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DUMKAL COLLEGE

P.O-Basantapur,P.S-Dumkal,Dist.-Murshidabad,WestBengal, PIN-742406
(Govt.Aided, Affiliated to the: University of Kalyani Included under section 2(f) & 12 (B) of UGC Act.)

2nd CYCLE NAAC ACCREDITATION PROCESS-2024

CRITERIA: 1 – Curricular Aspects

Key Indicator: 1.1: Curricular Planning and Implementation

Metric: 1.1.1: The Institution ensures effective curriculum planning and delivery through a well-planned and documented process including Academic calendar and conduct of continuous internal Assessment

Syllabus Distribution (2018-2019 to 2022-2023)

BHABESH PRAMANIK

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SYLLABUS DISTRIBUTION FOR THE SESSION 2018-2019

Department of Geography

Dumkal College

Name of the Teacher	Semester /Year	Paper	Content	No of classes allotted
DR SWATI MOLLAH	I	CC/T/02	Cartography	30
			Maps	
			Concept of Scales	
			Coordinate Systems	
	II Semester	CC/T/04	Cartograms and Thematic Maps	30
			Isopleth and Choropleth	
			Climograph, Hythergraph and Ergograph	
			Demographic Charts and Diagrams	
			Concepts of Bearing	
	PART II	PAPER IV-Group B	Scope and content of Hydrology	18
			Mode of occurrence of water	
			Hydrological Cycle	
			Factors of run-off and infiltration	
			Factors of groundwater movement and storage	
		PAPER V-Group B	Definition and stages of Remote Sensing	50
			EMR and Spectral ranges	
			Sensor Resolution	
			Concept of FCC	
			Remote Sensing Platforms and Sensors	
			Concept of Aerial Photography	
			Photo interpretation Keys	
			Fundamental concepts of GIS	
			Use of RS data in GIS	
			GIS data format	
			GIS data analysis	
			GPS	
			Applications of RS and GIS	
	Part III	PAPER X	Cartograms and Thematic mapping	60
			Weather map interpretation	
			Topographical map interpretation	
			Morphometric analysis of drainage basin	
			Structure of research report	
			Fieldwork in Geographical studies	
			Field techniques and tools-1	
			Field techniques and tools-2	
			Designing a field report	

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Name of the Teacher	Semester	Paper	Content	No of classes allotted
ARINDOM BISWAS	Semester I	CC/T/01	Earth's tectonic and structural evolution	45
			Earth's interior	
			Concept of Isostasy	
			Earth movements	
		CC/T/02	Topographical Maps	30
			Types of Rocks and Minerals and Characteristics	
			Concept of Bedding Plane, Unconformity and Non-conformity, Thickness of Bed, Dip, Throw, Hade, Heave	
		CCP/02	Construction of Scales	30
			Construction of Projections	
	Semester II	CCP/04	Diagrammatic Representation of Data	30
			Representation of Data on Map	
	PART II	PAPER IV Group A	Layering of atmosphere	60
			Insolation	
			Heat budget	
			Horizontal and Vertical distribution of temperature	
			Inversion of temperature	
			Pressure belts and air masses	
			General wind circulation	
			Jet stream	
			Monsoon mechanism	
			Process and forms of condensation	
			Forms and mechanisms of precipitation	
			Cyclones	
			World climatic classification	
		PAPER IV Group A	Nature and scope of Oceanography	25
			Distribution of land and water	
			Properties of sea water	
			Ocean currents	
			Coral reefs	
	PART III	PAPER XI	Projections	60
			Surveying	
			Megascopic identification of rocks and minerals	
			Field works and field reports	

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Name of the Teacher	Semester	Paper	Content	No of classes allotted
SUJAUDDIN	II Semester	CC/T/03	Introduction to Human Geography	45
			Evolution of Humans; Concept of Race and Ethnicity; Major Racial Groups of the World	
			Space, Society and Cultural Regions (Language and Religion)	
			Concept of culture	
	PART III	PAPER VII	Scope and content of Social and Cultural Geography	80
			Social geography of rural India	
			Concepts of culture, community, Caste and society	
			Settlement as social entities	
			Classification of settlement	
			Morphological theories	
			Scope and content of Political Geography	
			Heartland and Rimland theories	
			Boundaries and Frontiers	
			Nature of administrative areas	

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Department of Geography

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Name of the Teacher	Year	Paper	Content	No of classes allotted
MUSTAQUE RAHAMAN	PART III	PAPER IX	Concepts of region	70
			Methods of regional delineation	
			Indicators of regional imbalances	
			Study of regions	
			Concept of regional planning	
			Study of planning regions of India	
			Regional Geography of West Bengal	

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Name of the Teacher	Year	Paper	Content	No of classes allotted
AMANUL HOQUE	PART III	PAPER VIII	Scope and content of Economic Geography	80
			Sectors of Economy	
			Primary economic activities	
			Industries	

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Department of Geography

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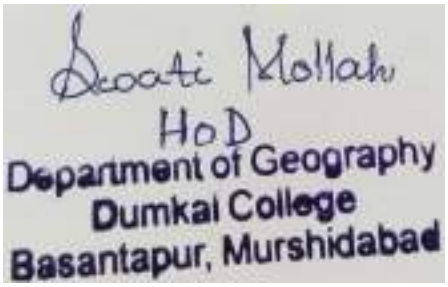
DR SWATI MOLLAH (HoD)	Semester I	CC/T/02	Cartography	30
			Maps	
			Concept of Scales	
			Coordinate Systems	
	II Semester	CC/T/04	Cartograms and Thematic Maps	30
			Isopleth and Choropleth	
			Climograph, Hythergraph and Ergograph	
			Demographic Charts and Diagrams	
			Concepts of Bearing	
	Part III	PAPER X	Cartograms and Thematic mapping	60
			Weather map interpretation	
			Topographical map interpretation	
			Morphometric analysis of drainage basin	
			Structure of research report	
			Fieldwork in Geographical studies	
			Field techniques and tools-1	
			Field techniques and tools-2	
			Designing a field report	
	Semester III	CC/P/06	Data Matrix	60
			Frequency Table	
			Measures of Central Tendency	
			Dispersion	
			Histograms and Frequency Curve	
			Scatter Diagram and Regression Line	
			Residual from Regression	
		SEC/P/01	Numbering Systems	60
			Data Computation, Storing and Formatting in Spreadsheets	
			Preparation of Annoted Diagrams and its Interpretation	
			Internet Surfing	
	Semester IV	CC/P/10	Questionnaire for perception survey	60
			Environmental mapping	
			Quality assessment of soil using field kit	
			Interpretation of air quality	
			Project file	
		SEC/P/02	Spatial and Non-spatial data	60
			Nearest Neighbour Analysis	
			Probability and Normal Distribution	
			Skewness	

			Sampling	
			Correlation and Regression Analysis	
			Time Series Analysis	



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			Earth's interior	
			Concept of Isostasy	
			Earth movements	
		CC/T/02	Topographical Maps	30
			Types of Rocks and Minerals and Characteristics	
			Concept of Bedding Plane, Unconformity and Non-conformity, Thickness of Bed, Dip, Throw, Hade, Heave	
		CCP/02	Construction of Scales	30
			Construction of Projections	
	Semester II	CCP/04	Diagrammatic Representation of Data	30
			Representation of Data on Map	
	PART II	PAPER IV Group A	Layering of atmosphere	60
			Insolation	
			Heat budget	
			Horizontal and Vertical distribution of temperature	
			Inversion of temperature	
			Pressure belts and air masses	
			General wind circulation	
			Jet stream	
			Monsoon mechanism	
			Process and forms of condensation	
			Forms and mechanisms of precipitation	
			Cyclones	
			World climatic classification	
		PAPER IV Group A	Nature and scope of Oceanography	
			Distribution of land and water	

			Properties of sea water	25
			Ocean currents	
			Coral reefs	
	PART III	PAPER XI	Projections	60
			Surveying	
			Megascopic identification of rocks and minerals	
			Field works and field reports	
	Semester III	CC/T/05	Nature, Composition and Layering of the Atmosphere	45
			Insolation	
			Temperature	
			Inversion of Temperature	
			Greenhouse Effect and Importance of Ozone Layer	
	Semester IV	CC/T/08	Concept of region, Types and delineation	90
			Types of planning, principles and techniques of regional planning	
			Needs of regional planning, multi level planning in India	
			Concept of metropolitan and urban agglomerations	
			Regionalisation of India for planning	
			Development	
			Theories and models for regional development I	
			Theories and models for regional development II	
			Changing concept of development	
			Concept of underdevelopment	
			Concept and indicators of regional imbalances in India	
			Significance of balanced development in India	
			Human development	
		CC/T/10	Environmental Geography	60
			Perception of environment in different stages of civilization	
			Concept of holistic environment	
			Concept of EIA	
			Ecosystem	
			Environmental pollution and degradation	
			Environmental issues related to agriculture	
			Urban environmental issues	
			Environmental programmes and policies	

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Name of the Teacher	Semester	Paper	Content	No of classes allotted
SUJAUDDIN	II Semester	CC/T/03	Introduction to Human Geography	45
			Evolution of Humans; Concept of Race and Ethnicity; Major Racial Groups of the World	
			Space, Society and Cultural Regions (Language and Religion)	
			Concept of culture	
	PART III	PAPER VII	Scope and content of Social and Cultural Geography	80
			Social geography of rural India	
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			Classification of settlement	
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			Heartland and Rimland theories	
			Boundaries and Frontiers	
			Nature of administrative areas	

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	III	CC/P/06	Data Matrix	60
			Frequency Table	
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			Dispersion	
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			Data Computation, Storing and Formatting in Spreadsheets	
			Preparation of Annoted Diagrams and its Interpretation	
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	IV	CC/P/10	Questionnaire for perception survey	60
			Environmental mapping	
			Quality assessment of soil using field kit	
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			Project file	
		SEC/P/02	Spatial and Non-spatial data	
			Nearest Neighbor Analysis	

			Probability and Normal Distribution	60
			Skewness	
			Sampling	
			Correlation and Regression Analysis	
			Time Series Analysis	
	V	CC/T/11	Research in Geography	90
			Literature review and research design	
			Research problem, objectives and hypothesis; Research materials and methods	
			Structure of research report	
			Fieldwork in Geographical studies	
			Field techniques and tools-1	
			Field techniques and tools-2	
			Designing a field report	
	VI	CC/P/14	Project Report	60
		CC/T/14	Concepts of Hazard and Disaster	30

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			Concept of Isostasy	
			Earth movements	
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			Concept of Bedding Plane, Unconformity and Non-conformity, Thickness of Bed, Dip, Throw, Hade, Heave	
		CC/P/02	Construction of Scales	20
			Construction of Projections	
	II	CC/P/04	Diagrammatic Representation of Data	30
			Representation of Data on Map	
	III	CC/T/05	Nature, Composition and Layering of the Atmosphere	45
			Insolation	
			Temperature	
			Inversion of Temperature	
			Greenhouse Effect and Importance of Ozone Layer	
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			Concept of EIA	
			Ecosystem	
			Environmental pollution and degradation	
			Environmental issues related to agriculture	
			Urban environmental issues	
			Environmental programmes and policies	
	V	CC/T/11	Research in Geography	60
			Literature review and research design	
			Research problem, objectives and hypothesis; Research materials and methods	
			Structure of research report	
			Fieldwork in Geographical studies	
			Field techniques and tools-1	
			Field techniques and tools-2	
			Designing a field report	
		DSE/T/01A	Urban Geography	45
			Theories of Urban Morphology	
			Concept of Hierarchy	
			Rank Size Rule	
			Patterns of urbanization in developed and developing countries	
	VI	CC/T/13	Development of Geography and contributions of Greek, Chinese and Indian geographers	45
			Impact of 'Dark Age' on Geography and Arab contributions	
			Geography during the Age of 'Discovery' and 'Exploration'	
			Geography during the Age of 'Discovery' and 'Exploration'	
			Transition from Cosmography to Scientific Geography	
			Dualism and Dichotomies	
			Concepts of Hazard and Disaster	
		CC/P/14	Project Report	20
		CC/T/14	Earthquake	30
			Landslide	
			Cyclone	
			Fire	

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DR PRASENJIT MONDAL	I	CC/T/01	Geomorphology	45
			Degradation processes	
			Models of landscape evolution	
			Development of river network and landforms on uniclinal and folded structures	
			Evolution of Landforms	
		CC/P/02	Construction and Interpretation of Relief Profiles, Average Slope, Relative relief and Stream ordering	40
			Transect chart	
			Geological Map	
	II	CC/T/04	Basic Concepts of Surveying and Survey Equipments	30
			Basic Concepts of Surveying and Survey Equipments	
			Interpretation of Land use and landcover maps	
		CC/P/04	Survey	30
			Determination of Height of Objects using Transit Theodolite	
	III	CC/T/05	Condensation	45
			Mechanism of Precipitation	
			Air mass	
			Fronts	
			Weather	
			Circulation in the Atmosphere	
			Monsoon Circulation and Mechanism with reference to India	
			Tropical and Mid-latitude Cyclones	
			Climatic Classification	
	IV	CC/T/09	Concept and classification of economic activities	45
			Location theories	
			Primary activities	
			Secondary activities	
			Concept of manufacturing region	
			Tertiary activities	
			Agricultural systems	
			Transnational sea-routes; railways and highways with reference to India	
			Designing a field report	
	V	CC/P/11	Field Work	20
		CC/T/12	Definition and stages of Remote Sensing	60

			Platforms and Sensors	
			Sensor resolutions and their applications with reference to IRS and LANDSAT	
			Aerial Photographs	
			Principles of Image interpretation	
			GIS data structures	
			Principles of preparing attributes tables, data manipulation and overlay analysis	
			Principles of GNSS positioning and waypoint collection	
		CC/P/12	Georeferencing of map	60
			Digitization of features	
			Data attachment overlay and preparation of thematic map	
			Preparation of FCC	
			Preparation of LULC map by Supervised Image Classification	
		DSE/T/01	Development of Population Geography	90
			World patterns determinants of population distribution and growth	
			Demographic Transition Model	
			Theories of population growth	
			Population distribution, density and growth profile in India	
			Population Composition and Characteristics	
			Determinate measures of Fertility and Mortality	
			Population Composition of India	
			Migration	
			Concept of Human Development Index	
			Population and development	
			Population policies in Selected Countries	
			Contemporary Issues in Population	
	VI	DSE/T/04A	Factors of soil formation	90
			Concept of soil profile	
			Definition and significance of Physical soil properties	
			Definition and significance of Chemical soil properties	
			Soil erosion and degradation	
			Principles of soil classification	
			Concepts of ecology, biosphere, ecosystem, biome, ecotone, community	
			Concept of trophic structure, food chain and food web; Energy flow in ecosystems	
			Geographical extent and characteristic of Biomes	
			Bio-geochemical cycles	
			Deforestation	
			Bio-diversity	

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SUJAUDDIN	II	CC/T/03	Introduction to Human Geography	45
			Evolution of Humans; Concept of Race and Ethnicity; Major Racial Groups of the World	
			Space, Society and Cultural Regions (Language and Religion)	
			Concept of culture	
	III	CC/T/07	Physical Perspectives of West Bengal	30
			Population of West Bengal	
			Resources of West Bengal	
			Regional Development of West Bengal	
	IV	CC/T/09	Meaning and approaches to Economic Geography	45
			Concept in Economic geography	
			Factors influencing location of economic activity and forces of agglomeration	
			Determining factors of transport costs	
	VI	DSE/T/03	Natural Resources	45
			Approaches to resource utilization	
			Conservation of Natural Resources	
			Problems of resource depletion	

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MUSTAQUE RAHAMAN	VI	DSE/T/03	Distribution, Utilisation, Problems and Management of Metallic Resources	45
			Distribution, Utilisation, Problems and Management of Non-Metallic Mineral Resources	
			Problems and Management of Energy Resources	
			Contemporary Energy Crisis and Future Scenario	
			Limits to Growth and Sustainable use of Resources	

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AMANUL HOQUE	II	CC/T/03	Evolution of Human Society	45
			Population Growth and Distribution, Population Composition	
			Demographic Transition Model	
			Population–Resource Regions	
			Population and Environment Relations with special reference to Development–Environment Conflict	
			Social Morphology and Rural House Types in India	
			Types and Patterns of Rural Settlements	
			Functional Classification of Urban Settlements	
			Trends and Pattern of World Urbanization	
	III	CC/T/07	Physical Features of India	60
			Regionalisation of India	
			Climate, Soil and Vegetation	
			Population	
			Distribution of Population by Race, Caste, Religion, Language, Tribes	
			Agricultural Regions	
			Green Revolution and its Consequences	
			Mineral and Power Resources	
			Industrial Development	
	V	DSE/T/01A	Ecological process of urban growth	45
			City Region	
			Patterns and trends of urbanization in India	
			Case studies of Delhi, Kolkata with reference to Land use and Urban issues	
			Urban renewal programme - JNNURM	
	VI	CC/T/13	Evolution of Geographical thoughts	45
			Contributions of Humbolt and Ritter	
			Contributions of Ratzel, Richthofen and Hettner	
			Schools of Geographical thought	
			Trends of Geography in the post World War-II period	
			Evolution of Geographical thought in India	
			Quantitative Revolution and its impact	
			Towards Post Modernism	

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			Measures of Central Tendency	
			Dispersion	
			Histograms and Frequency Curve	
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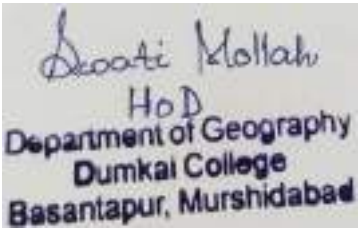
			Probability and Normal Distribution	
			Skewness	
			Sampling	
			Correlation and Regression Analysis	
			Time Series Analysis	
	V	CC/T/11	Research in Geography	
			Literature review and research design	

			Research problem, objectives and hypothesis; Research materials and methods	90
			Structure of research report	
			Fieldwork in Geographical studies	
			Field techniques and tools-1	
			Field techniques and tools-2	
			Designing a field report	
	VI	CC/P/14	Project Report	60
		CC/T/14	Concepts of Hazard and Disaster	30



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			Concept of Bedding Plane, Unconformity and Non-conformity, Thickness of Bed, Dip, Throw, Hade, Heave	
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			Construction of Projections	
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	IV	CC/T/08	Concept of region, Types and delineation	90
			Types of planning, principles and techniques of regional planning	
			Needs of regional planning, multi level planning in India	
			Concept of metropolitan and urban agglomerations	
			Regionalisation of India for planning	
			Development	
			Theories and models for regional development I	
			Theories and models for regional development II	
			Changing concept of development	
			Concept of underdevelopment	
			Concept and indicators of regional imbalances in India	
			Significance of balanced development in India	
			Human development	
		CC/T/10	Environmental Geography	60
			Perception of environment in different stages	

			of civilization	
			Concept of holistic environment	
			Concept of EIA	
			Ecosystem	
			Environmental pollution and degradation	
			Environmental issues related to agriculture	
			Urban environmental issues	
			Environmental programmes and policies	
	V	CC/T/11	Research in Geography	
			Literature review and research design	
			Research problem, objectives and hypothesis; Research materials and methods	60
			Structure of research report	
			Fieldwork in Geographical studies	
			Field techniques and tools-1	
			Field techniques and tools-2	
			Designing a field report	
		DSE/T/01A	Urban Geography	45
			Theories of Urban Morphology	
			Concept of Hierarchy	
			Rank Size Rule	
			Patterns of urbanisation in developed and developing countries	
	VI	CC/T/13	Development of Geography and contributions of Greek, Chinese and Indian geographers	45
			Impact of 'Dark Age' on Geography and Arab contributions	
			Geography during the Age of 'Discovery' and 'Exploration'	
			Geography during the Age of 'Discovery' and 'Exploration'	
			Transition from Cosmography to Scientific Geography	
			Dualism and Dichotomies	
			Concepts of Hazard and Disaster	
		CC/P/14	Project Report	20
		CC/T/14	Earthquake	30
			Landslide	
			Cyclone	
			Fire	

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Department of Geography

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Name of the Teacher	Semester	Paper	Content	No of classes allotted
DR PRASENJIT MONDAL	I	CC/T/01	Geomorphology	45
			Degradation processes	
			Models of landscape evolution	
			Development of river network and landforms on uniclinal and folded structures	
			Evolution of Landforms	
		CC/P/02	Construction and Interpretation of Relief Profiles, Average Slope, Relative relief and Stream ordering	40
			Transect chart	
			Geological Map	
	II	CC/T/04	Basic Concepts of Surveying and Survey Equipments	30
			Basic Concepts of Surveying and Survey Equipments	
			Interpretation of Landuse and landcover maps	
		CC/P/04	Survey	30
			Determination of Height of Objects using Transit Theodolite	
	III	CC/T/05	Condensation	45
			Mechanism of Precipitation	
			Air mass	
			Fronts	
			Weather	
			Circulation in the Atmosphere	
			Monsoon Circulation and Mechanism with reference to India	
			Tropical and Mid-latitude Cyclones	
			Climatic Classification	
	IV	CC/T/09	Concept and classification of economic activities	45
			Location theories	
			Primary activities	
			Secondary activities	
			Concept of manufacturing region	
			Tertiary activities	
			Agricultural systems	
			Transnational sea-routes; railways and highways with reference to India	
			Designing a field report	
	V	CC/P/11	Field Work	20
		CC/T/12	Definition and stages of Remote Sensing	60
			Platforms and Sensors	
			Sensor resolutions and their applications with	

			reference to IRS and LANDSAT	
			Aerial Photographs	
			Principles of Image interpretation	
			GIS data structures	
			Principles of preparing attributes tables, data manipulation and overlay analysis	
			Principles of GNSS positioning and waypoint collection	
		CC/P/12	Georeferencing of map	60
			Digitisation of features	
			Data attachment overlay and preparation of thematic map	
			Preparation of FCC	
			Preparation of LULC map by Supervised Image Classification	
		DSE/T/01	Development of Population Geography	90
			World patterns determinants of population distribution and growth	
			Demographic Transition Model	
			Theories of population growth	
			Population distribution, density and growth profile in India	
			Population Composition and Characteristics	
			Determinate measures of Fertility and Mortality	
			Population Composition of India	
			Migration	
			Concept of Human Development Index	
			Population and development	
			Population policies in Selected Countries	
			Contemporary Issues in Population	
	VI	DSE/T/04A	Factors of soil formation	90
			Concept of soil profile	
			Definition and significance of Physical soil properties	
			Definition and significance of Chemical soil properties	
			Soil erosion and degradation	
			Principles of soil classification	
			Concepts of ecology, biosphere, ecosystem, biome, ecotone, community	
			Concept of trophic structure, food chain and food web; Energy flow in ecosystems	
			Geographical extent and characteristic of Bioms	
			Bio-geochemical cycles	
			Deforestation	
			Bio-diversity	

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Department of Geography

Dumkal College

Name of the Teacher	Semester	Paper	Content	No of classes allotted
SUJAUDDIN	II	CC/T/03	Introduction to Human Geography	45
			Evolution of Humans; Concept of Race and Ethnicity; Major Racial Groups of the World	
			Space, Society and Cultural Regions (Language and Religion)	
			Concept of culture	
	III	CC/T/07	Physical Perspectives of West Bengal	30
			Population of West Bengal	
			Resources of West Bengal	
			Regional Development of West Bengal	
	IV	CC/T/09	Meaning and approaches to Economic Geography	45
			Concept in Economic geography	
			Factors influencing location of economic activity and forces of agglomeration	
			Determining factors of transport costs	
	VI	DSE/T/03	Natural Resources	45
			Approaches to resource utilisation	
			Conservation of Natural Resources	
			Problems of resource depletion	

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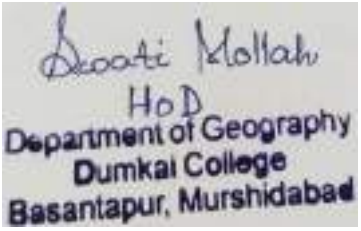
Department of Geography

Dumkal College

Name of the Teacher	Semester	Paper	Content	No of classes allotted
MUSTAQUE RAHAMAN	VI	DSE/T/03	Distribution, Utilisation, Problems and Management of Metallic Resources	45
			Distribution, Utilisation, Problems and Management of Non-Metallic Mineral Resources	
			Problems and Management of Energy Resources	
			Contemporary Energy Crisis and Future Scenario	
			Limits to Growth and Sustainable use of Resources	



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Department of Geography

Dumkal College

Name of the Teacher	Semester	Paper	Content	No of classes allotted
AMANUL HOQUE	II	CC/T/03	Evolution of Human Society	45
			Population Growth and Distribution, Population Composition	
			Demographic Transition Model	
			Population–Resource Regions	
			Population and Environment Relations with special reference to Development–Environment Conflict	
			Social Morphology and Rural House Types in India	
			Types and Patterns of Rural Settlements	
			Functional Classification of Urban Settlements	
			Trends and Pattern of World Urbanization	
	III	CC/T/07	Physical Features of India	60
			Regionalisation of India	
			Climate, Soil and Vegetation	
			Population	
			Distribution of Population by Race, Caste, Religion, Language, Tribes	
			Agricultural Regions	
			Green Revolution and its Consequences	
			Mineral and Power Resources	
			Industrial Development	
	V	DSE/T/01 A	Ecological process of urban growth	45
			City Region	
			Patterns and trends of urbanization in India	
			Case studies of Delhi, Kolkata with reference to Land use and Urban issues	
			Urban renewal programme - JNNURM	
	VI	CC/T/13	Evolution of Geographical thoughts	45
			Contributions of Humbolt and Ritter	
			Contributions of Ratzel, Richthofen and Hettner	
			Schools of Geographical thought	
			Trends of Geography in the post World War-II period	
			Evolution of Geographical thought in India	
			Quantitative Revolution and its impact	
			Towards Post Modernism	

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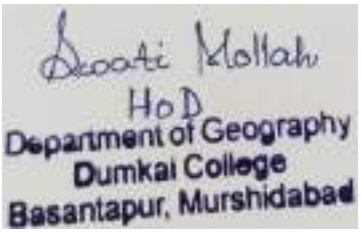
Name of the Teacher	Semester	Paper	Content	No of classes allotted
DR SWATI MOLLAH	I	CC/T/02	Cartography	30
			Maps	
			Concept of Scales	
			Coordinate Systems	
	II	CC/T/04	Cartograms and Thematic Maps	30
			Isopleth and Choropleth	
			Climograph, Hythergraph and Ergograph	
			Demographic Charts and Diagrams	
			Concepts of Bearing	
	III	CC/P/06	Data Matrix	60
			Frequency Table	
			Measures of Central Tendency	
			Dispersion	
			Histograms and Frequency Curve	
			Scatter Diagram and Regression Line	
			Residual from Regression	
		SEC/P/01	Numbering Systems	60
			Data Computation, Storing and Formatting in Spreadsheets	
			Preparation of Annoted Diagrams and its Interpretation	
			Internet Surfing	
	IV	CC/P/10	Questionnaire for perception survey	60
			Environmental mapping	
			Quality assessment of soil using field kit	
			Interpretation of air quality	
			Project file	
		SEC/P/02	Spatial and Non-spatial data	60
			Nearest Neighbour Analysis	
			Probability and Normal Distribution	
			Skewness	
			Sampling	
			Correlation and Regression Analysis	
			Time Series Analysis	
	V	CC/T/11	Research in Geography	
			Literature review and research design	

			Research problem, objectives and hypothesis; Research materials and methods	90
			Structure of research report	
			Fieldwork in Geographical studies	
			Field techniques and tools-1	
			Field techniques and tools-2	
			Designing a field report	
	VI	CC/P/14	Project Report	60
		CC/T/14	Concepts of Hazard and Disaster	30



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Name of the Teacher	Semester	Paper	Content	No of classes allotted
ARINDOM BISWAS	I	CC/T/01	Earth's tectonic and structural evolution	45
			Earth's interior	
			Concept of Isostasy	
			Earth movements	
		CC/T/02	Topographical Maps	30
			Types of Rocks and Minerals and Characteristics	
			Concept of Bedding Plane, Unconformity and Non-conformity, Thickness of Bed, Dip, Throw, Hade, Heave	
		CC/P/02	Construction of Scales	20
			Construction of Projections	
	II	CC/P/04	Diagrammatic Representation of Data	30
			Representation of Data on Map	
	III	CC/T/05	Nature, Composition and Layering of the Atmosphere	45
			Insolation	
			Temperature	
			Inversion of Temperature	
			Greenhouse Effect and Importance of Ozone Layer	
	IV	CC/T/08	Concept of region, Types and delineation	90
			Types of planning, principles and techniques of regional planning	
			Needs of regional planning, multi level planning in India	
			Concept of metropolitan and urban agglomerations	
			Regionalisation of India for planning	
			Development	
			Theories and models for regional development I	
			Theories and models for regional development II	
			Changing concept of development	
			Concept of underdevelopment	
			Concept and indicators of regional imbalances in India	
			Significance of balanced development in India	
			Human development	
		CC/T/10	Environmental Geography	60
			Perception of environment in different stages	

			of civilization	
			Concept of holistic environment	
			Concept of EIA	
			Ecosystem	
			Environmental pollution and degradation	
			Environmental issues related to agriculture	
			Urban environmental issues	
			Environmental programmes and policies	
	V	CC/T/11	Research in Geography	
			Literature review and research design	
			Research problem, objectives and hypothesis; Research materials and methods	60
			Structure of research report	
			Fieldwork in Geographical studies	
			Field techniques and tools-1	
			Field techniques and tools-2	
			Designing a field report	
		DSE/T/01A	Urban Geography	45
			Theories of Urban Morphology	
			Concept of Hierarchy	
			Rank Size Rule	
			Patterns of urbanisation in developed and developing countries	
	VI	CC/T/13	Development of Geography and contributions of Greek, Chinese and Indian geographers	45
			Impact of 'Dark Age' on Geography and Arab contributions	
			Geography during the Age of 'Discovery' and 'Exploration'	
			Geography during the Age of 'Discovery' and 'Exploration'	
			Transition from Cosmography to Scientific Geography	
			Dualism and Dichotomies	
			Concepts of Hazard and Disaster	
		CC/P/14	Project Report	20
		CC/T/14	Earthquake	30
			Landslide	
			Cyclone	
			Fire	

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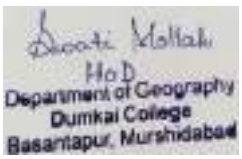
Name of the Teacher	Semester	Paper	Content	No of classes allotted
DR PRASENJIT MONDAL	I	CC/T/01	Geomorphology	45
			Degradation processes	
			Models of landscape evolution	
			Development of river network and landforms on uniclinal and folded structures	
			Evolution of Landforms	
		CC/P/02	Construction and Interpretation of Relief Profiles, Average Slope, Relative relief and Stream ordering	40
			Transect chart	
			Geological Map	
	II	CC/T/04	Basic Concepts of Surveying and Survey Equipments	30
			Basic Concepts of Surveying and Survey Equipments	
			Interpretation of Landuse and landcover maps	
		CC/P/04	Survey	30
			Determination of Height of Objects using Transit Theodolite	
	III	CC/T/05	Condensation	45
			Mechanism of Precipitation	
			Air mass	
			Fronts	
			Weather	
			Circulation in the Atmosphere	
			Monsoon Circulation and Mechanism with reference to India	
			Tropical and Mid-latitude Cyclones	
			Climatic Classification	
	IV	CC/T/09	Concept and classification of economic activities	45
			Location theories	
			Primary activities	
			Secondary activities	
			Concept of manufacturing region	
			Tertiary activities	
			Agricultural systems	
			Transnational sea-routes; railways and highways with reference to India	
			Designing a field report	
	V	CC/P/11	Field Work	20
		CC/T/12	Definition and stages of Remote Sensing	60
			Platforms and Sensors	
			Sensor resolutions and their applications with reference to IRS and LANDSAT	
			Aerial Photographs	
			Principles of Image interpretation	

			GIS data structures	
			Principles of preparing attributes tables, data manipulation and overlay analysis	
			Principles of GNSS positioning and waypoint collection	
		CC/P/12	Georeferencing of map	60
			Digitisation of features	
			Data attachment overlay and preparation of thematic map	
			Preparation of FCC	
			Preparation of LULC map by Supervised Image Classification	
		DSE/T/01	Development of Population Geography	90
			World patterns determinants of population distribution and growth	
			Demographic Transition Model	
			Theories of population growth	
			Population distribution, density and growth profile in India	
			Population Composition and Characteristics	
			Determinate measures of Fertility and Mortality	
			Population Composition of India	
			Migration	
			Concept of Human Development Index	
			Population and development	
			Population policies in Selected Countries	
			Contemporary Issues in Population	
	VI	DSE/T/04A	Factors of soil formation	90
			Concept of soil profile	
			Definition and significance of Physical soil properties	
			Definition and significance of Chemical soil properties	
			Soil erosion and degradation	
			Principles of soil classification	
			Concepts of ecology, biosphere, ecosystem, biome, ecotone, community	
			Concept of trophic structure, food chain and food web; Energy flow in ecosystems	
			Geographical extent and characteristic of Bioms	
			Bio-geochemical cycles	
			Deforestation	
			Bio-diversity	



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Name of the Teacher	Semester	Paper	Content	No of classes allotted
SUJAUDDIN	II	CC/T/03	Introduction to Human Geography	45
			Evolution of Humans; Concept of Race and Ethnicity; Major Racial Groups of the World	
			Space, Society and Cultural Regions (Language and Religion)	
			Concept of culture	
	III	CC/T/07	Physical Perspectives of West Bengal	30
			Population of West Bengal	
			Resources of West Bengal	
			Regional Development of West Bengal	
	IV	CC/T/09	Meaning and approaches to Economic Geography	45
			Concept in Economic geography	
			Factors influencing location of economic activity and forces of agglomeration	
			Determining factors of transport costs	
	VI	DSE/T/03	Natural Resources	45
			Approaches to resource utilisation	
			Conservation of Natural Resources	
			Problems of resource depletion	

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Name of the Teacher	Semester	Paper	Content	No of classes allotted
MUSTAQUE RAHAMAN	VI	DSE/T/03	Distribution, Utilisation, Problems and Management of Metallic Resources	45
			Distribution, Utilisation, Problems and Management of Non-Metallic Mineral Resources	
			Problems and Management of Energy Resources	
			Contemporary Energy Crisis and Future Scenario	
			Limits to Growth and Sustainable use of Resources	

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Name of the Teacher	Semester	Paper	Content	No of classes allotted
AMANUL HOQUE	II	CC/T/03	Evolution of Human Society	45
			Population Growth and Distribution, Population Composition	
			Demographic Transition Model	
			Population–Resource Regions	
			Population and Environment Relations with special reference to Development–Environment Conflict	
			Social Morphology and Rural House Types in India	
			Types and Patterns of Rural Settlements	
			Functional Classification of Urban Settlements	
			Trends and Pattern of World Urbanization	
	III	CC/T/07	Physical Features of India	60
			Regionalisation of India	
			Climate, Soil and Vegetation	
			Population	
			Distribution of Population by Race, Caste, Religion, Language, Tribes	
			Agricultural Regions	
			Green Revolution and its Consequences	
			Mineral and Power Resources	
			Industrial Development	
	V	DSE/T/01 A	Ecological process of urban growth	45
			City Region	
			Patterns and trends of urbanization in India	
			Case studies of Delhi, Kolkata with reference to Land use and Urban issues	
			Urban renewal programme - JNNURM	
	VI	CC/T/13	Evolution of Geographical thoughts	45
			Contributions of Humbolt and Ritter	
			Contributions of Ratzel, Richthofen and Hettner	
			Schools of Geographical thought	
			Trends of Geography in the post World War-II period	
			Evolution of Geographical thought in India	
			Quantitative Revolution and its impact	
			Towards Post Modernism	

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Department of Mathematics

Syllabus Distribution Chart (2018-2019)

Name of Teachers	HONOURS				GENERAL			
	1st Semester	2nd Semester	2nd YEAR	3rd YEAR	1st Semester	2nd Semester	2nd YEAR	3rd YEAR
Dr. H. Ali	CC-1: Unit-1 CC-2: Unit-2	CC-4: Uint-3 & 4	i.Analysis-II(10) ii.Classical Algebra(15)	i.Tensor Alg (10) ii.statistics iii.Rigid Dynamics(20)	GE-T-01: All	-	i.Classical Algebra ii. Vector Algebra	i.Dynamics of a Particle(40)
Mr. B. Sarkar	CC-1: Unit-2 CC-2: Unit-3	CC-3: Unit 1	i.L.P.P and Game theory (40) ii.Abstract Algebra(20)	i.Computer Theory & Practical(50+20) ii.Diff. Eqs.(15) iii.Matrix Space(20)	-	-	i.Abstract Algebra ii.Linear Algebra ii.L.P.P & Game(50)	i.Computer(15)
M. Ahmed	CC-1: Unit-4 CC-2: Unit 1	CC-4: Uint-1 & 2	i. Dynamics(50) ii.Linear Algebra(15)	i.Numerical Analysis ii.Hydrostatics iii.statics	-	-	I.Geometry 2D ii.Statistics	i.Numerical Analysis(25)
Ms. L. Pal	CC-1: Unit-3 CC-2: Unit-4	CC-3: Unit 2 & Unit 3	i. Real Analysis I (50)	i.Real Analysis-III ii.Complex analysis iii.Probability iv.Vector analysis	-	-	i.Geometry 3D II.Probability	i.Statics(20)
TOTAL	150	150	200	400	75		200	100

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Department of Mathematics

Syllabus Distribution Chart (2019-2020)

Name of Teachers	HONOURS				GENERAL		
	1st Semester	3rd Semester	5th Semester	3rd YEAR	1st Semester	3rd Semester	3rd YEAR
Mr. T. Molla	CC-1: Unit-4 CC-2: Unit-1	CC-5: All CC-7: Practical	DSE-T-02: All	-	-	GE-H-T-03	-
Dr. H. Ali	CC-1: Unit-1 CC-2: Unit-2	SEC-1: All	CC-12: All	i.Tensor Alg (10) ii.statistics iii.Rigid iv.Dynamics(20)	GE-H-T-01	-	i.Dynamics of a Particle(40)
Mr. S. SK	CC-1: Unit-2 CC-2: Unit-3	CC-7: Theory (All)	DSE-T-01: All	i.Numerical Analysis ii.Hydrostatics iii.statics	-	-	i.Numerical Analysis(25)
Ms. L Pal	CC-1: Unit-3 CC-2: Unit-4	CC-06: Unit-1, 2	CC-11: All	i.Real Analysis-III ii.Complex analysis iii.Probability iv.Vector analysis	-	-	i.Statics(20)
Mr. B. Sarkar		CC-6: Unit- 3, 4 & 5		i.Computer Theory & Practical(50+20) ii.Diff. Eqs.(15) iii.Matrix Space(20)	-	-	i.Computer(15)
TOTAL	150	300	300	400	75	75	100

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Department of Mathematics

Syllabus Distribution (2020-2021)

Name of Teachers	HONOURS						GE/PROGRAM					
	1st Sem.	2nd Sem.	3rd Sem.	4th Sem.	5th Sem.	6th Sem.	1st Sem.	2nd Sem.	3rd Sem.	4th Sem.	5th Sem.	6th Sem.
Mr. T. Molla	CC-1: Unit-4 CC-2: Unit-1	CC-3: All	CC-5: All CC-7: Practical	CC-8: All & SEC-T-2A: All	DSE-2A: All	CC-13: All & DSE-3B: All	GE-T-01: All & G-CC-1: All	GE-T-02: All	GE-T-01: All	GE-T-02: All & G-CC-4: All	G-DSE-1A: All	
Dr. H. Ali	CC-1: Unit-1 CC-2: Unit-2	CC-4: Uint-3 & 4	SEC-1: All	CC-10: All	CC-12: All	CC-14: All	-	G-CC-2: All	G-CC-3: All	-	-	G-DSE-2: All
Mr. S. SK	CC-1: Unit-2 CC-2: Unit-3	-	CC-7: Theory (All)	-	DSE-1A: All	-	-	-	-		-	-
Ms. L. Pal	CC-1: Unit-3 CC-2: Unit-4	CC-4: Uint-1 & 2	CC-06: All	CC-9: All	CC-11: All	DSE-4A: All						
TOTAL	150	150	300	300	300	300	75	75	75	75	75	75

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DUMKAL COLLEGE

P.O- Basantapur, P.S- Dumkal, Dist.- Murshidabad, West Bengal, Pin- 742406
(Govt. Aided, Affiliated to the: University of Kalyani Included under section 2(f) & 12 (B) of UGC Act.)

Department of Mathematics

Syllabus Distribution Chart (2021-2022)

Name of Teachers	HONOURS						GE/PROGRAM					
	1st Sem.	2nd Sem.	3rd Sem.	4th Sem.	5th Sem.	6th Sem.	1st Sem.	2nd Sem.	3rd Sem.	4th Sem.	5th Sem.	6th Sem.
Mr. T. Molla	CC-1: Unit-1 CC-2: Unit-1	CC-3: All	CC-5: All CC-7: Practical	CC-8: All & SEC-T-2A: All	DSE-2A: All	CC-13: All & DSE-3B: All	GE-T-01: All & G-CC-1: All	GE-T-02: All	GE-T-01: All	GE-T-02: All & G-CC-4: All	G-DSE-1A: All	
Dr. H. Ali	CC-1: Unit-2 CC-2: Unit-2	CC-4: Uint-3 & 4	SEC-1: All CC-6: All	CC-10: All	CC-12: All	CC-14: All	-	G-CC-2: All	G-CC-3: All	-	-	G-DSE-2: All
Mr. S. SK	CC-2: Unit-3	-	CC-7: Theory (All)	-	DSE-1A: All	-	-	-	-		-	-
Ms. L. Pal	CC-1: Unit-3	CC-4: Uint-1 & 2		CC-9: All	CC-11: All	DSE-4A: All	-	-	-	-	-	-
TOTAL	150	150	300	300	300	300	75	75	75	75	75	75

Principal
Dumkal College
Basantapur, Murshidabad

Head, Department of Mathematics, Dumkal College
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	1st Sem.	2nd Sem.	3rd Sem.	4th Sem.	5th Sem.	6th Sem.	1' Sem.	2nd Sem.	3rd Sem.	4th Sem.	5th Sem.	6th Sem.
Dr. T. Molla	CC-1: Unit-1 CC-2: Unit-1	CC-3: Unit-3,4 CC-4: Unit-1	CC-5: Unit-1 CC-6: Unit-1 CC-7: Unit-4, Practical SEC-T-1: Unit-1	CC-8: Unit-3,4 CC-9: Unit-1 CC-10: Unit-1	CC-12: Unit-2 DSE-1A: Unit 1	CC-13: Unit-3,4 DSE-3B: Unit-2	GE-T-01: Unit-1	GE-T-02: All	GE-T-01: Unit-1	GE-T-02: All	G-DSE-1A: All	
Dr. H. Ali	CC-1: Unit-1 CC-2: Unit-2	CC-4: Uint-4	CC-5: Uint-4	CC-10: Uint-4	DSE-1A: Uint-2 CC-12: Uint-1	CC-14: Uint-1 DSE-3B: Unit-1	GE-T-01: Unit-2 & G-CC-1: All	G-CC-2: All	GE-T-01: Unit-2 & G-CC-3: All	G-CC-4: All	-	G-DSE-2: All
Invitee-1	CC-2: Unit-2	CC-3: Unit-1,2-	CC-5: Unit-2 SEC-1: Unit-2	CC-8: Unit-1,2 CC-9: Unit-2	CC-11: Uint-2 DSE-2A: Uint-2	CC-14: Uint-3	-	-	-		-	-
Invitee-2	CC-1: Unit-3	CC-4: Unit-5	CC-5: Unit-3 CC-7: Unit-3	SEC-2B: All	CC-11: Uint-1 DSE-2A: Uint-1	CC-13: Uint-1,2 DSE-3B: Unit-3	-	-	-		-	-
Invitee-3	CC-1: Unit-3	CC-4: Unit-3	CC-06: Unit-3 CC-7: Unit-2,5	CC-9: Unit-3,4 CC-10: Unit-2,3	CC-11: Uint-3,4 DSE-2A: Uint-3,4	DSE-4A: Uint-2, 3, 4	-	-	-	-	-	-
Invitee-4	CC-2: Unit-1	CC-4: Unit-2	CC-06: Unit-2 CC-7: Unit-1	CC-9: Unit-3,4 CC-10: Unit-2,3	CC-12: Uint-3 DSE-1A: Uint-3	DSE-4A: Uint-1	-	-	-	-	-	-
TOTAL	150	150	300	300	300	300	75	75	75	75	75	75

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Name of Teacher	Semester	Paper	Content	No. of Lecture
Dr. Nabin Chandra Maity	I	CEMHCC-TH-1	Periodic properties Bohr's model and atomic spectrum of hydrogen, Limitations of Bohr's model and Sommerfeld's modifications, de Broglie's concept, Heisenberg's uncertainty principle and its significance,	7
			Time independent Schrödinger's wave equation (without application and solution detail), Significance of ψ and ψ2, Radial and angular wave functions for hydrogen atom (qualitative idea), radial probability distribution curves, shapes of s, p, d and f orbitals (qualitative idea), Quantum numbers and their significance, Pauli's exclusion principle, Aufbau principle and limitations, Hund's rules, exchange energy, electronic configurations of atoms. Elementary idea of microstates.	7
			Acidimetry and alkalimetry	10
Mrs. Saleha Khatun	I	CEMHCC-TH-1	Inorganic chemistry-I Theory Extranuclear structure of atom Bohr's model and atomic spectrum of hydrogen, Limitations of Bohr's model and Sommerfeld's modifications, de Broglie's concept, Heisenberg's uncertainty principle and its significance, Time independent Schrödinger's wave equation (without application and solution detail)	06
			Significance of ψ and ψ2, Radial and angular wave functions for hydrogen atom (qualitative idea), radial probability	04

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			distribution curves, shapes of s, p, d and f orbitals (qualitative idea)	
			Quantum numbers and their significance, Pauli's exclusion principle, Aufbau principle and limitations, Hund's rules, exchange energy, Electronic configurations of atoms.	04
			Elementary idea of microstates	02
		CEMHCC-P-1 Inorganic Chemistry-IA practical	Method of Preparation of standard solutions of titrants	02
			Estimation of Carbonate and hydroxide present together in a mixture	02
			Estimation of carbonate and bicarbonate present together in a mixture	02
Dr. Sandip Kumar Rajak	I	CHEMHT-IA Physical Chemistry-IA	Kinetic Theory and Gaseous state Kinetic Theory of gases	06
			Maxwell's distribution of speed and energy	06
			Real gas and virial equation	06
		CHEMHP-IA Physical Chemistry-IA	Determination of heat of neutralization of a strong acid by a strong base.	02
			Determination of heat of solute ion of oxalic acid from solubilitymeasurement	02
Mr. Delwar Ansary	I	CHEMHT-IA Physical Chemistry-IA	Chemical Thermodynamics-1: Zeroth and 1st law of Thermodynamics	07
		CHEMHT-IA Physical Chemistry-IA	Chemical Thermodynamics-1 : Thermochemistry	05
			Kinetic Theory and Gaseous state Kinetic Theory of gases	06
Mr. Yasin Nuree	I	CEMHCC-T-2 Organic Chemistry-1 Theory	General Treatment of Reaction Mechanism – I Mechanistic classification:	07
			Reactive intermediates:	07
			Stereochemistry-I Bonding geometries of carbon compounds and representation	06

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			of molecules	
			Concept of chirality and symmetry:	07
		CEMHCC-P-2 Organic Chemistry-1 Practical	Separation	04
			Determination of boiling point	04
			Identification of a Pure Organic Compound by chemical test	08
Mr. Md Muttakin Sarkar	I	CEMHCC-T-2 Organic Chemistry-1 Theory	Bonding and Physical Properties Valence Bond Theory	02
			Electronic displacements	04
			MO theory	04
			Physical properties	03
			Stereochemistry-I Relative and absolute configuration	03
			Optical activity of chiral compounds	04

Dr. Nabin Chandra Maity	II	CHEMHT-3	Acid-Base Concepts and Solvents Recapitulation of Arrhenius concept, Bronsted-Lowry concept, Solvent system concept (in H_2O, liq. NH_3, liq. SO_2 and liq. HF), Lux-Flood concept, Lewis concept	8
			Drago-Wayland equation, Solvent levelling and differentiating effects, Relative strength of different acids and bases, Pauling's rules, Hammett acidity function and super acids, HSAB principle and its applications, Acid-base equilibria in aqueous solution, pH, Buffer, Acid-base neutralization curves and choice of indicators. Gas phase acidity.	7
			Quantitative Chemical Analysis	10

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			I. Estimation of Fe(II) using $K_2Cr_2O_7$ solution II. Estimation of Fe(III) using $K_2Cr_2O_7$ and $KMnO_4$ solution iii. Estimation of Ca^{2+} using $KMnO^4$ solution iv. Estimation of Cu^{2+} iodometrically v. Estimation of Cr^{3+} using $K_2Cr_2O_7$ solution	
Mrs. Saleha Khatun	II	CEMHCC-T-3 Inorganic Chemistry-IB Theory	Redox reactions and Precipitation reactions Qualitative idea about complimentary, noncomplimentary, disproportionation and comproportionation reactions, standard redox potentials with sign conventions, Electrochemical series and its application to explore the feasibility of reactions and equilibrium constants	06
			Nernst equation; effect of pH, complexation and precipitation on redox potentials, formal potential; Basis of redox titration and redox indicators, Redox potential diagrams (Latimer and Frost) of common elements and their applications.	05
			Solubility product principle, common ion effect and their applications to the precipitation and separation of common metallic ions as hydroxides, sulphides, carbonates, sulphates and halides.	04
		CEMHCC-P-3 Inorganic Chemistry Practical-IB	Estimation of Fe(II) using $K_2Cr_2O_7$ solution	01
			Estimation of Fe(III) using $K_2Cr_2O_7$ Solution	01
			Estimation of Cu^{2+} iodometrycally	02

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			Estimation of Cr^{3+} using $K_2Cr_2O_7$ Solution	01
Dr. Sandip Kumar Rajak	II	CHEMHT-3 Physical chemistry-IB	Chemical kinetics Rate law, order and molecularity:	05
			Chemical kinetics Role of Temperature and theories of reaction rate:	07
			Chemical kinetics Homogeneous catalysis:	06
		CHEMHP-3 Physical chemistry-IB	Study of kinetics of acid-catalyzed hydrolysis of methyl acetate	04
			Study of kinetics of decomposition of H_2O_2.	04
Mr. Delwar Ansary	II	CHEMHT-3 Physical chemistry-IB	Chemical Thermodynamics-II: Second Law	05
			Chemical Thermodynamics-II: Clausius inequality, Criteria for spontaneity and equilibrium.	05
			Chemical Thermodynamics-II: Thermodynamic relations:	02
Mr. Yasin Nuree	II	CEMHCC-T-4 Organic Chemistry-2 Theory	Stereochemistry-II Concept of pro-stereoisomerism:	06 04
			Conformation:	06
			Substitution and Elimination Reactions	08
		CEMHCC-P-4 Organic Chemistry-2 Practical	Organic Preparations	18
Mr. Md Muttakin Sarkar	II	CEMHCC-T-4 Organic Chemistry-2	General Treatment of Reaction Mechanism II Reaction thermodynamics	02
			Concept of organic acids and bases	02
			Tautomerism	04
			Reaction kinetics	05
			Substitution and Elimination Reactions Free-radical substitution reaction	03
			Nucleophilic substitution reactions	04

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Dr. Sandip Kumar Rajak	III	CHEMHT-5 Physical Chemistry – II	Transport processes Viscosity:	10
			Transport processes Conductance and transport number:	10
			Foundation of Quantum Mechanics Beginning of Quantum Mechanics:	04
			Foundation of Quantum Wave function:Mechanics	06
			Foundation of Quantum Mechanics Concept of Operators:	05
			Foundation of Quantum Mechanics Particle in a box:	05
		CHEMHP-5 Physical Chemistry – II	Determination of partition coefficient for the distribution of I_2 between water andCCl_4	04
			Determination of K_{eq} for KI + I_2= KI_3, using partition coefficient between water and CCl_4.	04
			Conductometric titration of an acid (strong, weak/ monobasic, dibasic) againststrong base.	04
Mr. Delwar Ansary	III	CHEMHT-5 Physical Chemistry – II	Application of Thermodynamics-I: Partial properties and chemical potential:	03
			Application of Thermodynamics-I: Chemical Equilibrium:	03
			Application of Thermodynamics-I:	03
			Application of Thermodynamics-I: Nernst's distribution law;	04
			Chemical potential and other properties of ideal substances-pure and mixtures: Pure ideal gas:	04
			Application of Thermodynamics-I:	03

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			Condensed Phase	
		CHEMHP-5 Physical Chemistry – II	Study of viscosity of unknown quid (glycerol, sugar) with espect to water.	04
			Application of Thermodynamics-I: Partial properties and chemical potential:	03
Dr. Nabin Chandra Maity	III	CHEMHT-6	Chemical Bonding–II Covalent Bond: Lewis structures, formal charge; Qualitative idea of V. B. Theory, directional properties of covalent bond, Concept of Equivalent and non equivalent Hybridization and shapes of simple molecules and ions (examples from main groups), Stereochemically non-rigid molecules – Berry's pseudorotation, Resonance and Dipole moments of inorganic molecules and ions.	14
			VSEPR theory and Bent's rule and their applications; M.O. Theory (elementary pictorial approach), concept of bond order, MO diagram of homo-nuclear diatomics (1^{st} and 2^{nd} period elements), hetero-nuclear diatomics (HF, CO, NO, NO^+ and CN^-) and triatomics (H_2O and BeH_2). Electron sea model and elementary idea about band theory, classification of inorganic solids and their conduction properties according to band theory; Hydrogen bonding: classifications, its effect on the properties of compounds and its importance in biological systems, Vander Waal's forces.	14
			Metal extraction and purification: Basic Metallurgy Idea about ores and minerals,	10

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			operations involved in metallurgy, Flow chart diagram for the extraction of pure Ti, Ni and U (including reactions) from their important ores and their uses.	
		CHEMHP-6	Quantitative inorganic analysis i. Estimation of Fe(II) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution ii. Estimation of Fe(III) and Cu(II) in a given mixture using $K_2Cr_2O_7$ solution iii. Estimation of Cr(VI) and Mn(II) in a given mixture using $K_2Cr_2O_7$ solution iv. Estimation of Fe(III) and Cr(VI) in a given mixture using $K_2Cr_2O_7$ solution v. Estimation of Fe(II) and Mn(II) in a given mixture using $KMnO_4$ solution vi. Estimation of Fe(III) and Ca(II) in a given mixture using $KMnO_4$ solution	10
Mrs. Saleha Khatun	III	CEMHCC-T-6 Inorganic Chemistry-II Theory	Ionic Bond: Lattice energy, Born-Lande equation with derivation and importance of Kapustinskii expression for lattice energy	05
			Born-Haber cycle and its applications, Polarising power and polarisability of ions, Fajan's rules and its applications	05
			radius ratio rules – its applications and limitations, salvation energy and solubility energetics of dissolution process;	05
			Packing in crystals, voids in crystal lattice, packing efficiency, Structure of ionic solids: rock salt, zinc blende, wurtzite, fluorite, antifluorite, perovskite and layer lattice.	05
			Qualitative idea about	02

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			stoichiometric and non-stoichiometric crystal defects.	
		CEMHCC-P-6 Inorganic Chemistry-II Practical	Estimation of Fe(II) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution	02
			Estimation of Cu(II) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution	02
			Estimation of Cr(VI) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution	02
			Estimation of Ca(II) and Fe(III) in a given mixture using K_2Cr_2O7 solution	02
Mr. Yasin Nuree	III	CEMHCC-T-7 Organic Chemistry-3 Theory	Carbonyl and Related Compounds Addition to C=O	09
			Exploitation of acidity of α-H of C=O	08
			Elementary ideas of Green Chemistry	03
			Nucleophilic addition to α, β-unsaturated carbonyl system: Nucleophilic addition to α, β-unsaturated carbonyl system:	03
			Substitution at sp2 carbon (C=O system)	03
		CEMHCC-P-7 Organic Chemistry-3 Practical	Qualitative Organic Analysis of single solid organic compound	16
Mr. Md Muttakin Sarkar	III	CEMHCC-T-7 Organic Chemistry-3 Theory	Chemistry of alkenes and alkynes Addition to C=C	06
			Addition to C≡C (in comparison to C=C)	04
		CEMHCC-P-7 Organic Chemistry-3 Practical	Aromatic Substitution Electrophilic aromatic substitution	04
			Organo-metallics Free-radical substitution Reaction	04
Mr. Yasin Nuree	III	SEC-1B Basic Analytical Chemistry	Introduction	04
			Complexometry	02
			Soil Analysis	02

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			Analysis of water	03
			Analysis of food products	03
			Chromatography	03
			Ion-exchange	02
			Analysis of cosmetics	03
			Suggested Applications (Any one)	02
			Suggested Instrumental demonstrations	03

Dr. Sandip Kumar Rajak	IV	CHEMHT-8 Physical Chemistry–III	Application of Thermodynamics – II: Colligative properties:	08
			Application of Thermodynamics – II: Phase rule:	06
			Application of Thermodynamics – II: Binary solutions:	06
			Quantum Chemistry Angular momentum:	06
			Quantum Chemistry Qualitative treatment of hydrogen atom and hydrogen-like ions	08
			Quantum Chemistry LCAO and HF-SCF:	06
		CHEMHP-8 Physical Chemistry – II	Determination of solubility of sparingly soluble salt in water, in electrolyte.with common ions and in neutral electrolyte (using common indicator).	02
			pH-metric titration of acid (mono-and di-basic) against strong base.	02
			Determination of K_{sp} for AgCl by potentiometric titration of $AgNO_3$solution against standard KCl solution.	02
Mr. Delwar Ansary	IV	CHEMHT-8 Physical Chemistry–III	Electrical Properties of molecules: Ionic equilibria	08
		CHEMHP-8	Electrical Properties of	06

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		Physical Chemistry – II	molecules: Electromotive Force:	
			Electrical Properties of molecules: Dipole moment and polarizability	06
			Potentiometric titration of Mohr's salt solution against standard K_2Cr_2O-solution.	02
		CHEMHT-8 Physical Chemistry–III	Effect of ionic strength on the rate of Persulphate –Iodide reaction.	02
			Study of phenol-water phase diagram.	02
			Electrical Properties of molecules: Ionic equilibria	08
Dr. Nabin Chandra Maity	IV	CHEMHT-9	Radioactivity and Nuclear Chemistry Atomic nucleus – nuclear stability, n/p ratio and different modes of decay, mass defect, packing fraction and nuclear binding energy. Nuclear forces: Meson exchange theory, elementary idea of nuclear shell model and magic numbers. Fission, fusion and spallation reactions, artificial radioactivity, super heavy elements and their IUPAC nomenclature. Moderators, slow and fast neutrons, Applications of radio-isotopes in: determination of structures, establishment of reaction mechanisms and radio-carbon dating, hazards of radiation and safety measures.	8
			Chemistry of s and p-block elements Diagonal relationship (Li-Mg; B-Si) and anomalous behavior of first member of each group, Allotropy and catenation (examples of C, P and S	7

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			compounds). Study of the following compounds with emphasis on preparation, properties, structure and bonding: Berylium hydrides and halides; diborane; borazine; boron nitride, boric acid, borax, fluorocarbons (with environmental effect); oxides and oxyacids of nitrogen, phosphorous, sulphur and chlorine; Peroxo acids of sulphur; tetrasulphur trtranitride; interhalogens, pseudohalogens, polyhalides, fluorides and oxides of xenon. Noble gas clathrates; basic properties of iodine. Synthesis, structural aspects and applications of silicones and phosphazines; Structural properties of various silicates.	
		CHEMHP-9	Complexometric Titration	10
			Inorganic Preparation	
Mrs. Saleha Khatun	IV	CEMHCC-T-9	Coordination Chemistry-I Idea about double salts and complex salts, Werner's theory	03
			EAN rule, classification of ligands and their binding modes	03
			IUPAC nomenclature of coordination compounds (up to two metal centres)	03
			overall and stepwise stability constants, chelates, inner metallic complexes	03
			Stereochemistry and isomerism (constitutional and stereo) of complexes with coordination no. 4 and 6.	03
		CEMHCC-P-9	Complexometric Titration: i)Estimation of Hardness of Water ii)Estimation of Ca(II) and Mg(II) in a mixture	04

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			Inorganic Preparation: i)Mohr's Salt ii)Tetraamminecarbonatocobalt (III) trihydrate	02
Mr. Yasin Nuree	IV	CEMHCC-T-10 Organic Chemistry-4 Theory	Nitrogen Compounds Amines: Aliphatic & Aromatic:	03
			Nitro compounds (aliphatic and aromatic):	02
			Alkylnitrile and isonitrile	02
			Diazonium salts and their related compounds	02
			The Logic of Organic Synthesis Retrosynthetic analysis:	08
			Strategy of ring synthesis:	04
			Asymmetric synthesis:	06
		CEMHCC-P-10 Organic Chemistry-4 Practical	Organic Quantative Estimation	14
Mr. Md Muttakin Sarkar	IV	CEMHCC-T-10 Organic Chemistry-4	Rearrangements: Mechanism with evidence and stereochemical Features for the following Rearrangement to electron-deficient carbon	03
			Rearrangement to electron-deficient nitrogen	01
		CEMHCC-P-10 Organic Chemistry-4 Practical	Rearrangement to electron-deficient oxygen	02
			Aromatic rearrangements	01
			Migration from nitrogen to ring carbon	01
			Rearrangement reactions by green approach	01
			Organic Spectroscopy UV Spectroscopy	02
			IR Spectroscopy	02
			NMR Spectroscopy	05
Mr Yasin Nuree	IV	SEC-1B	Drugs & Pharmaceuticals Introduction	08

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		CHEMHS – 2A Pharmaceutical Chemistry	Fermentation	06
			Hands On Practical	06

Dr. Nabin Chandra Maity	V	CHEMHT-11	Magnetochemistry Classification of magnetic substances, Origin of para magnetic moments, temperature dependence of para magnetism – Curie and Curie-Weiss law, TIP, magnetic susceptibility and its measurement (Gouy method), diamagnetic correction, effective magnetic moment, spin only moment for 3d metals, Orbital contribution to magnetic moment, spin-orbit coupling, quenching of orbital contribution, Sub-normal magnetic moments and antiferromagnetic interactions (elementary idea with examples).	12
			Chemistry of d- and f-block elements d-block elements: Characteristic properties, Comparison among the elements of 3d series with reference to electronic configuration, oxidation states and E^0 values; General comparison between 3d, 4d and 5d series elements in term of electronic configuration, oxidation states, atomization energy, magnetic properties and coordination chemistry. f-block elements: Comparison between d and f-block elements; Electronic	12

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			configuration, oxidation states, variation of magnetic properties (Ln^{3+}), atomic and ionic (3+) radii of lanthanoids; consequences of lanthanide contraction, separation of lanthanides by ion exchange and solvent extraction methods; comparison between lanthanoids and actinoids.	
		CHEMHP-11	Quantitative estimation A. Quantitative: i. Estimation of available chlorine in bleaching powder using iodometry ii. Estimation of available oxygen in pyrolusite using permanganometry iii. Estimation of Cu in brass using iodometry iv. Estimation of Fe in cement using permanganometry v. Estimation of chloride gravimetrically vi. Estimation of Ni(II) using DMG gravimetrically B.	10
			Experiment: i. Paper chromatographic separation of Ni(II) and Co(II) ii. Measurement of 10Dq by spectrophotometric method iii. Preparation of Mn(acac)3 and determination of its λmax colorimetrically	
Mrs. Saleha Khatun	V	CEMHCC-T-11 Inorganic chemistry-III Theory Coordination Chemistry-II	structure and bonding of coordination compounds on the basis of V. B. Theory and its limitations.	04
			Elementary idea about CFT, splitting of d^n configuration in ML4 to ML6 and ML8 systems, factors affecting, measurement of o, spectrochemical series of ligands,	06
			CFSE in weak and strong fields, OSSE, High	02

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			spin and low spin complexes, spin isomerism,	
			tetragonal distortion, Jahn Teller theorem and applications, achievements and limitations of CFT, nephalauxetic effect, stabilisation of unusually high and low oxidation states of 3d series elements	06
			MOT (elementary idea), σ and π bonding in octahedral complexes (a pictorial approach). Colour and electronic spectra of complexes: selection rules for electronic transitions, d-d transition, charge transfer transition (qualitative idea)	04
			L-S coupling and R-S ground state term for atomic no. up to 30, qualitative ORGEL diagram for 3d1 – 3d9 ions with appropriate symbols for the energy levels.	06
		CEMHCC-P-11 Inorganic Chemistry-IV Practical	Estimation of available chlorine in bleaching powder using iodometry	01
			Estimation of available oxygen in pyrolusite using permanganometry	02
			Estimation of Fe in cement using permanganometry	02
			Estimation of Ni(II) using DMG gravimetrically	01
			Estimation of chloride gravimetrically	01
Dr. Sandip Kumar Rajak	V	CHEMHT-12 Physical Chemistry – IV	Molecular Spectroscopy Interaction of electromagnetic radiation	04
			Molecular Spectroscopy Rotation spectroscopy:	06
			Vibrational spectroscopy:	06
			Molecular Spectroscopy	04

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			Raman spectroscopy:	
			Molecular Spectroscopy Nuclear Magnetic Resonance (NMR) spectroscopy, Electron Spin Resonance (ESR) spectroscopy:	04
			Surface phenomenon Surface tension and energy:	06
			Surface phenomenon Adsorption:	06
			Surface phenomenon Colloids:	06
		CHEMHP-12 Physical Chemistry – IV	Verification of Beer and Lambert's Law for $KMnO_4$and $K_2Cr_2O_7$solution	02
			Study of kinetics of $K_2S_2O_8$+ KI reaction, spectrophotometrically.	02
			Determination of CMC from surface tension measurements.	02
Mr. Delwar Ansary	V	CHEMHT-12 Physical Chemistry – IV	Phtochemistry: Lambert-Beer's law	06
			Photochemistry: Photochemical Processes	06
			Photochemistry: Rate of Photochemical processes	06
		CHEMHP-12 Physical Chemistry – IV	Determination of surface tension of a liquid using Stalagmometer.	02
			Determination of pH of unknown buffer, spectrophotometrically.	02
Dr. Nabin Chandra Maity	V	CHEMHTDSE-1B Inorganic Materials of Industrial Importance	Silicate Industries	9
			Fertilizers	9
			Surface Coatings	9
			Batteries	9
			Alloys	9
			Catalysis	9
			Chemical explosives	6
Mr. Yasin Nuree	V	CEMH-DSE-T-2C Green Chemistry Theory	Twelve principles of Green Chemistry	06
			Prevention/ minimization of	05

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			hazardous/ toxic products	
			Energy requirements for reactions – alternative sources of energy	05
			Prevention of chemical accidents designing greener processes	06
			Future Trends in Green Chemistry Oxidation reagents and catalysts	04
		CEMH-DSE-P-2C Green Chemistry Practical	Green Chemistry Practical	15
Mr. Md. Muttakin Sarkar	V	CEMHDSE-T-2C Green Chemistry	Green Chemistry Introduction to Green Chemistry	05
			Examples of Green Synthesis/ Reactions and some real-World cases	10
		CEMHDSE-T-2C Green Chemistry Theory	Green Chemistry Practical	05

Dr. Nabin Chandra Maity	VI	CHEMHT-13	Bio-inorganic Chemistry Essential elements of life, Role of metal ions in living systems- a brief review, Elementary idea about proteins, enzymes and ionophores; Structure of ATP, Na^+ ion pump and transport of Na^+ and K^+ across cell membrane; active site structures and bio-functions of haemoglobin, myoglobin, carboxy peptidase A, carbonic anhydrase B, cytochrome c, ferredoxins and chlorophyll; biological nitrogen fixation; toxic metals (Pb, Cd and Hg) and their effects, Wilson disease, chelation therapy; platinum and gold complexes as drugs (examples only).	25
			Organometallic chemistry and	25

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			catalysis Definition, Classification of organometallic compounds, hapticity of ligands, nomenclature, 16- electron & 18-electron rule and its applications; preparation and structure of mono- and bi-nuclear carbonyls of 3d series, synergic effect of CO and use of IR data to explain extent of back bonding; General methods of preparation of metal-carbon σ-bonded complexes, Zeise's salt, Metal-carbon multiple bonding; Preparation, structures, properties and reactions of ferrocene; elementary idea about oxidative addition, reductive elimination, insertion reactions; Study of the following catalytic processes: alkene hydrogenation (Wilkinson's catalyst), hydroformylation, Wacker process, Synthetic gasoline (Fischer Tropsch reaction) and Olefin polymerization reaction (Ziegler-Natta catalyst)	
		CHEMHP-13	Qualitative semimicro analysis	10
Mrs. Saleha Khatun	VI	CEMHCC-T-13 Molecular Symmetry and Point group	Symmetry as a universal theme, concept of symmetry elements and operations (with examples);	02
			symmetry properties of atomic orbitals (s, p and d);	02
			identification of molecular point groups in some simple molecules and ions;	04
			applications of symmetry for polarity and chirality.	02
		Bio-inorganic Chemistry	Essential elements of life, Role of metal ions in living systems- a brief review, Elementary idea about proteins, enzymes and ionophores; Structure of ATP, Na+ ion pump and transport of Na+ and K+ across cell membrane;	06
			active site structures and bio-functions of haemoglobin, myoglobin,	03

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			carboxy peptidase A, carbonic anhydrase B, cytochrome c, ferredoxins and chlorophyll; biological nitrogen fixation;	06
			toxic metals (Pb, Cd and Hg) and their effects, Wilson disease,	04
			chelation therapy; platinum and gold complexes as drugs (examples only)	04
		CEMHCC-P-13 Qualitative semimicro analysis	Qualitative semimicro analysis of mixtures containing four radicals (excluding oxide and carbonate). Emphasis should be given to the understanding of the chemistry of different reactions and to assign the most probable composition. Basic Radicals: K^+, $NH4^+$, $Mg^{2+,}$ Ca^{2+}, Ba^{2+}, Sr^{2+}, Al^{3+}, Cr^{3+}, Mn^{2+}, Fe^{3+}/ Fe^{2+}, Co^{2+}, $Ni^{2+,}$ Cu^{2+}, Zn^{2+}, $Pb^{2+,}$ Cd^{2+}, Bi^{3+}, Sn^{2+} / Sn^{4+}, As^{3+}/$As^{5+,}$ $Sb^{3+/}$ Sb^{5+}	06
			Acid Radicals: Cl^-, Br^-, I^-, $S^{2-,}$ SO_4^{2-}, $S_2O_3^{2-}$, SCN^-, NO_3^-, NO_2^-, BO_3^{3-}, PO_4^{3-}, AsO_4^{3-} and H_3BO_3	02
			Insoluble Materials: Cr_2O_3(ig), Fe_2O_3(ig), Al_2O_3, SnO_2, $PbSO_4$, $BaSO_4$, $SrSO_4$	03
Mr. Yasin Nuree	VI	CEMHCC-T-14 Organic Chemistry-4 Theory	Carbocycles and Heterocycles Polynuclear hydrocarbons and their derivatives	06
			Heterocyclic compounds	04
			Synthesis (including retrosynthetic approach and mechanistic details)	04
			Pyridine	06
			Cyclic Stereochemistry Alicyclic compounds	06
		CHEMHCC-P-14 Organic Chemistry-4 Practical	Chromatographic Separations	08
			Spectroscopic Analysis of Organic Compounds	06
Mr. Md Muttakin Sarkar	VI	CEMHCC-T-14	Pericyclic reactions Mechanism, stereochemistry,	03

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		Organic Chemistry-4 Theory	regioselectivity in case of Electrocyclic reactions	
			Cycloaddition reactions	02
			Sigmatropic reactions	02
		CHEMHCC-P-14	Carbohydrates Monosaccharides, disaccharides, polysaccharides	05
			Biomolecules Amino acids, peptides	05
			Chromatographic Separations	05
Dr. Sandip Kumar Rajak	VI	CHEMHTDSE-3 Advanced Physical Chemistry	Statistical Thermodynamics Configuration:	06
			Statistical Thermodynamics Boltzmann distribution:	06
			Statistical Thermodynamics Partition function:	06
			Special selected topics Specific heat of solid:	07
			Special selected topics 3rd law:	07
			Special selected topics Polymers	07
		CHEMHTDSE-3 Advanced Physical Chemistry	Roots of equations: (e.g. volume of van der Waals gas and comparison withideal gas, pH of a weak acid).	02
			Numerical differentiation (e.g., change in pressure for small change in volume of a van der Waals gas, potentiometric titrations).	02
			Numerical integration (e.g. entropy/ enthalpy changes from heat capacity data), probability distributions (gas kinetic theory) and mean values.	02
Mr. Delwar Ansary	VI	CHEMHTDSE-3 Advanced Physical Chemistry	Crystal Structure: Bravais Lattice and Laws of Crystallography:	08
			Crystal Structure: Crystal planes:	06
			Crystal Structure: Determination of crystal structure	06
Mrs. Saleha Khatun	I (NEP)	CHEM-MAT-1 inorganic-1A	**Atomic Structure:** Bohr's model and atomic spectrum of hydrogen	6
			Time independent Schrodinger's wave equation (without application and solution detail),	6
			Pauli's exclusion principle, aufbau principle and limitations	4
Dr Nabin Chandra	I	CHEM-MAT-1	**Periodic properties**	4

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Maity	(NEP)	inorganic-1A	Modern IUPAC periodic table and classification of elements in the table	
			Atomic radii, Ionic radii and Pauling's method for determining univalent ionic radii	5
			Electron affinity and factors influencing these properties	5
Dr. Sandip Kumar Rajak	I (NEP)		**Kinetic Theory and Gaseous state** Kinetic Theory of gases	6
			Maxwell's distribution of speed and energy:	6
			Real gas and virial equation:	6
		Physical-1A	**Chemical Thermodynamics – I** Zeroth and 1st law of Thermodynamics	6
			Thermochemistry:	6
Yasin Nuree	I (NEP)	CHEM-MDC-1	Food additives	6
			Vitamins	4
			Drugs	8
Dr Nabin Chandra Maity	I (NEP)	CHEM-MDC-1	Fats and Oil	8
			Soaps and detergents	6
			Pesticides	7
			Glass Ceramics	6
Yasin Nuree	I (NEP)	CHEM-SEC-1	**Pharmaceutical Chemistry** Basic concepts of drug discovery, design and development	6
			Synthesis of the representative drugs of the following classes	6
			antiviral agents	6
			Central Nervous System agents	4
			Cardiovascular	2
			HIV-AIDS related drugs	3
			Fermentation: Aerobic and anaerobic fermentation	5
			Production of (i) Ethyl alcohol and citric acid, (ii) Antibiotics; Penicillin, Cephalosporin, Chloromycetin and Streptomycin	5
			Hands On Practical: Preparation of Aspirin and its analysis.	4
			Preparation of magnesium bisilicate (Antacid).	4

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Name of Teacher	Semester	Paper	Content	No. of Lecture
Saleha Khatun	I	CHEMG-T-01	Atomic Structure	09
			Chemical Periodicity	09
			Redox Reactions	04
		CHEMG-P-01	Estimation of Fe(II) ions with $K_2Cr_2O_7$	01
			Estimation of carbonate and bicarbonate present together in a mixture	02
Delwar Ansary	I (NEP)	CHEM-MIT-1A (Minor-1)	**Acids and bases** Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents.	03
			Acids and bases Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept.	03
			Acids and bases Hard and soft acids and bases (HSAB concept), applications of HSAB process.	02
			Aliphatic Hydrocarbons Introduction	02
			Alkanes (up to 5 Carbons)	03
			Alkenes: (up to 5 Carbons).	04
			Alkynes: (up to 5 Carbons).	03
		CHEM-MIP-1A (Minor-1)	Estimation of oxalic acid by titrating it with $KMnO_4$.	02
			Estimation of Cu (II) ions iodometrically using $Na_2S_2O_3$.	02
Md Muttakin Sarkar	I	CHEMG-T-01	**Fundamentals of Organic Chemistry** 1.Electronic displacements	05
			2.Stereochemistry	05
			3. Nucleophilic Substitution and Elimination Reactions	04
		CHEMGP-1	Qualitative Analysis of Single	05

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		Organic Chemistry -1	Solid Organic Compound(s)	

Saleha Khatun	II	CHEMG-T-02	Chemical Bonding and Molecular structure: a) Ionic Bonding	06
			b) Covalent Bonding	07
			c) MO Approach	07
			Comparative study of p-block elements: a) Group trends in electronic configuration, modification of pure elements,	04
			b) Common oxidation states,inert pair effect,and their important compounds in respect of the following groups of elements i. B-Al-Ga-In-Tl ii. C-Si-Ge-Sn-Pb	04
			iii. N-P-As-Sb-Bi iv. O-S-Se-Te v. F-Cl-Br-I	02
		CHEMG-P-02	Qualitative semi-micro analysis of mixtures containing three radicals. Emphasis should be given to the understanding of the chemistry of different reactions. Acid Radicals: Cl^-, Br^-, I^-, NO_2^-, NO_3^-, S^{2-}, SO_4^{2-}, BO_3^{3-}, H_3BO_3.	03
			Basic Radicals: Na^+, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Cr^{3+}, Mn^{2+}, Fe^{3+}, Ni^{2+}, Cu^{2+}, NH_4^+.	02
Delwar Ansary	II	CHEMG-T-02	Kinetic Theory of Gases and Real gases	12
			Liquids	05
		CHEMG-P-02	Surface tension measurement (use of organic solvents excluded)	02

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			Viscosity measurement (use of organic solvents excluded)	02
Md Muttakin Sarkar	II	CHEMG-T-02	Solids	05
			Chemical kinetics	05
		CHEMG-P-02 Physical Chemistry – I	Viscosity measurement (use of organic solvents excluded)	02

Delwar Ansary	I	CHEMG-T-01	**Acids and bases** Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents.	03
			Acids and bases Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept.	03
			Acids and bases Hard and soft acids and bases (HSAB concept), applications of HSAB process.	02
			Aliphatic Hydrocarbons *Introduction*	02
			Alkanes (up to 5 Carbons)	03
			Alkenes: (up to 5 Carbons).	04
			Alkynes: (up to 5 Carbons).	03
		CHEMG-P-01	Estimation of oxalic acid by titrating it with $KMnO_4$.	02
			Estimation of Cu (II) ions iodometrically using $Na_2S_2O_3$.	02
Saleha Khatun	III	CHEMG-T-01	Atomic Structure	09
			Chemical Periodicity	09
			Redox Reactions	04
			Estimation of Fe(II) ions with	01

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		CHEMG-P-01	$K_2Cr_2O_7$	
			Estimation of carbonate and bicarbonate present together in a mixture	02
Md Muttakin Sarkar	III	CHEMG-T-01	**Fundamentals of Organic Chemistry** 1.Electronic displacements	05
			2.Stereochemistry	05
			3. Nucleophilic Substitution and Elimination Reactions	04
		CHEMGP-1 Organic Chemistry -1	Qualitative Analysis of Single Solid Organic Compound(s)	05

Delwar Ansary	II	CHEMG-T-02	Kinetic Theory of Gases and Real gases	12
			Liquids	05
			Surface tension measurement (use of organic solvents excluded)	02
		CHEMG-P-02	Viscosity measurement (use of organic solvents excluded)	02
Saleha Khatun	IV	CHEMG-T-02	Chemical Bonding and Molecular structure: d) Ionic Bonding	06
			Covalent Bonding	07
			MO Approach	07
			Comparative study of p-block elements: a) Group trends in electronic configuration, modification of pure elements,	04
			b) Common oxidation states, inert pair effect, and their important compounds in respect of the following groups of elements i. B-Al-Ga-In-Tl ii. C-Si-Ge-Sn-Pb	04
			iii. N-P-As-Sb-Bi iv. O-S-Se-Te v. F-Cl-Br-I	02
		CHEMG-P-02	Qualitative semi-micro analysis of mixtures containing three radicals. Emphasis	03

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			should be given to the understanding of the chemistry of different reactions. Acid Radicals: Cl^-, Br^-, I^-, NO_2^-, NO_3^-, S^{2-}, SO_4^{2-}, BO_3^{3-}, H_3BO_3.	
			Basic Radicals: Na^+, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Cr^{3+}, Mn^{2+}, Fe^{3+}, Ni^{2+}, Cu^{2+}, NH_4^+.	02
Md Muttakin Sarkar	IV	CHEMG-T-02	Solids	05
			Chemical kinetics	05
		CHEMG-P-02 Physical Chemistry – I	Viscosity measurement (use of organic solvents excluded)	02

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Name of Teacher	Semester	Paper	Content	No. of Lecture
Saleha Khatun	I	CHEMG-T-01	Atomic Structure	09
			Chemical Periodicity	09
			Redox Reactions	04
		CHEMG-P-01	Estimation of Fe(II) ions with $K_2Cr_2O_7$	01
			Estimation of carbonate and bicarbonate present together in a mixture	02
Delwar Ansary	I	CHEMG-T-01	**Acids and bases** Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents.	03
			Acids and bases Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept.	03
			Acids and bases Hard and softacids and bases (HSAB concept), applications of HSAB process.	02
			Aliphatic Hydrocarbons Introduction	02
			Alkanes (up to5 Carbons)	03
			Alkenes:(upto5 Carbons).	04
			Alkynes:(upto5 Carbons)	03
		CHEMG-P-01	Estimation of oxalic acid by titrating it with $KMnO_4$.	02
			Estimation of Cu(II)ions iodometrically using $Na_2S_2O_3$.	02
Md Muttakin Sarkar	I	CHEMG-T-01	**Fundamentals of Organic Chemistry** Electronic displacements	05
			Stereochemistry	05
			Nucleophilic Substitution and Elimination Reactions	04
		CHEMGP-1 Organic Chemistry -1	Qualitative Analysis of Single Solid Organic Compound(s)	05

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Saleha Khatun	II	CHEMG-T-02	Chemical Bonding and Molecular structure: a) Ionic Bonding	06
			b) Covalent Bonding	07
			c) MO Approach	07
			Comparative study of p-block elements: a) Group trends in electronic configuration, modification of pure elements,	04
			b) Common oxidation states, inert pair effect, and their important compounds in respect of the following groups of elements i. B-Al-Ga-In-Tl ii. C-Si-Ge-Sn-Pb	04
			iii. N-P-As-Sb-Bi iv. O-S-Se-Te v. F-Cl-Br-I	02
		CHEMG-P-02	Qualitative semi-micro analysis of mixtures containing three radicals. Emphasis should be given to the understanding of the chemistry of different reactions. Acid Radicals: Cl^-, Br^-, I^-, NO_2^-, NO_3^-, S^{2-}, SO_4^{2-}, BO_3^{3-}, H_3BO_3.	03
			Basic Radicals: Na^+, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Cr^{3+}, Mn^{2+}, Fe^{3+}, Ni^{2+}, Cu^{2+}, NH_4^+.	02
Delwar Ansary	II	CHEMG-T-02	Kinetic Theory of Gases and Real gases	12
			Liquids	05
		CHEMG-P-02	Surface tension measurement (use of organic solvents excluded)	02
			Viscosity measurement (use of organic solvents excluded)	02
MdMuttakin Sarkar	II	CHEMG-T-02	Solids	05
			Chemical kinetics	05
		CHEMG-P-02 Physical Chemistry – I	Viscosity measurement (use of organic solvents excluded)	02

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Nabin Chandra Maity	III	CHEMG-T-03	Ionic Equilibria	09
			Aryl Halides	04
		CHEMG-P-03	Determination of enthalpy of hydration of copper sulphate	02
Delwar Ansary	III	CHEMG-T-03	Chemical Energetics	12
			Carbonyl Compounds	07
		CHEMG-P-03	Determination of heat capacity of calorimeter for different volumes	02
			Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide	02
Saleha Khatun	III	CHEMG-T-03	Chemical Equilibrium	09
			Alcohols, Phenols and Ethers	08
		CHEMG-P-03	Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH meter and compare it with the indicator method	02
			Preparation of buffer solutions and find the pH of an unknown buffer solution by colour matching method (using following buffers) a. Sodium acetate-acetic acid b. Ammonium chloride-ammonium hydroxide	02
Md Muttakin Sarkar	III	CHEMG-T-03	Aromatic hydrocarbons	06
			Organometallic compounds	04
		CHEMGP-3 Organic Chemistry -1	Identification of a pure organic compound	04

Nabin Chandra Maity	IV	CHEMG-T-04	Coordination Chemistry	10
			Crystal Field Theory	10
		CHEMG-P-04	Complexometric estimation of (i) Mg2+ or (ii) Zn2+ using EDTA.	02
			Preparation of any two of the following complexes: a.tetraammine	01

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			carbonatocobalt (III) nitrate	
Delwar Ansary	IV	CHEMG-T-04	Phase Equilibrium	07
		CHEMG-P-04	Study of the equilibrium of one of the following reactions by the distribution method: $I_2(aq) + I^-(aq) = I^-(aq)$	02
			Perform the following potentiometric titrations: Weak acid vs. strong base	02
			Potassium dichromate. Mohr's salt	02
Saleha Khatun	IV	CHEMG-T-04	Conductance	08
			Transition Elements (3d Series)	10
		CHEMG-P-04	Preparation of any two of the following complexes: b. tetraamminecopper(II) sulphate	01
			c. potassium trioxalatochromate(III) trihydrate	01
			d. potassium bisoxalatocuprate(II) trihydrate	01
Md Muttakin Sarkar	IV	CHEMG-T-04	Solutions	05
			Electromotive force	05
		CHEMG-P-4	conductometric titrations: Strong acid vs. strong base	02
Nabin Chandra Maity	V	CHEMGTDSE-1	Chemical Analysis	14
		CHEMGPDSE-1	To find the total hardness of water by EDTA titration	02
			Determination of the strength of the H2O2 sample	02
Delwar Ansary	V	CHEMGTDSE-1	Error Analysis and Computer Applications	12
		CHEMGPDSE-1	To determine the rate constant for the acid catalysed hydrolysis of an ester.	02

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			TitrationofHClandCH$_3$COOHmixturevsNaOHusingtwodifferentindicatorstofindtheconcentration.	02
Saleha Khatun	V	CHEMGTDSE-1	Industrial Chemistry	18
		CHEMGPDSE-1	Titration of Na2CO3 and NaHCO3 mixture vs HCl using phenolphthalein and methyl orange indicators	02
Md Muttakin Sarkar	V	CHEMGTDSE-1	Environmental Chemistry	16
		CHEMGPDSE-1	Estimation of available oxygen in pyrolusite	02
Nabin Chandra Maity	VI	CHEMGTDSE-2	Polymers	04
			Paints	03
			Varnishes	02
			Fats and Oils	03
		CHEMGPDSE-2	Purification of the crude product is to be made by crystallisation from water/alcohol	02
			Estimation of saponification value of oil / ester / fat.	02
Delwar Ansary	VI	CHEMGTDSE-2	Amines and Diazonium Salts	10
			Amino Acids and Carbohydrates	10
		CHEMGPDSE-2	Hydrolysis of amides/imides	02
			Acetylation of aromatic amines	02
Saleha Khatun	VI	CHEMGTDSE-2	Synthetic dyes	02
			Drugs and Phermaceuticals	03
			Pesticides	03
			Fermentation Chemicals	03
		CHEMGPDSE-2	Estimation of acetic acid in commercial vinegar	01
			Estimation of amino acid by formol titration	02
Md Muttakin Sarkar	VI	CHEMGTDSE-2	Carboxylic Acids and Their Derivatives	06
			Industrial Chemistry Food additives	02
		CHEMGPDSE-2	Nitration of aromatic compounds	02

			Purification of the crude product is to be made by crystallization from water/alcohol.	01

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Dr. Nabin Chandra Maity	I	CEMHCC-TH-1	Periodic properties Bohr's model and atomic spectrum of hydrogen, Limitations of Bohr's model and Sommerfeld's modifications, de Broglie's concept, Heisenberg's uncertainty principle and its significance,	7
			Time independent Schrödinger's wave equation (without application and solution detail), Significance of ψ and ψ2, Radial and angular wave functions for hydrogen atom (qualitative idea), radial probability distribution curves, shapes of s, p, d and f orbitals (qualitative idea), Quantum numbers and their significance, Pauli's exclusion principle, Aufbau principle and limitations, Hund's rules, exchange energy, electronic configurations of atoms. Elementary idea of microstates.	7
			Acidimetry and alkalimetry	10
Mrs. Saleha Khatun	I	CEMHCC-TH-1	Inorganic chemistry-I Theory Extranuclear structure of atom Bohr's model and atomic spectrum of hydrogen, Limitations of Bohr's model and Sommerfeld's modifications, de Broglie's concept, Heisenberg's uncertainty principle and its significance, Time independent Schrödinger's wave equation (without application and solution detail)	06
			Significance of ψ and ψ2, Radial and angular wave functions for hydrogen atom (qualitative idea), radial probability	04

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			distribution curves, shapes of s, p, d and f orbitals (qualitative idea)	
			Quantum numbers and their significance, Pauli's exclusion principle, Aufbau principle and limitations, Hund's rules, exchange energy, Electronic configurations of atoms.	04
			Elementary idea of microstates	02
		CEMHCC-P-1 Inorganic Chemistry-IA practical	Method of Preparation of standard solutions of titrants	02
			Estimation of Carbonate and hydroxide present together in a mixture	02
			Estimation of carbonate and bicarbonate present together in a mixture	02
Dr. Sandip Kumar Rajak	I	CHEMHT-IA Physical Chemistry-IA	Kinetic Theory and Gaseous state Kinetic Theory of gases	06
			Maxwell's distribution of speed and energy	06
			Real gas and virial equation	06
		CHEMHP-IA Physical Chemistry-IA	Determination of heat of neutralization of a strong acid by a strong base.	02
			Determination of heat of solute ion of oxalic acid from solubilitymeasurement	02
Mr. Delwar Ansary	I	CHEMHT-IA Physical Chemistry-IA	Chemical Thermodynamics-1: Zeroth and 1st law of Thermodynamics	07
		CHEMHT-IA Physical Chemistry-IA	Chemical Thermodynamics-1 : Thermochemistry	05
			Kinetic Theory and Gaseous state Kinetic Theory of gases	06
Mr. Yasin Nuree	I	CEMHCC-T-2 Organic Chemistry-1 Theory	General Treatment of Reaction Mechanism – I Mechanistic classification:	07
			Reactive intermediates:	07
			Stereochemistry-I Bonding geometries of carbon compounds and representation	06

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			of molecules	
			Concept of chirality and symmetry:	07
		CEMHCC-P-2 Organic Chemistry-1 Practical	Separation	04
			Determination of boiling point	04
			Identification of a Pure Organic Compound by chemical test	08
Mr. Md Muttakin Sarkar	I	CEMHCC-T-2 Organic Chemistry-1 Theory	Bonding and Physical Properties Valence Bond Theory	02
			Electronic displacements	04
			MO theory	04
			Physical properties	03
			Stereochemistry-I Relative and absolute configuration	03
			Optical activity of chiral compounds	04

Dr. Nabin Chandra Maity	II	CHEMHT-3	Acid-Base Concepts and Solvents Recapitulation of Arrhenius concept, Bronsted-Lowry concept, Solvent system concept (in H_2O, liq. NH_3, liq. SO_2 and liq. HF), Lux-Flood concept, Lewis concept	8
			Drago-Wayland equation, Solvent levelling and differentiating effects, Relative strength of different acids and bases, Pauling's rules, Hammett acidity function and super acids, HSAB principle and its applications, Acid-base equilibria in aqueous solution, pH, Buffer, Acid-base neutralization curves and choice of indicators. Gas phase acidity.	7
			Quantitative Chemical Analysis	10

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			I. Estimation of Fe(II) using $K_2Cr_2O_7$ solution II. Estimation of Fe(III) using $K_2Cr_2O_7$ and $KMnO_4$ solution iii. Estimation of Ca^{2+} using $KMnO^4$ solution iv. Estimation of Cu^{2+} iodometrically v. Estimation of Cr^{3+} using $K_2Cr_2O_7$ solution	
Mrs. Saleha Khatun	II	CEMHCC-T-3 Inorganic Chemistry-IB Theory	Redox reactions and Precipitation reactions Qualitative idea about complimentary, noncomplimentary, disproportionation and comproportionation reactions, standard redox potentials with sign conventions, Electrochemical series and its application to explore the feasibility of reactions and equilibrium constants	06
			Nernst equation; effect of pH, complexation and precipitation on redox potentials, formal potential; Basis of redox titration and redox indicators, Redox potential diagrams (Latimer and Frost) of common elements and their applications.	05
			Solubility product principle, common ion effect and their applications to the precipitation and separation of common metallic ions as hydroxides, sulphides, carbonates, sulphates and halides.	04
		CEMHCC-P-3 Inorganic Chemistry Practical-IB	Estimation of Fe(II) using $K_2Cr_2O_7$ solution	01
			Estimation of Fe(III) using $K_2Cr_2O_7$ Solution	01
			Estimation of Cu^{2+} iodometrycally	02

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			Estimation of Cr^{3+} using $K_2Cr_2O_7$ Solution	01
Dr. Sandip Kumar Rajak	II	CHEMHT-3 Physical chemistry-IB	Chemical kinetics Rate law, order and molecularity:	05
			Chemical kinetics Role of Temperature and theories of reaction rate:	07
			Chemical kinetics Homogeneous catalysis:	06
		CHEMHP-3 Physical chemistry-IB	Study of kinetics of acid-catalyzed hydrolysis of methyl acetate	04
			Study of kinetics of decomposition of H_2O_2.	04
Mr. Delwar Ansary	II	CHEMHT-3 Physical chemistry-IB	Chemical Thermodynamics-II: Second Law	05
			Chemical Thermodynamics-II: Clausius inequality, Criteria for spontaneity and equilibrium.	05
			Chemical Thermodynamics-II: Thermodynamic relations:	02
Mr. Yasin Nuree	II	CEMHCC-T-4 Organic Chemistry-2 Theory	Stereochemistry-II Stereochemistry-II Concept of pro-stereoisomerism:	06 04
			Conformation:	06
			Substitution and Elimination Reactions Elimination reactions:	08
		CEMHCC-P-4 Organic Chemistry-2 Practical	Organic Preparations	18
Mr. Md Muttakin Sarkar	II	CEMHCC-T-4 Organic Chemistry-2	General Treatment of Reaction Mechanism II Reaction thermodynamics	02
			Concept of organic acids and bases	02
			Tautomerism	04
			Reaction kinetics	05

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			Substitution and Elimination Reactions Free-radical substitution reaction	03
			Nucleophilic substitution reactions	04

Dr. Sandip Kumar Rajak	III	CHEMHT-5 Physical Chemistry – II	Transport processes Viscosity:	10
			Transport processes Conductance and transport number:	10
			Foundation of Quantum Mechanics Beginning of Quantum Mechanics:	04
			Foundation of Quantum Mechanics Wave function:	06
			Foundation of Quantum Mechanics Concept of Operators:	05
			Foundation of Quantum Mechanics Particle in a box:	05
		CHEMHP-5 Physical Chemistry – II	Determination of partition coefficient for the distribution of I_2 between water and CCl_4	04
			Determination of K_{eq} for KI + I_2= KI_3, using partition coefficient between water and CCl_4.	04
			Conductometric titration of an acid (strong, weak/ monobasic, dibasic) againststrong base.	04
Mr. Delwar Ansary	III	CHEMHT-5 Physical Chemistry – II	Application of Thermodynamics-I: Partial properties and chemical potential:	03
			Application of Thermodynamics-I: Chemical Equilibrium:	03
			Application of	03

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			Thermodynamics-I:	
			Application of Thermodynamics-I: Nernst's distribution law;	04
			Chemical potential and other properties of ideal substances-pure and mixtures: Pure ideal gas:	04
			Application of Thermodynamics-I: Condensed Phase	03
		CHEMHP-5 Physical Chemistry – II	Study of viscosity of unknown liquid (glycerol, sugar) with respect to water.	04
			Application of Thermodynamics-I: Partial properties and chemical potential:	03
Dr. Nabin Chandra Maity	III	CHEMHT-6	Chemical Bonding–II Covalent Bond: Lewis structures, formal charge; Qualitative idea of V. B. Theory, directional properties of covalent bond, Concept of Equivalent and non equivalent Hybridization and shapes of simple molecules and ions (examples from main groups), Stereochemically non-rigid molecules – Berry's pseudorotation, Resonance and Dipole moments of inorganic molecules and ions.	14

			VSEPR theory and Bent's rule and their applications; M.O. Theory (elementary pictorial approach), concept of bond order, MO diagram of homo-nuclear diatomics (1st and 2nd period elements), hetero-nuclear diatomics (HF, CO, NO, NO^+ and CN^-) and triatomics (H_2O and BeH_2). Electron sea model and elementary idea about band theory, classification of inorganic solids and their conduction properties according to band theory; Hydrogen bonding: classifications, its effect on the properties of compounds and its importance in biological systems, Vander Waal's forces.	14
			Metal extraction and purification: Basic Metallurgy Idea about ores and minerals, operations involved in metallurgy, Flow chart diagram for the extraction of pure Ti, Ni and U (including reactions) from their important ores and their uses.	10
		CHEMHP-6	Quantitative inorganic analysis i. Estimation of Fe(II) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution ii. Estimation of Fe(III) and Cu(II) in a given mixture using $K_2Cr_2O_7$ solution iii. Estimation of Cr(VI) and Mn(II) in a given mixture using $K_2Cr_2O_7$ solution iv. Estimation of Fe(III) and Cr(VI) in a given mixture using $K_2Cr_2O_7$ solution v. Estimation of Fe(II) and Mn(II) in a given mixture using $KMnO_4$ solution vi. Estimation of Fe(III) and	10

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			Ca(II) in a given mixture using $KMnO_4$ solution	
Mrs. Saleha Khatun	III	CEMHCC-T-6 Inorganic Chemistry-II Theory	Ionic Bond: Lattice energy, Born-Lande equation with derivation and importance of Kapustinskii expression for lattice energy	05
			Born-Haber cycle and its applications, Polarising power and polarisability of ions, Fajan's rules and its applications	05
			radius ratio rules – its applications and limitations, salvation energy and solubility energetics of dissolution process;	05
			Packing in crystals, voids in crystal lattice, packing efficiency, Structure of ionic solids: rock salt, zinc blende, wurtzite, fluorite, antifluorite, perovskite and layer lattice.	05
			Qualitative idea about stoichiometric and non-stoichiometric crystal defects.	02
		CEMHCC-P-6 Inorganic Chemistry-II Practical	Estimation of Fe(II) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution	02
			Estimation of Cu(II) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution	02
			Estimation of Cr(VI) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution	02
			Estimation of Ca(II) and Fe(III) in a given mixture using K_2Cr_2O7 solution	02
Mr. Yasin Nuree	III	CEMHCC-T-7 Organic Chemistry-3 Theory	Carbonyl and Related Compounds Addition to C=O	09
			Exploitation of acidity of α-H of C=O	08
			Elementary ideas of Green Chemistry	03
			Nucleophilic addition to α,β-unsaturated carbonyl system:	03

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			Nucleophilic addition to α,β-unsaturated carbonyl system:	
			Substitution at sp2 carbon (C=O system)	03
		CEMHCC-P-7 Organic Chemistry-3 Practical	Qualitative Organic Analysis of single solid organic compound	16
Mr. Md Muttakin Sarkar	III	CEMHCC-T-7 Organic Chemistry-3 Theory	Chemistry of alkenes and alkynes Addition to C=C	06
			Addition to C≡C (in comparison to C=C)	04
		CEMHCC-P-7 Organic Chemistry-3 Practical	Aromatic Substitution Electrophilic aromatic substitution	04
			Organo-metallics Free-radical substitution Reaction	04
Mr. Yasin Nuree	III	SEC-1B Basic Analytical Chemistry	Introduction	04
			Complexometry	02
			Soil Analysis	02
			Analysis of water	03
			Analysis of food products	03
			Chromatography	03
			Ion-exchange	02
			Analysis of cosmetics	03
			Suggested Applications (Any one)	02
			Suggested Instrumental demonstrations	03

Dr. Sandip Kumar Rajak	IV	CHEMHT-8 Physical Chemistry–III	Application of Thermodynamics – II: Colligative properties:	08
			Application of Thermodynamics – II: Phase rule:	06
			Application of Thermodynamics – II: Binary solutions:	06

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			Quantum Chemistry Angular momentum:	06
			Quantum Chemistry Qualitative treatment of hydrogen atom and hydrogen-like ions	08
			Quantum Chemistry LCAO and HF-SCF:	06
		CHEMHP-8 Physical Chemistry – II	Determination of solubility of sparingly soluble salt in water, in electrolyte.with common ions and in neutral electrolyte (using common indicator).	02
			pH-metric titration of acid (mono-and di-basic) against strong base.	02
			Determination of K_{sp} for AgCl by potentiometric titration of $AgNO_3$solution against standard KCl solution.	02
Mr. Delwar Ansary	IV	CHEMHT-8 Physical Chemistry–III	Electrical Properties of molecules: Ionic equilibria	08
		CHEMHP-8 Physical Chemistry – II	Electrical Properties of molecules: Electromotive Force:	06
			Electrical Properties of molecules: Dipole moment and polarizability	06
			Potentiometric titration of Mohr's salt solution against standard K_2Cr_2O-solution.	02
		CHEMHT-8 Physical Chemistry–III	Effect of ionic strength on the rate of Persulphate –Iodide reaction.	02
			Study of phenol-water phase diagram.	02
			Electrical Properties of molecules: Ionic equilibria	08
Dr. Nabin Chandra Maity	IV	CHEMHT-9	Radioactivity and Nuclear Chemistry	8

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			Atomic nucleus – nuclear stability, n/p ratio and different modes of decay, mass defect, packing fraction and nuclear binding energy. Nuclear forces: Meson exchange theory, elementary idea of nuclear shell model and magic numbers. Fission, fusion and spallation reactions, artificial radioactivity, super heavy elements and their IUPAC nomenclature. Moderators, slow and fast neutrons, Applications of radio-isotopes in: determination of structures, establishment of reaction mechanisms and radio-carbon dating, hazards of radiation and safety measures.	
			Chemistry of s and p-block elements Diagonal relationship (Li-Mg; B-Si) and anomalous behavior of first member of each group, Allotropy and catenation (examples of C, P and S compounds). Study of the following compounds with emphasis on preparation, properties, structure and bonding: Berylium hydrides and halides; diborane; borazine; boron nitride, boric acid, borax, fluorocarbons (with environmental effect); oxides and oxyacids of nitrogen, phosphorous, sulphur and chlorine; Peroxo acids of sulphur; tetrasulphur trtranitride; interhalogens, pseudohalogens, polyhalides, fluorides and oxides of xenon. Noble gas clathrates; basic properties of iodine. Synthesis, structural aspects and applications of silicones and phosphazines; Structural	7

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			properties of various silicates.	
		CHEMHP-9	Complexometric Titration	10
			Inorganic Preparation	
Mrs. Saleha Khatun	IV	CEMHCC-T-9	Coordination Chemistry-I Idea about double salts and complex salts, Werner's theory	03
			EAN rule, classification of ligands and their binding modes	03
			IUPAC nomenclature of coordination compounds (up to two metal centres)	03
			overall and stepwise stability constants, chelates, inner metallic complexes	03
			Stereochemistry and isomerism (constitutional and stereo) of complexes with coordination no. 4 and 6.	03
		CEMHCC-P-9	Complexometric Titration: i)Estimation of Hardness of Water ii)Estimation of Ca(II) and Mg(II) in a mixture	04
			Inorganic Preparation: i)Mohr's Salt ii)Tetraamminecarbonatocobalt (III) trihydrate	02
Mr. Yasin Nuree	IV	CEMHCC-T-10 Organic Chemistry-4 Theory	Nitrogen Compounds Amines: Aliphatic & Aromatic:	03
			Nitro compounds (aliphatic and aromatic):	02
			Alkylnitrile and isonitrile	02
			Diazonium salts and their related compounds	02
			The Logic of Organic Synthesis Retrosynthetic analysis:	08
			Strategy of ring synthesis:	04
			Asymmetric synthesis:	06
		CEMHCC-P-10 Organic Chemistry-4 Practical	Organic Quantative Estimation	14

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Mr. Md Muttakin Sarkar	IV	CEMHCC-T-10 Organic Chemistry-4	Rearrangements: Mechanism with evidence and stereochemical Features for the following Rearrangement to electron-deficient carbon	03
			Rearrangement to electron-deficient nitrogen	01
		CEMHCC-P-10 Organic Chemistry-4 Practical	Rearrangement to electron-deficient oxygen	02
			Aromatic rearrangements	01
			Migration from nitrogen to ring carbon	01
			Rearrangement reactions by green approach	01
			Organic Spectroscopy UV Spectroscopy	02
			IR Spectroscopy	02
			NMR Spectroscopy	05
Mr Yasin Nuree	IV	SEC-1B CHEMHS – 2A Pharmaceutical Chemistry	Drugs & Pharmaceuticals Introduction	08
			Fermentation	06
			Hands On Practical	06

Dr. Nabin Chandra Maity	V	CHEMHT-11	Magnetochemistry Classification of magnetic substances, Origin of para magnetic moments, temperature dependence of para magnetism – Curie and Curie-Weiss law, TIP, magnetic susceptibility and its measurement (Gouy method), diamagnetic correction, effective magnetic moment, spin only moment for 3d metals, Orbital contribution to magnetic moment, spin-orbit coupling, quenching of orbital	12

			contribution, Sub-normal magnetic moments and antiferromagnetic interactions (elementary idea with examples).	
			Chemistry of d- and f-block elements d-block elements: Characteristic properties, Comparison among the elements of 3d series with reference to electronic configuration, oxidation states and E^0 values; General comparison between 3d, 4d and 5d series elements in term of electronic configuration, oxidation states, atomization energy, magnetic properties and coordination chemistry. f-block elements: Comparison between d and f-block elements; Electronic configuration, oxidation states, variation of magnetic properties (Ln^{3+}), atomic and ionic (3+) radii of lanthanoids; consequences of lanthanide contraction, separation of lanthanides by ion exchange and solvent extraction methods; comparison between lanthanoids and actinoids.	12
		CHEMHP-11	Quantitative estimation A. Quantitative: i. Estimation of available chlorine in bleaching powder using iodometry ii. Estimation of available oxygen in pyrolusite using permanganometry iii. Estimation of Cu in brass using iodometry iv. Estimation of Fe in cement using permanganometry v. Estimation of chloride gravimetrically vi. Estimation of Ni(II) using DMG gravimetrically B.	10

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			Experiment: i. Paper chromatographic separation of Ni(II) and Co(II) ii. Measurement of 10Dq by spectrophotometric method iii. Preparation of Mn(acac)3 and determination of its λmax colorimetrically	
Mrs. Saleha Khatun	V	CEMHCC-T-11 Inorganic chemistry-III Theory Coordination Chemistry-II	structure and bonding of coordination compounds on the basis of V. B. Theory and its limitations.	04
			Elementary idea about CFT, splitting of d^n configuration in ML4 to ML6 and ML8 systems, factors affecting, measurement of o, spectrochemical series of ligands,	06
			CFSE in weak and strong fields, OSSE, High spin and low spin complexes, spin isomerism,	02
			tetragonal distortion, Jahn Teller theorem and applications, achievements and limitations of CFT, nephalauxetic effect, stabilisation of unusually high and low oxidation states of 3d series elements	06
			MOT (elementary idea), σ and π bonding in octahedral complexes (a pictorial approach). Colour and electronic spectra of complexes: selection rules for electronic transitions, d-d transition, charge transfer transition (qualitative idea)	04
			L-S coupling and R-S ground state term for atomic no. up to 30, qualitative ORGEL diagram for 3d1 – 3d9 ions with	06

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			appropriate symbols for the energy levels.	
		CEMHCC-P-11 Inorganic Chemistry-IV Practical	Estimation of available chlorine in bleaching powder using iodometry	01
			Estimation of available oxygen in pyrolusite using permanganometry	02
			Estimation of Fe in cement using permanganometry	02
			Estimation of Ni(II) using DMG gravimetrically	01
			Estimation of chloride gravimetrically	01
Dr. Sandip Kumar Rajak	V	CHEMHT-12 Physical Chemistry – IV	Molecular Spectroscopy Interaction of electromagnetic radiation	04
			Molecular Spectroscopy Rotation spectroscopy:	06
			Vibrational spectroscopy:	06
			Molecular Spectroscopy Raman spectroscopy:	04
			Molecular Spectroscopy Nuclear Magnetic Resonance (NMR) spectroscopy, Electron Spin Resonance (ESR) spectroscopy:	04
			Surface phenomenon Surface tension and energy:	06
			Surface phenomenon Adsorption:	06
			Surface phenomenon Colloids:	06
		CHEMHP-12 Physical Chemistry – IV	Verification of Beer and Lambert's Law for $KMnO_4$and $K_2Cr_2O_7$solution	02
			Study of kinetics of $K_2S_2O_8$+ KI reaction, spectrophotometrically.	02
			Determination of CMC from surface tension measurements.	02
Mr. Delwar Ansary	V	CHEMHT-12 Physical Chemistry –	Phtochemistry: Lambert-Beer's law	06

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		IV	Photochemistry: Photochemical Processes	06
			Photochemistry: Rate of Photochemical processes	06
		CHEMHP-12 Physical Chemistry – IV	Determination of surface tension of a liquid using Stalagmometer.	02
			Determination of pH of unknown buffer, spectrophotometrically.	02
Dr. Nabin Chandra Maity	V	CHEMHTDSE-1B Inorganic Materials of Industrial Importance	Silicate Industries	9
			Fertilizers	9
			Surface Coatings	9
			Batteries	9
			Alloys	9
			Catalysis	9
			Chemical explosives	6
Mr. Yasin Nuree	V	CEMH-DSE-T-2C Green Chemistry Theory	Twelve principles of Green Chemistry	06
			Prevention/ minimization of hazardous/ toxic products	05
			Energy requirements for reactions – alternative sources of energy	05
			Prevention of chemical accidents designing greener processes	06
			Future Trends in Green Chemistry Oxidation reagents and catalysts	04
		CEMH-DSE-P-2C Green Chemistry Practical	Green Chemistry Practical	15
Mr. Md. Muttakin Sarkar	V	CEMHDSE-T-2C Green Chemistry	Green Chemistry Introduction to Green Chemistry	05
			Examples of Green Synthesis/ Reactions and some real-World cases	10
		CEMHDSE-T-2C Green Chemistry	Green Chemistry Practical	05

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		Theory		

Dr. Nabin Chandra Maity	VI	CHEMHT-13	Bio-inorganic Chemistry Essential elements of life, Role of metal ions in living systems- a brief review, Elementary idea about proteins, enzymes and ionophores; Structure of ATP, Na^+ ion pump and transport of Na^+ and K^+ across cell membrane; active site structures and bio-functions of haemoglobin, myoglobin, carboxy peptidase A, carbonic anhydrase B, cytochrome c, ferredoxins and chlorophyll; biological nitrogen fixation; toxic metals (Pb, Cd and Hg) and their effects, Wilson disease, chelation therapy; platinum and gold complexes as drugs (examples only).	25
			Organometallic chemistry and catalysis Definition, Classification of organometallic compounds, hapticity of ligands, nomenclature, 16- electron & 18-electron rule and its applications; preparation and structure of mono- and bi-nuclear carbonyls of 3d series, synergic effect of CO and use of IR data to explain extent of back bonding; General methods of preparation of metal-carbon σ-bonded complexes, Zeise's salt, Metal-carbon multiple bonding; Preparation, structures, properties and reactions of ferrocene; elementary idea about oxidative addition, reductive elimination, insertion reactions; Study of the	25

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			following catalytic processes: alkene hydrogenation (Wilkinson's catalyst), hydroformylation, Wacker process, Synthetic gasoline (Fischer Tropsch reaction) and Olefin polymerization reaction (Ziegler-Natta catalyst)	
		CHEMHP-13	Qualitative semimicro analysis	10
Mrs. Saleha Khatun	VI	CEMHCC-T-13 Molecular Symmetry and Point group	Symmetry as a universal theme, concept of symmetry elements and operations (with examples);	02
			symmetry properties of atomic orbitals (s, p and d);	02
			identification of molecular point groups in some simple molecules and ions;	04
			applications of symmetry for polarity and chirality.	02
		Bio-inorganic Chemistry	Essential elements of life, Role of metal ions in living systems- a brief review, Elementary idea about proteins, enzymes and ionophores; Structure of ATP, Na+ ion pump and transport of Na+ and K+ across cell membrane;	06
			active site structures and bio-functions of haemoglobin, myoglobin,	03
			carboxy peptidase A, carbonic anhydrase B, cytochrome c, ferredoxins and chlorophyll; biological nitrogen fixation;	06
			toxic metals (Pb, Cd and Hg) and their effects, Wilson disease,	04
			chelation therapy; platinum and gold complexes as drugs (examples only)	04
		CEMHCC-P-13 Qualitative semimicro analysis	Qualitative semimicro analysis of mixtures containing four radicals (excluding oxide and	06

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			carbonate). Emphasis should be given to the understanding of the chemistry of different reactions and to assign the most probable composition. Basic Radicals: K^+, $NH4^+$, $Mg^{2+,}$ Ca^{2+}, Ba^{2+}, Sr^{2+}, Al^{3+}, Cr^{3+}, Mn^{2+}, Fe^{3+}/ Fe^{2+}, Co^{2+}, $Ni^{2+,}$ Cu^{2+}, Zn^{2+}, $Pb^{2+,}$ Cd^{2+}, Bi^{3+}, Sn^{2+} / Sn^{4+}, As^{3+}/$As^{5+,}$ $Sb^{3+/}$ Sb^{5+}	
			Acid Radicals: Cl^-, Br^-, I^-, $S^{2-,}$ SO_4^{2-}, $S_2O_3^{2-}$, SCN^-, NO_3^-, NO_2^-, BO_3^{3-}, PO_4^{3-}, AsO_4^{3-} and H_3BO_3	02
			Insoluble Materials: Cr_2O_3(ig), Fe_2O_3(ig), Al_2O_3, SnO_2, $PbSO_4$, $BaSO_4$, $SrSO_4$	03
Mr. Yasin Nuree	VI	CEMHCC-T-14 Organic Chemistry-4 Theory	Carbocycles and Heterocycles Polynuclear hydrocarbons and their derivatives	06
			Heterocyclic compounds	04
			Synthesis (including retrosynthetic approach and mechanistic details)	04
			Pyridine	06
			Cyclic Stereochemistry Alicyclic compounds	06
		CHEMHCC-P-14 Organic Chemistry-4 Practical	Chromatographic Separations	08
			Spectroscopic Analysis of Organic Compounds	06
Mr. Md Muttakin Sarkar	VI	CEMHCC-T-14 Organic Chemistry-4 Theory	Pericyclic reactions Mechanism, stereochemistry, regioselectivity in case of Electrocyclic reactions	03
			Cycloaddition reactions	02
			Sigmatropic reactions	02
		CHEMHCC-P-14	Carbohydrates Monosaccharides, disaccharides, polysaccharides	05
			Biomolecules Amino acids, peptides	05

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			Chromatographic Separations	05
Dr. Sandip Kumar Rajak	VI	CHEMHTDSE-3 Advanced Physical Chemistry	Statistical Thermodynamics Configuration:	06
			Statistical Thermodynamics Boltzmann distribution:	06
			Statistical Thermodynamics Partition function:	06
			Special selected topics Specific heat of solid:	07
			Special selected topics 3rd law:	07
			Special selected topics Polymers	07
		CHEMHTDSE-3 Advanced Physical Chemistry	Roots of equations: (e.g. volume of van der Waals gas and comparison with ideal gas, pH of a weak acid).	02
			Numerical differentiation (e.g., change in pressure for small change involume of a van der Waals gas, potentiometric titrations).	02
			Numerical integration (e.g. entropy/ enthalpy change from heat capacity data), probability distributions (gas kinetic theory) and mean values.	02
Mr. Delwar Ansary	VI	CHEMHTDSE-3 Advanced Physical Chemistry	Crystal Structure: Bravais Lattice and Laws of Crystallography:	08
			Crystal Structure: Crystal planes:	06
			Crystal Structure: Determination of crystal structure	06

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Name of Teacher	Semester	Paper	Content	No. of Lecture
Saleha Khatun	I	CHEMG-T-01	Atomic Structure	09
			Chemical Periodicity	09
			Redox Reactions	04
		CHEMG-P-01	Estimation of Fe(II) ions with $K_2Cr_2O_7$	01
			Estimation of carbonate and bicarbonate present together in a mixture	02
Delwar Ansary	I	CHEMG-T-01	**Acids and bases** Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents.	03
			Acids and bases Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept.	03
			Acids and bases Hard and soft acids and bases (HSAB concept), applications of HSAB process.	02
			Aliphatic Hydrocarbons Introduction	02
			Alkanes (up to 5 Carbons)	03
			Alkenes: (up to 5 Carbons).	04
			Alkynes: (up to 5 Carbons).	03
		CHEMG-P-01	Estimation of oxalic acid by titrating it with $KMnO_4$.	02
			Estimation of Cu (II) ions iodometrically using $Na_2S_2O_3$.	02
Md Muttakin Sarkar	I	CHEMG-T-01	**Fundamentals of Organic Chemistry** 1.Electronic displacements	05
			2.Stereochemistry	05

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			3. Nucleophilic Substitution and Elimination Reactions	04
		CHEMGP-1 Organic Chemistry -1	Qualitative Analysis of Single Solid Organic Compound(s)	05

Saleha Khatun	II	CHEMG-T-02	Chemical Bonding and Molecular structure: a) Ionic Bonding	06
			b) Covalent Bonding	07
			c) MO Approach	07
			Comparative study of p-block elements: a) Group trends in electronic configuration, modification of pure elements,	04
			b) Common oxidation states,inert pair effect,and their important compounds in respect of the following groups of elements i. B-Al-Ga-In-Tl ii. C-Si-Ge-Sn-Pb	04
			iii. N-P-As-Sb-Bi iv. O-S-Se-Te v. F-Cl-Br-I	02
		CHEMG-P-02	Qualitative semi-micro analysis of mixtures containing three radicals. Emphasis should be given to the understanding of the chemistry of different reactions. Acid Radicals: Cl^-, Br^-, I^-, NO_2^-, NO_3^-, S^{2-}, SO_4^{2-}, BO_3^{3-}, H_3BO_3.	03
			Basic Radicals: Na^+, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Cr^{3+}, Mn^{2+}, Fe^{3+}, Ni^{2+}, Cu^{2+}, NH_4^+.	02
Delwar Ansary	II	CHEMG-T-02	Kinetic Theory of Gases and Real gases	12
			Liquids	05

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		CHEMG-P-02	Surface tension measurement (use of organic solvents excluded)	02
			Viscosity measurement (use of organic solvents excluded)	02
Md Muttakin Sarkar	II	CHEMG-T-02	Solids	05
			Chemical kinetics	05
		CHEMG-P-02 Physical Chemistry – I	Viscosity measurement (use of organic solvents excluded)	02

Delwar Ansary	I	CHEMG-T-01	**Acids and bases** Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents.	03
			Acids and bases Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept.	03
			Acids and bases Hard and soft acids and bases (HSAB concept), applications of HSAB process.	02
			Aliphatic Hydrocarbons *Introduction*	02
			Alkanes (up to 5 Carbons)	03
			Alkenes: (up to 5 Carbons).	04
			Alkynes: (up to 5 Carbons).	03
		CHEMG-P-01	Estimation of oxalic acid by titrating it with $KMnO_4$.	02
			Estimation of Cu (II) ions iodometrically using $Na_2S_2O_3$.	02
Saleha Khatun	III	CHEMG-T-01	Atomic Structure	09
			Chemical Periodicity	09

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			Redox Reactions	04
		CHEMG-P-01	Estimation of Fe(II) ions with $K_2Cr_2O_7$	01
			Estimation of carbonate and bicarbonate present together in a mixture	02
Md Muttakin Sarkar	III	CHEMG-T-01	**Fundamentals of Organic Chemistry** 1.Electronic displacements	05
			2.Stereochemistry	05
			3. Nucleophilic Substitution and Elimination Reactions	04
		CHEMGP-1 Organic Chemistry -1	Qualitative Analysis of Single Solid Organic Compound(s)	05

Delwar Ansary	II	CHEMG-T-02	Kinetic Theory of Gases and Real gases	12
			Liquids	05
			Surface tension measurement (use of organic solvents excluded)	02
		CHEMG-P-02	Viscosity measurement (use of organic solvents excluded)	02
Saleha Khatun	IV	CHEMG-T-02	Chemical Bonding and Molecular structure: d) Ionic Bonding	06
			Covalent Bonding	07
			MO Approach	07
			Comparative study of p-block elements: a) Group trends in electronic configuration, modification of pure elements,	04
			b) Common oxidation states, inert pair effect, and their important compounds in respect of the following groups of elements i. B-Al-Ga-In-Tl ii. C-Si-Ge-Sn-Pb	04

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			iii. N-P-As-Sb-Bi iv. O-S-Se-Te v. F-Cl-Br-I	02
		CHEMG-P-02	Qualitative semi-micro analysis of mixtures containing three radicals. Emphasis should be given to the understanding of the chemistry of different reactions. Acid Radicals: Cl^-, Br^-, I^-, NO_2^-, NO_3^-, S^{2-}, SO_4^{2-}, BO_3^{3-}, H_3BO_3.	03
			Basic Radicals: Na^+, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Cr^{3+}, Mn^{2+}, Fe^{3+}, Ni^{2+}, Cu^{2+}, NH_4^+.	02
Md Muttakin Sarkar	IV	CHEMG-T-02	Solids	05
			Chemical kinetics	05
		CHEMG-P-02 Physical Chemistry – I	Viscosity measurement (use of organic solvents excluded)	02

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Name of Teacher	Semester	Paper	Content	No. of Lecture
Saleha Khatun	I	CHEMG-T-01	Atomic Structure	09
			Chemical Periodicity	09
			Redox Reactions	04
		CHEMG-P-01	Estimation of Fe(II) ions with $K_2Cr_2O_7$	01
			Estimation of carbonate and bicarbonate present together in a mixture	02
Delwar Ansary	I	CHEMG-T-01	**Acids and bases** Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents.	03
			Acids and bases Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept.	03
			Acids and bases Hard and softacids and bases (HSAB concept), applications of HSAB process.	02
			Aliphatic Hydrocarbons Introduction	02
			Alkanes (up to5 Carbons)	03
			Alkenes:(upto5 Carbons).	04
			Alkynes:(upto5 Carbons)	03
		CHEMG-P-01	Estimation of oxalic acid by titrating it with $KMnO_4$.	02
			Estimation of Cu(II)ions iodometrically using $Na_2S_2O_3$.	02
Md Muttakin Sarkar	I	CHEMG-T-01	**Fundamentals of Organic Chemistry** Electronic displacements	05
			Stereochemistry	05
			Nucleophilic Substitution and Elimination Reactions	04
		CHEMGP-1 Organic Chemistry -1	Qualitative Analysis of Single Solid Organic Compound(s)	05

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Saleha Khatun	II	CHEMG-T-02	Chemical Bonding and Molecular structure: a) Ionic Bonding	06
			b) Covalent Bonding	07
			c) MO Approach	07
			Comparative study of p-block elements: a) Group trends in electronic configuration, modification of pure elements,	04
			b) Common oxidation states, inert pair effect, and their important compounds in respect of the following groups of elements i. B-Al-Ga-In-Tl ii. C-Si-Ge-Sn-Pb	04
			iii. N-P-As-Sb-Bi iv. O-S-Se-Te v. F-Cl-Br-I	02
		CHEMG-P-02	Qualitative semi-micro analysis of mixtures containing three radicals. Emphasis should be given to the understanding of the chemistry of different reactions. Acid Radicals: Cl^-, Br^-, I^-, NO_2^-, NO_3^-, S^{2-}, SO_4^{2-}, BO_3^{3-}, H_3BO_3.	03
			Basic Radicals: Na^+, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Cr^{3+}, Mn^{2+}, Fe^{3+}, Ni^{2+}, Cu^{2+}, NH_4^+.	02
Delwar Ansary	II	CHEMG-T-02	Kinetic Theory of Gases and Real gases	12
			Liquids	05
		CHEMG-P-02	Surface tension measurement (use of organic solvents excluded)	02
			Viscosity measurement (use of organic solvents excluded)	02
MdMuttakin Sarkar	II	CHEMG-T-02	Solids	05
			Chemical kinetics	05
		CHEMG-P-02 Physical Chemistry – I	Viscosity measurement (use of organic solvents excluded)	02

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Nabin Chandra Maity	III	CHEMG-T-03	Ionic Equilibria	09
			Aryl Halides	04
		CHEMG-P-03	Determination of enthalpy of hydration of copper sulphate	02
Delwar Ansary	III	CHEMG-T-03	Chemical Energetics	12
			Carbonyl Compounds	07
		CHEMG-P-03	Determination of heat capacity of calorimeter for different volumes	02
			Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide	02
Saleha Khatun	III	CHEMG-T-03	Chemical Equilibrium	09
			Alcohols, Phenols and Ethers	08
		CHEMG-P-03	Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH meter and compare it with the indicator method	02
			Preparation of buffer solutions and find the pH of an unknown buffer solution by colour matching method (using following buffers) a. Sodium acetate-acetic acid b. Ammonium chloride-ammonium hydroxide	02
Md Muttakin Sarkar	III	CHEMG-T-03	Aromatic hydrocarbons	06
			Organometallic compounds	04
		CHEMGP-3 Organic Chemistry -1	Identification of a pure organic compound	04

Nabin Chandra Maity	IV	CHEMG-T-04	Coordination Chemistry	10
			Crystal Field Theory	10
		CHEMG-P-04	Complexometric estimation of (i) Mg2+ or (ii) Zn2+ using EDTA.	02
			Preparation of any two of the following complexes: a.tetraammine	01

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			carbonatocobalt (III) nitrate	
Delwar Ansary	IV	CHEMG-T-04	Phase Equilibrium	07
		CHEMG-P-04	Study of the equilibrium of one of the following reactions by the distribution method: $I_2(aq) + I^-(aq) = I^-(aq)$	02
			Perform the following potentiometric titrations: Weak acid vs. strong base	02
			Potassium dichromate. Mohr's salt	02
Saleha Khatun	IV	CHEMG-T-04	Conductance	08
			Transition Elements (3d Series)	10
		CHEMG-P-04	Preparation of any two of the following complexes: b. tetraamminecopper(II) sulphate	01
			c. potassium trioxalatochromate(III) trihydrate	01
			d. potassium bisoxalatocuprate(II) trihydrate	01
Md Muttakin Sarkar	IV	CHEMG-T-04	Solutions	05
			Electromotive force	05
		CHEMG-P-4	conductometric titrations: Strong acid vs. strong base	02
Nabin Chandra Maity	V	CHEMGTDSE-1	Chemical Analysis	14
		CHEMGPDSE-1	To find the total hardness of water by EDTA titration	02
			Determination of the strength of the H2O2 sample	02
Delwar Ansary	V	CHEMGTDSE-1	Error Analysis and Computer Applications	12
		CHEMGPDSE-1	To determine the rate constant for the acid catalysed hydrolysis of an ester.	02

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			TitrationofHClandCH$_3$COOHmixturevsNaOHusingtwodifferentindicatorstofindtheconcentration.	02
Saleha Khatun	V	CHEMGTDSE-1	Industrial Chemistry	18
		CHEMGPDSE-1	Titration of Na2CO3 and NaHCO3 mixture vs HCl using phenolphthalein and methyl orange indicators	02
Md Muttakin Sarkar	V	CHEMGTDSE-1	Environmental Chemistry	16
		CHEMGPDSE-1	Estimation of available oxygen in pyrolusite	02
Nabin Chandra Maity	VI	CHEMGTDSE-2	Polymers	04
			Paints	03
			Varnishes	02
			Fats and Oils	03
		CHEMGPDSE-2	Purification of the crude product is to be made by crystallisation from water/alcohol	02
			Estimation of saponification value of oil / ester / fat.	02
Delwar Ansary	VI	CHEMGTDSE-2	Amines and Diazonium Salts	10
			Amino Acids and Carbohydrates	10
		CHEMGPDSE-2	Hydrolysis of amides/imides	02
			Acetylation of aromatic amines	02
Saleha Khatun	VI	CHEMGTDSE-2	Synthetic dyes	02
			Drugs and Phermaceuticals	03
			Pesticides	03
			Fermentation Chemicals	03
		CHEMGPDSE-2	Estimation of acetic acid in commercial vinegar	01
			Estimation of amino acid by formol titration	02
Md Muttakin Sarkar	VI	CHEMGTDSE-2	Carboxylic Acids and Their Derivatives	06
			Industrial Chemistry Food additives	02
		CHEMGPDSE-2	Nitration of aromatic compounds	02

			Purification of the crude product is to be made by crystallization from water/alcohol.	01

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Name of Teacher	Semester	Paper	Content	No. of Lecture
Dr. Nabin Chandra Maity	I	CEMHCC-TH-1	Periodic properties Bohr's model and atomic spectrum of hydrogen, Limitations of Bohr's model and Sommerfeld's modifications, de Broglie's concept, Heisenberg's uncertainty principle and its significance,	7
			Time independent Schrödinger's wave equation (without application and solution detail), Significance of ψ and ψ2, Radial and angular wave functions for hydrogen atom (qualitative idea), radial probability distribution curves, shapes of s, p, d and f orbitals (qualitative idea), Quantum numbers and their significance, Pauli's exclusion principle, Aufbau principle and limitations, Hund's rules, exchange energy, electronic configurations of atoms. Elementary idea of microstates.	7
			Acidimetry and alkalimetry	10
Mrs. Saleha Khatun	I	CEMHCC-TH-1	Inorganic chemistry-I Theory Extranuclear structure of atom Bohr's model and atomic spectrum of hydrogen, Limitations of Bohr's model and Sommerfeld's modifications, de Broglie's concept, Heisenberg's uncertainty principle and its significance, Time independent Schrödinger's wave equation (without application and solution detail)	06
			Significance of ψ and ψ2, Radial and angular wave functions for hydrogen atom (qualitative idea), radial probability	04

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			distribution curves, shapes of s, p, d and f orbitals (qualitative idea)	
			Quantum numbers and their significance, Pauli's exclusion principle, Aufbau principle and limitations, Hund's rules, exchange energy, Electronic configurations of atoms.	04
			Elementary idea of microstates	02
		CEMHCC-P-1 Inorganic Chemistry-IA practical	Method of Preparation of standard solutions of titrants	02
			Estimation of Carbonate and hydroxide present together in a mixture	02
			Estimation of carbonate and bicarbonate present together in a mixture	02
Dr.Sandip Kumar Rajak	I	CHEMHT-IA Physical Chemistry-IA	Kinetic Theory and Gaseous state Kinetic Theory of gases	06
			Maxwell's distribution of speed and energy	06
			Real gas and virial equation	06
		CHEMHP-IA Physical Chemistry-IA	Determination of heat of neutralization of a strong acid by a strong base.	02
			Determination of heat of solute ion of oxalic acid from solubilitymeasurement	02
Mr. Delwar Ansary	I	CHEMHT-IA Physical Chemistry-IA	Chemical Thermodynamics-1: Zeroth and 1st law of Thermodynamics	07
		CHEMHT-IA Physical Chemistry-IA	Chemical Thermodynamics-1 : Thermochemistry	05
			Kinetic Theory and Gaseous state Kinetic Theory of gases	06
Mr. Yasin Nuree	I	CEMHCC-T-2 Organic Chemistry-1 Theory	General Treatment of Reaction Mechanism – I Mechanistic classification:	07
			Reactive intermediates:	07
			Stereochemistry-I Bonding geometries of carbon compounds and representation	06

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			of molecules	
			Concept of chirality and symmetry:	07
		CEMHCC-P-2 Organic Chemistry-1 Practical	Separation	04
			Determination of boiling point	04
			Identification of a Pure Organic Compound by chemical test	08
Mr. Md Muttakin Sarkar	I	CEMHCC-T-2 Organic Chemistry-1 Theory	Bonding and Physical Properties Valence Bond Theory	02
			Electronic displacements	04
			MO theory	04
			Physical properties	03
			Stereochemistry-I Relative and absolute configuration	03
			Optical activity of chiral compounds	04

Dr. Nabin Chandra Maity	II	CHEMHT-3	Acid-Base Concepts and Solvents Recapitulation of Arrhenius concept, Bronsted-Lowry concept, Solvent system concept (in H_2O, liq. NH_3, liq. SO_2 and liq. HF), Lux-Flood concept, Lewis concept	8
			Drago-Wayland equation, Solvent levelling and differentiating effects, Relative strength of different acids and bases, Pauling's rules, Hammett acidity function and super acids, HSAB principle and its applications, Acid-base equilibria in aqueous solution, pH, Buffer, Acid-base neutralization curves and choice of indicators. Gas phase acidity.	7
			Quantitative Chemical Analysis	10

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			I. Estimation of Fe(II) using $K_2Cr_2O_7$ solution II. Estimation of Fe(III) using $K_2Cr_2O_7$ and $KMnO_4$ solution iii. Estimation of Ca^{2+} using $KMnO^4$ solution iv. Estimation of Cu^{2+} iodometrically v. Estimation of Cr^{3+} using $K_2Cr_2O_7$ solution	
Mrs. Saleha Khatun	II	CEMHCC-T-3 Inorganic Chemistry-IB Theory	Redox reactions and Precipitation reactions Qualitative idea about complimentary, noncomplimentary, disproportionation and comproportionation reactions, standard redox potentials with sign conventions, Electrochemical series and its application to explore the feasibility of reactions and equilibrium constants	06
			Nernst equation; effect of pH, complexation and precipitation on redox potentials, formal potential; Basis of redox titration and redox indicators, Redox potential diagrams (Latimer and Frost) of common elements and their applications.	05
			Solubility product principle, common ion effect and their applications to the precipitation and separation of common metallic ions as hydroxides, sulphides, carbonates, sulphates and halides.	04
		CEMHCC-P-3 Inorganic Chemistry Practical-IB	Estimation of Fe(II) using $K_2Cr_2O_7$ solution	01
			Estimation of Fe(III) using $K_2Cr_2O_7$ Solution	01
			Estimation of Cu^{2+} iodometrycally	02

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			Estimation of Cr^{3+} using $K_2Cr_2O_7$ Solution	01
Dr. Sandip Kumar Rajak	II	CHEMHT-3 Physical chemistry-IB	Chemical kinetics Rate law, order and molecularity:	05
			Chemical kinetics Role of Temperature and theories of reaction rate:	07
			Chemical kinetics Homogeneous catalysis:	06
		CHEMHP-3 Physical chemistry-IB	Study of kinetics of acid-catalyzed hydrolysis of methyl acetate	04
			Study of kinetics of decomposition of H_2O_2.	04
Mr. Delwar Ansary	II	CHEMHT-3 Physical chemistry-IB	Chemical Thermodynamics-II: Second Law	05
			Chemical Thermodynamics-II: Clausius inequality, Criteria for spontaneity and equilibrium.	05
			Chemical Thermodynamics-II: Thermodynamic relations:	02
Mr. Yasin Nuree	II	CEMHCC-T-4 Organic Chemistry-2 Theory	Stereochemistry-II Stereochemistry-II Concept of pro-stereoisomerism:	06 04
			Conformation:	06
			Substitution and Elimination Reactions Elimination reactions:	08
		CEMHCC-P-4 Organic Chemistry-2 Practical	Organic Preparations	18
Mr. Md Muttakin Sarkar	II	CEMHCC-T-4 Organic Chemistry-2	General Treatment of Reaction Mechanism II Reaction thermodynamics	02
			Concept of organic acids and bases	02
			Tautomerism	04
			Reaction kinetics	05

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			Substitution and Elimination Reactions Free-radical substitution reaction	03
			Nucleophilic substitution reactions	04

Dr. Sandip Kumar Rajak	III	CHEMHT-5 Physical Chemistry – II	Transport processes Viscosity:	10
			Transport processes Conductance and transport number:	10
			Foundation of Quantum Mechanics Beginning of Quantum Mechanics:	04
			Foundation of Quantum Mechanics Wave function:	06
			Foundation of Quantum Mechanics Concept of Operators:	05
			Foundation of Quantum Mechanics Particle in a box:	05
		CHEMHP-5 Physical Chemistry – II	Determination of partition coefficient for the distribution of I_2 between water and CCl_4	04
			Determination of K_{eq} for KI + I_2= KI_3, using partition coefficient between water and CCl_4.	04
			Conductometric titration of an acid (strong, weak/ monobasic, dibasic) againststrong base.	04
Mr. Delwar Ansary	III	CHEMHT-5 Physical Chemistry – II	Application of Thermodynamics-I: Partial properties and chemical potential:	03
			Application of Thermodynamics-I: Chemical Equilibrium:	03
			Application of	03

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			Thermodynamics-I:	
			Application of Thermodynamics-I: Nernst's distribution law;	04
			Chemical potential and other properties of ideal substances-pure and mixtures: Pure ideal gas:	04
			Application of Thermodynamics-I: Condensed Phase	03
		CHEMHP-5 Physical Chemistry – II	Study of viscosity of unknown liquid (glycerol, sugar) with respect to water.	04
			Application of Thermodynamics-I: Partial properties and chemical potential:	03
Dr. Nabin Chandra Maity	III	CHEMHT-6	Chemical Bonding–II Covalent Bond: Lewis structures, formal charge; Qualitative idea of V. B. Theory, directional properties of covalent bond, Concept of Equivalent and non equivalent Hybridization and shapes of simple molecules and ions (examples from main groups), Stereochemically non-rigid molecules – Berry's pseudorotation, Resonance and Dipole moments of inorganic molecules and ions.	14

			VSEPR theory and Bent's rule and their applications; M.O. Theory (elementary pictorial approach), concept of bond order, MO diagram of homo-nuclear diatomics (1st and 2nd period elements), hetero-nuclear diatomics (HF, CO, NO, NO^+ and CN^-) and triatomics (H_2O and BeH_2). Electron sea model and elementary idea about band theory, classification of inorganic solids and their conduction properties according to band theory; Hydrogen bonding: classifications, its effect on the properties of compounds and its importance in biological systems, Vander Waal's forces.	14
			Metal extraction and purification: Basic Metallurgy Idea about ores and minerals, operations involved in metallurgy, Flow chart diagram for the extraction of pure Ti, Ni and U (including reactions) from their important ores and their uses.	10
		CHEMHP-6	Quantitative inorganic analysis i. Estimation of Fe(II) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution ii. Estimation of Fe(III) and Cu(II) in a given mixture using $K_2Cr_2O_7$ solution iii. Estimation of Cr(VI) and Mn(II) in a given mixture using $K_2Cr_2O_7$ solution iv. Estimation of Fe(III) and Cr(VI) in a given mixture using $K_2Cr_2O_7$ solution v. Estimation of Fe(II) and Mn(II) in a given mixture using $KMnO_4$ solution vi. Estimation of Fe(III) and	10

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			Ca(II) in a given mixture using $KMnO_4$ solution	
Mrs. Saleha Khatun	III	CEMHCC-T-6 Inorganic Chemistry-II Theory	Ionic Bond: Lattice energy, Born-Lande equation with derivation and importance of Kapustinskii expression for lattice energy	05
			Born-Haber cycle and its applications, Polarising power and polarisability of ions, Fajan's rules and its applications	05
			radius ratio rules – its applications and limitations, salvation energy and solubility energetics of dissolution process;	05
			Packing in crystals, voids in crystal lattice, packing efficiency, Structure of ionic solids: rock salt, zinc blende, wurtzite, fluorite, antifluorite, perovskite and layer lattice.	05
			Qualitative idea about stoichiometric and non-stoichiometric crystal defects.	02
		CEMHCC-P-6 Inorganic Chemistry-II Practical	Estimation of Fe(II) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution	02
			Estimation of Cu(II) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution	02
			Estimation of Cr(VI) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution	02
			Estimation of Ca(II) and Fe(III) in a given mixture using K_2Cr_2O7 solution	02
Mr. Yasin Nuree	III	CEMHCC-T-7 Organic Chemistry-3 Theory	Carbonyl and Related Compounds Addition to C=O	09
			Exploitation of acidity of α-H of C=O	08
			Elementary ideas of Green Chemistry	03
			Nucleophilic addition to α,β-unsaturated carbonyl system:	03

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			Nucleophilic addition to α,β-unsaturated carbonyl system:	
			Substitution at sp2 carbon (C=O system)	03
		CEMHCC-P-7 Organic Chemistry-3 Practical	Qualitative Organic Analysis of single solid organic compound	16
Mr. Md Muttakin Sarkar	III	CEMHCC-T-7 Organic Chemistry-3 Theory	Chemistry of alkenes and alkynes Addition to C=C	06
			Addition to C≡C (in comparison to C=C)	04
		CEMHCC-P-7 Organic Chemistry-3 Practical	Aromatic Substitution Electrophilic aromatic substitution	04
			Organo-metallics Free-radical substitution Reaction	04
Mr. Yasin Nuree	III	SEC-1B Basic Analytical Chemistry	Introduction	04
			Complexometry	02
			Soil Analysis	02
			Analysis of water	03
			Analysis of food products	03
			Chromatography	03
			Ion-exchange	02
			Analysis of cosmetics	03
			Suggested Applications (Any one)	02
			Suggested Instrumental demonstrations	03

Dr. Sandip Kumar Rajak	IV	CHEMHT-8 Physical Chemistry–III	Application of Thermodynamics – II: Colligative properties:	08
			Application of Thermodynamics – II: Phase rule:	06
			Application of Thermodynamics – II: Binary solutions:	06

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			Quantum Chemistry Angular momentum:	06
			Quantum Chemistry Qualitative treatment of hydrogen atom and hydrogen-like ions	08
			Quantum Chemistry LCAO and HF-SCF:	06
		CHEMHP-8 Physical Chemistry – II	Determination of solubility of sparingly soluble salt in water, in electrolyte.with common ions and in neutral electrolyte (using common indicator).	02
			pH-metric titration of acid (mono-and di-basic) against strong base.	02
			Determination of K_{sp} for AgCl by potentiometric titration of $AgNO_3$solution against standard KCl solution.	02
Mr. Delwar Ansary	IV	CHEMHT-8 Physical Chemistry–III CHEMHP-8 Physical Chemistry – II	Electrical Properties of molecules: Ionic equilibria	08
			Electrical Properties of molecules: Electromotive Force:	06
			Electrical Properties of molecules: Dipole moment and polarizability	06
			Potentiometric titration of Mohr's salt solution against standard K_2Cr_2O-solution.	02
		CHEMHT-8 Physical Chemistry–III	Effect of ionic strength on the rate of Persulphate –Iodide reaction.	02
			Study of phenol-water phase diagram.	02
			Electrical Properties of molecules: Ionic equilibria	08
Dr. Nabin Chandra Maity	IV	CHEMHT-9	Radioactivity and Nuclear Chemistry	8

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			Atomic nucleus – nuclear stability, n/p ratio and different modes of decay, mass defect, packing fraction and nuclear binding energy. Nuclear forces: Meson exchange theory, elementary idea of nuclear shell model and magic numbers. Fission, fusion and spallation reactions, artificial radioactivity, super heavy elements and their IUPAC nomenclature. Moderators, slow and fast neutrons, Applications of radio-isotopes in: determination of structures, establishment of reaction mechanisms and radio-carbon dating, hazards of radiation and safety measures.	
			Chemistry of s and p-block elements Diagonal relationship (Li-Mg; B-Si) and anomalous behavior of first member of each group, Allotropy and catenation (examples of C, P and S compounds). Study of the following compounds with emphasis on preparation, properties, structure and bonding: Berylium hydrides and halides; diborane; borazine; boron nitride, boric acid, borax, fluorocarbons (with environmental effect); oxides and oxyacids of nitrogen, phosphorous, sulphur and chlorine; Peroxo acids of sulphur; tetrasulphur trtranitride; interhalogens, pseudohalogens, polyhalides, fluorides and oxides of xenon. Noble gas clathrates; basic properties of iodine. Synthesis, structural aspects and applications of silicones and phosphazines; Structural	7

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			properties of various silicates.	
		CHEMHP-9	Complexometric Titration	10
			Inorganic Preparation	
Mrs. Saleha Khatun	IV	CEMHCC-T-9	Coordination Chemistry-I Idea about double salts and complex salts, Werner's theory	03
			EAN rule, classification of ligands and their binding modes	03
			IUPAC nomenclature of coordination compounds (up to two metal centres)	03
			overall and stepwise stability constants, chelates, inner metallic complexes	03
			Stereochemistry and isomerism (constitutional and stereo) of complexes with coordination no. 4 and 6.	03
		CEMHCC-P-9	Complexometric Titration: i)Estimation of Hardness of Water ii)Estimation of Ca(II) and Mg(II) in a mixture	04
			Inorganic Preparation: i)Mohr's Salt ii)Tetraamminecarbonatocobalt (III) trihydrate	02
Mr. Yasin Nuree	IV	CEMHCC-T-10 Organic Chemistry-4 Theory	Nitrogen Compounds Amines: Aliphatic & Aromatic:	03
			Nitro compounds (aliphatic and aromatic):	02
			Alkylnitrile and isonitrile	02
			Diazonium salts and their related compounds	02
			The Logic of Organic Synthesis Retrosynthetic analysis:	08
			Strategy of ring synthesis:	04
			Asymmetric synthesis:	06
		CEMHCC-P-10 Organic Chemistry-4 Practical	Organic Quantative Estimation	14

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Mr. Md Muttakin Sarkar	IV	CEMHCC-T-10 Organic Chemistry-4	Rearrangements: Mechanism with evidence and stereochemical Features for the following Rearrangement to electron-deficient carbon	03
			Rearrangement to electron-deficient nitrogen	01
		CEMHCC-P-10 Organic Chemistry-4 Practical	Rearrangement to electron-deficient oxygen	02
			Aromatic rearrangements	01
			Migration from nitrogen to ring carbon	01
			Rearrangement reactions by green approach	01
			Organic Spectroscopy UV Spectroscopy	02
			IR Spectroscopy	02
			NMR Spectroscopy	05
Mr Yasin Nuree	IV	SEC-1B CHEMHS – 2A Pharmaceutical Chemistry	Drugs & Pharmaceuticals Introduction	08
			Fermentation	06
			Hands On Practical	06

Dr. Nabin Chandra Maity	V	CHEMHT-11	Magnetochemistry Classification of magnetic substances, Origin of para magnetic moments, temperature dependence of para magnetism – Curie and Curie-Weiss law, TIP, magnetic susceptibility and its measurement (Gouy method), diamagnetic correction, effective magnetic moment, spin only moment for 3d metals, Orbital contribution to magnetic moment, spin-orbit coupling, quenching of orbital	12

			contribution, Sub-normal magnetic moments and antiferromagnetic interactions (elementary idea with examples).	
			Chemistry of d- and f-block elements d-block elements: Characteristic properties, Comparison among the elements of 3d series with reference to electronic configuration, oxidation states and E^0 values; General comparison between 3d, 4d and 5d series elements in term of electronic configuration, oxidation states, atomization energy, magnetic properties and coordination chemistry. f-block elements: Comparison between d and f-block elements; Electronic configuration, oxidation states, variation of magnetic properties (Ln^{3+}), atomic and ionic (3+) radii of lanthanoids; consequences of lanthanide contraction, separation of lanthanides by ion exchange and solvent extraction methods; comparison between lanthanoids and actinoids.	12
		CHEMHP-11	Quantitative estimation A. Quantitative: i. Estimation of available chlorine in bleaching powder using iodometry ii. Estimation of available oxygen in pyrolusite using permanganometry iii. Estimation of Cu in brass using iodometry iv. Estimation of Fe in cement using permanganometry v. Estimation of chloride gravimetrically vi. Estimation of Ni(II) using DMG gravimetrically B.	10

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			Experiment: i. Paper chromatographic separation of Ni(II) and Co(II) ii. Measurement of 10Dq by spectrophotometric method iii. Preparation of Mn(acac)3 and determination of its λmax colorimetrically	
Mrs. Saleha Khatun	V	CEMHCC-T-11 Inorganic chemistry-III Theory Coordination Chemistry-II	structure and bonding of coordination compounds on the basis of V. B. Theory and its limitations.	04
			Elementary idea about CFT, splitting of d^n configuration in ML4 to ML6 and ML8 systems, factors affecting, measurement of o, spectrochemical series of ligands,	06
			CFSE in weak and strong fields, OSSE, High spin and low spin complexes, spin isomerism,	02
			tetragonal distortion, Jahn Teller theorem and applications, achievements and limitations of CFT, nephalauxetic effect, stabilisation of unusually high and low oxidation states of 3d series elements	06
			MOT (elementary idea), σ and π bonding in octahedral complexes (a pictorial approach). Colour and electronic spectra of complexes: selection rules for electronic transitions, d-d transition, charge transfer transition (qualitative idea)	04
			L-S coupling and R-S ground state term for atomic no. up to 30, qualitative ORGEL diagram for 3d1 – 3d9 ions with	06

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			appropriate symbols for the energy levels.	
		CEMHCC-P-11 Inorganic Chemistry-IV Practical	Estimation of available chlorine in bleaching powder using iodometry	01
			Estimation of available oxygen in pyrolusite using permanganometry	02
			Estimation of Fe in cement using permanganometry	02
			Estimation of Ni(II) using DMG gravimetrically	01
			Estimation of chloride gravimetrically	01
Dr. Sandip Kumar Rajak	V	CHEMHT-12 Physical Chemistry – IV	Molecular Spectroscopy Interaction of electromagnetic radiation	04
			Molecular Spectroscopy Rotation spectroscopy:	06
			Vibrational spectroscopy:	06
			Molecular Spectroscopy Raman spectroscopy:	04
			Molecular Spectroscopy Nuclear Magnetic Resonance (NMR) spectroscopy, Electron Spin Resonance (ESR) spectroscopy:	04
			Surface phenomenon Surface tension and energy:	06
			Surface phenomenon Adsorption:	06
			Surface phenomenon Colloids:	06
		CHEMHP-12 Physical Chemistry – IV	Verification of Beer and Lambert's Law for $KMnO_4$and $K_2Cr_2O_7$solution	02
			Study of kinetics of $K_2S_2O_8$+ KI reaction, spectrophotometrically.	02
			Determination of CMC from surface tension measurements.	02
Mr. Delwar Ansary	V	CHEMHT-12 Physical Chemistry –	Phtochemistry: Lambert-Beer's law	06

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		IV	Photochemistry: Photochemical Processes	06
			Photochemistry: Rate of Photochemical processes	06
		CHEMHP-12 Physical Chemistry – IV	Determination of surface tension of a liquid using Stalagmometer.	02
			Determination of pH of unknown buffer, spectrophotometrically.	02
Dr. Nabin Chandra Maity	V	CHEMHTDSE-1B Inorganic Materials of Industrial Importance	Silicate Industries	9
			Fertilizers	9
			Surface Coatings	9
			Batteries	9
			Alloys	9
			Catalysis	9
			Chemical explosives	6
Mr. Yasin Nuree	V	CEMH-DSE-T-2C Green Chemistry Theory	Twelve principles of Green Chemistry	06
			Prevention/ minimization of hazardous/ toxic products	05
			Energy requirements for reactions – alternative sources of energy	05
			Prevention of chemical accidents designing greener processes	06
			Future Trends in Green Chemistry Oxidation reagents and catalysts	04
		CEMH-DSE-P-2C Green Chemistry Practical	Green Chemistry Practical	15
Mr. Md. Muttakin Sarkar	V	CEMHDSE-T-2C Green Chemistry	Green Chemistry Introduction to Green Chemistry	05
			Examples of Green Synthesis/ Reactions and some real-World cases	10
		CEMHDSE-T-2C Green Chemistry	Green Chemistry Practical	05

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		Theory		

Dr. Nabin Chandra Maity	VI	CHEMHT-13	Bio-inorganic Chemistry Essential elements of life, Role of metal ions in living systems- a brief review, Elementary idea about proteins, enzymes and ionophores; Structure of ATP, Na^+ ion pump and transport of Na^+ and K^+ across cell membrane; active site structures and bio-functions of haemoglobin, myoglobin, carboxy peptidase A, carbonic anhydrase B, cytochrome c, ferredoxins and chlorophyll; biological nitrogen fixation; toxic metals (Pb, Cd and Hg) and their effects, Wilson disease, chelation therapy; platinum and gold complexes as drugs (examples only).	25
			Organometallic chemistry and catalysis Definition, Classification of organometallic compounds, hapticity of ligands, nomenclature, 16- electron & 18-electron rule and its applications; preparation and structure of mono- and bi-nuclear carbonyls of 3d series, synergic effect of CO and use of IR data to explain extent of back bonding; General methods of preparation of metal-carbon σ-bonded complexes, Zeise's salt, Metal-carbon multiple bonding; Preparation, structures, properties and reactions of ferrocene; elementary idea about oxidative addition, reductive elimination, insertion reactions; Study of the	25

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			following catalytic processes: alkene hydrogenation (Wilkinson's catalyst), hydroformylation, Wacker process, Synthetic gasoline (Fischer Tropsch reaction) and Olefin polymerization reaction (Ziegler-Natta catalyst)	
		CHEMHP-13	Qualitative semimicro analysis	10
Mrs. Saleha Khatun	VI	CEMHCC-T-13 Molecular Symmetry and Point group	Symmetry as a universal theme, concept of symmetry elements and operations (with examples);	02
			symmetry properties of atomic orbitals (s, p and d);	02
			identification of molecular point groups in some simple molecules and ions;	04
			applications of symmetry for polarity and chirality.	02
		Bio-inorganic Chemistry	Essential elements of life, Role of metal ions in living systems- a brief review, Elementary idea about proteins, enzymes and ionophores; Structure of ATP, Na+ ion pump and transport of Na+ and K+ across cell membrane;	06
			active site structures and bio-functions of haemoglobin, myoglobin,	03
			carboxy peptidase A, carbonic anhydrase B, cytochrome c, ferredoxins and chlorophyll; biological nitrogen fixation;	06
			toxic metals (Pb, Cd and Hg) and their effects, Wilson disease,	04
			chelation therapy; platinum and gold complexes as drugs (examples only)	04
		CEMHCC-P-13 Qualitative semimicro analysis	Qualitative semimicro analysis of mixtures containing four radicals (excluding oxide and	06

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			carbonate). Emphasis should be given to the understanding of the chemistry of different reactions and to assign the most probable composition. Basic Radicals: K^+, $NH4^+$, $Mg^{2+,}$ Ca^{2+}, Ba^{2+}, Sr^{2+}, Al^{3+}, Cr^{3+}, Mn^{2+}, Fe^{3+}/ Fe^{2+}, Co^{2+}, $Ni^{2+,}$ Cu^{2+}, Zn^{2+}, $Pb^{2+,}$ Cd^{2+}, Bi^{3+}, Sn^{2+} / Sn^{4+}, As^{3+}/$As^{5+,}$ $Sb^{3+/}$ Sb^{5+}	
			Acid Radicals: Cl^-, Br^-, I^-, $S^{2-,}$ SO_4^{2-}, $S_2O_3^{2-}$, SCN^-, NO_3^-, NO_2^-, BO_3^{3-}, PO_4^{3-}, AsO_4^{3-} and H_3BO_3	02
			Insoluble Materials: Cr_2O_3(ig), Fe_2O_3(ig), Al_2O_3, SnO_2, $PbSO_4$, $BaSO_4$, $SrSO_4$	03
Mr. Yasin Nuree	VI	CEMHCC-T-14 Organic Chemistry-4 Theory	Carbocycles and Heterocycles Polynuclear hydrocarbons and their derivatives	06
			Heterocyclic compounds	04
			Synthesis (including retrosynthetic approach and mechanistic details)	04
			Pyridine	06
			Cyclic Stereochemistry Alicyclic compounds	06
		CHEMHCC-P-14 Organic Chemistry-4 Practical	Chromatographic Separations	08
			Spectroscopic Analysis of Organic Compounds	06
Mr. Md Muttakin Sarkar	VI	CEMHCC-T-14 Organic Chemistry-4 Theory	Pericyclic reactions Mechanism, stereochemistry, regioselectivity in case of Electrocyclic reactions	03
			Cycloaddition reactions	02
			Sigmatropic reactions	02
		CHEMHCC-P-14	Carbohydrates Monosaccharides, disaccharides, polysaccharides	05
			Biomolecules Amino acids, peptides	05

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			Chromatographic Separations	05
Dr. Sandip Kumar Rajak	VI	CHEMHTDSE-3 Advanced Physical Chemistry	Statistical Thermodynamics Configuration:	06
			Statistical Thermodynamics Boltzmann distribution:	06
			Statistical Thermodynamics Partition function:	06
			Special selected topics Specific heat of solid:	07
			Special selected topics 3rd law:	07
			Special selected topics Polymers	07
		CHEMHTDSE-3 Advanced Physical Chemistry	Roots of equations: (e.g. volume of van der Waals gas and comparison with ideal gas, pH of a weak acid).	02
			Numerical differentiation (e.g., change in pressure for small change involume of a van der Waals gas, potentiometric titrations).	02
			Numerical integration (e.g. entropy/ enthalpy change from heat capacity data), probability distributions (gas kinetic theory) and mean values.	02
Mr. Delwar Ansary	VI	CHEMHTDSE-3 Advanced Physical Chemistry	Crystal Structure: Bravais Lattice and Laws of Crystallography:	08
			Crystal Structure: Crystal planes:	06
			Crystal Structure: Determination of crystal structure	06

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Name of Teacher	Semester	Paper	Content	No. of Lecture
Saleha Khatun	I	CHEMG-T-01	Atomic Structure	09
			Chemical Periodicity	09
			Redox Reactions	04
		CHEMG-P-01	Estimation of Fe(II) ions with $K_2Cr_2O_7$	01
			Estimation of carbonate and bicarbonate present together in a mixture	02
Delwar Ansary	I	CHEMG-T-01	**Acids and bases** Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents.	03
			Acids and bases Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept.	03
			Acids and bases Hard and soft acids and bases (HSAB concept), applications of HSAB process.	02
			Aliphatic Hydrocarbons Introduction	02
			Alkanes (up to 5 Carbons)	03
			Alkenes: (up to 5 Carbons).	04
			Alkynes: (up to 5 Carbons).	03
		CHEMG-P-01	Estimation of oxalic acid by titrating it with $KMnO_4$.	02
			Estimation of Cu (II) ions iodometrically using $Na_2S_2O_3$.	02
Md Muttakin Sarkar	I	CHEMG-T-01	**Fundamentals of Organic Chemistry** 1.Electronic displacements	05
			2.Stereochemistry	05

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			3. Nucleophilic Substitution and Elimination Reactions	04
		CHEMGP-1 Organic Chemistry -1	Qualitative Analysis of Single Solid Organic Compound(s)	05

Saleha Khatun	II	CHEMG-T-02	Chemical Bonding and Molecular structure: a) Ionic Bonding	06
			b) Covalent Bonding	07
			c) MO Approach	07
			Comparative study of p-block elements : a)Group trends in electronic configuration, modification of pure elements,	04
			b) Common oxidation states,inert pair effect,and their important compounds in respect of the following groups of elements i. B-Al-Ga-In-Tl ii. C-Si-Ge-Sn-Pb	04
			iii. N-P-As-Sb-Bi iv. O-S-Se-Te v. F-Cl-Br-I	02
		CHEMG-P-02	Qualitative semi-micro analysis of mixtures containing three radicals. Emphasis should be given to the understanding of the chemistry of different reactions. Acid Radicals: Cl^-, Br^-, I^-, NO_2^-, NO_3^-, S^{2-}, SO_4^{2-}, BO_3^{3-}, H_3BO_3.	03
			Basic Radicals: Na^+, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Cr^{3+}, Mn^{2+}, Fe^{3+}, Ni^{2+}, Cu^{2+}, NH_4^+.	02
Delwar Ansary	II	CHEMG-T-02	Kinetic Theory of Gases and Real gases	12
			Liquids	05

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		CHEMG-P-02	Surface tension measurement (use of organic solvents excluded)	02
			Viscosity measurement (use of organic solvents excluded)	02
Md Muttakin Sarkar	II	CHEMG-T-02	Solids	05
			Chemical kinetics	05
		CHEMG-P-02 Physical Chemistry – I	Viscosity measurement (use of organic solvents excluded)	02

Delwar Ansary	I	CHEMG-T-01	**Acids and bases** Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents.	03
			Acids and bases Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept.	03
			Acids and bases Hard and soft acids and bases (HSAB concept), applications of HSAB process.	02
			Aliphatic Hydrocarbons *Introduction*	02
			Alkanes (up to 5 Carbons)	03
			Alkenes: (up to 5 Carbons).	04
			Alkynes: (up to 5 Carbons).	03
		CHEMG-P-01	Estimation of oxalic acid by titrating it with $KMnO_4$.	02
			Estimation of Cu (II) ions iodometrically using $Na_2S_2O_3$.	02
Saleha Khatun	III	CHEMG-T-01	Atomic Structure	09
			Chemical Periodicity	09

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			Redox Reactions	04
		CHEMG-P-01	Estimation of Fe(II) ions with $K_2Cr_2O_7$	01
			Estimation of carbonate and bicarbonate present together in a mixture	02
Md Muttakin Sarkar	III	CHEMG-T-01	**Fundamentals of Organic Chemistry** 1.Electronic displacements	05
			2.Stereochemistry	05
			3. Nucleophilic Substitution and Elimination Reactions	04
		CHEMGP-1 Organic Chemistry -1	Qualitative Analysis of Single Solid Organic Compound(s)	05

Delwar Ansary	II	CHEMG-T-02	Kinetic Theory of Gases and Real gases	12
			Liquids	05
			Surface tension measurement (use of organic solvents excluded)	02
		CHEMG-P-02	Viscosity measurement (use of organic solvents excluded)	02
Saleha Khatun	IV	CHEMG-T-02	Chemical Bonding and Molecular structure: d) Ionic Bonding	06
			Covalent Bonding	07
			MO Approach	07
			Comparative study of p-block elements : a)Group trends in electronic configuration, modification of pure elements,	04
			b) Common oxidation states,inert pair effect,and their important compounds in respect of the following groups of elements i. B-Al-Ga-In-Tl ii. C-Si-Ge-Sn-Pb	04

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			iii. N-P-As-Sb-Bi iv. O-S-Se-Te v. F-Cl-Br-I	02
		CHEMG-P-02	Qualitative semi-micro analysis of mixtures containing three radicals. Emphasis should be given to the understanding of the chemistry of different reactions. Acid Radicals: Cl^-, Br^-, I^-, NO_2^-, NO_3^-, S^{2-}, SO_4^{2-}, BO_3^{3-}, H_3BO_3.	03
			Basic Radicals: Na^+, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Cr^{3+}, Mn^{2+}, Fe^{3+}, Ni^{2+}, Cu^{2+}, NH_4^+.	02
Md Muttakin Sarkar	IV	CHEMG-T-02	Solids	05
			Chemical kinetics	05
		CHEMG-P-02 Physical Chemistry – I	Viscosity measurement (use of organic solvents excluded)	02

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Name of Teacher	Semester	Paper	Content	No. of Lecture
Saleha Khatun	I	CHEMG-T-01	Atomic Structure	09
			Chemical Periodicity	09
			Redox Reactions	04
		CHEMG-P-01	Estimation of Fe(II) ions with $K_2Cr_2O_7$	01
			Estimation of carbonate and bicarbonate present together in a mixture	02
Delwar Ansary	I	CHEMG-T-01	**Acids and bases** Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents.	03
			Acids and bases Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept.	03
			Acids and bases Hard and softacids and bases (HSAB concept), applications of HSAB process.	02
			Aliphatic Hydrocarbons Introduction	02
			Alkanes (up to5 Carbons)	03
			Alkenes:(upto5 Carbons).	04
			Alkynes:(upto5 Carbons)	03
		CHEMG-P-01	Estimation of oxalic acid by titrating it with $KMnO_4$.	02
			Estimation of Cu(II)ions iodometrically using $Na_2S_2O_3$.	02
Md Muttakin Sarkar	I	CHEMG-T-01	**Fundamentals of Organic Chemistry** Electronic displacements	05
			Stereochemistry	05
			Nucleophilic Substitution and Elimination Reactions	04
		CHEMGP-1 Organic Chemistry -1	Qualitative Analysis of Single Solid Organic Compound(s)	05

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Saleha Khatun	II	CHEMG-T-02	Chemical Bonding and Molecular structure: a) Ionic Bonding	06
			b) Covalent Bonding	07
			c) MO Approach	07
			Comparative study of p-block elements: a) Group trends in electronic configuration, modification of pure elements,	04
			b) Common oxidation states, inert pair effect, and their important compounds in respect of the following groups of elements i. B-Al-Ga-In-Tl ii. C-Si-Ge-Sn-Pb	04
			iii. N-P-As-Sb-Bi iv. O-S-Se-Te v. F-Cl-Br-I	02
		CHEMG-P-02	Qualitative semi-micro analysis of mixtures containing three radicals. Emphasis should be given to the understanding of the chemistry of different reactions. Acid Radicals: Cl^-, Br^-, I^-, NO_2^-, NO_3^-, S^{2-}, SO_4^{2-}, BO_3^{3-}, H_3BO_3.	03
			Basic Radicals: Na^+, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Cr^{3+}, Mn^{2+}, Fe^{3+}, Ni^{2+}, Cu^{2+}, NH_4^+.	02
Delwar Ansary	II	CHEMG-T-02	Kinetic Theory of Gases and Real gases	12
			Liquids	05
		CHEMG-P-02	Surface tension measurement (use of organic solvents excluded)	02
			Viscosity measurement (use of organic solvents excluded)	02
MdMuttakin Sarkar	II	CHEMG-T-02	Solids	05
			Chemical kinetics	05
		CHEMG-P-02 Physical Chemistry – I	Viscosity measurement (use of organic solvents excluded)	02

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Nabin Chandra Maity	III	CHEMG-T-03	Ionic Equilibria	09
			Aryl Halides	04
		CHEMG-P-03	Determination of enthalpy of hydration of copper sulphate	02
Delwar Ansary	III	CHEMG-T-03	Chemical Energetics	12
			Carbonyl Compounds	07
		CHEMG-P-03	Determination of heat capacity of calorimeter for different volumes	02
			Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide	02
Saleha Khatun	III	CHEMG-T-03	Chemical Equilibrium	09
			Alcohols, Phenols and Ethers	08
		CHEMG-P-03	Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH meter and compare it with the indicator method	02
			Preparation of buffer solutions and find the pH of an unknown buffer solution by colour matching method (using following buffers) a. Sodium acetate-acetic acid b. Ammonium chloride-ammonium hydroxide	02
Md Muttakin Sarkar	III	CHEMG-T-03	Aromatic hydrocarbons	06
			Organometallic compounds	04
		CHEMGP-3 Organic Chemistry -1	Identification of a pure organic compound	04

Nabin Chandra Maity	IV	CHEMG-T-04	Coordination Chemistry	10
			Crystal Field Theory	10
		CHEMG-P-04	Complexometric estimation of (i) Mg2+ or (ii) Zn2+ using EDTA.	02
			Preparation of any two of the following complexes: a.tetraammine	01

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			carbonatocobalt (III) nitrate	
Delwar Ansary	IV	CHEMG-T-04	Phase Equilibrium	07
		CHEMG-P-04	Study of the equilibrium of one of the following reactions by the distribution method: $I_2(aq) + I^-(aq) = I^-(aq)$	02
			Perform the following potentiometric titrations: Weak acid vs. strong base	02
			Potassium dichromate. Mohr's salt	02
Saleha Khatun	IV	CHEMG-T-04	Conductance	08
			Transition Elements (3d Series)	10
		CHEMG-P-04	Preparation of any two of the following complexes: b. tetraamminecopper(II) sulphate	01
			c. potassium trioxalatochromate(III) trihydrate	01
			d. potassium bisoxalatocuprate(II) trihydrate	01
Md Muttakin Sarkar	IV	CHEMG-T-04	Solutions	05
			Electromotive force	05
		CHEMG-P-4	conductometric titrations: Strong acid vs. strong base	02
Nabin Chandra Maity	V	CHEMGTDSE-1	Chemical Analysis	14
		CHEMGPDSE-1	To find the total hardness of water by EDTA titration	02
			Determination of the strength of the H2O2 sample	02
Delwar Ansary	V	CHEMGTDSE-1	Error Analysis and Computer Applications	12
		CHEMGPDSE-1	To determine the rate constant for the acid catalysed hydrolysis of an ester.	02

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			TitrationofHClandCH$_3$COOHmixturevsNaOHusingtwodifferentindicatorstofindtheconcentration.	02
Saleha Khatun	V	CHEMGTDSE-1	Industrial Chemistry	18
		CHEMGPDSE-1	Titration of Na2CO3 and NaHCO3 mixture vs HCl using phenolphthalein and methyl orange indicators	02
Md Muttakin Sarkar	V	CHEMGTDSE-1	Environmental Chemistry	16
		CHEMGPDSE-1	Estimation of available oxygen in pyrolusite	02
Nabin Chandra Maity	VI	CHEMGTDSE-2	Polymers	04
			Paints	03
			Varnishes	02
			Fats and Oils	03
		CHEMGPDSE-2	Purification of the crude product is to be made by crystallisation from water/alcohol	02
			Estimation of saponification value of oil / ester / fat.	02
Delwar Ansary	VI	CHEMGTDSE-2	Amines and Diazonium Salts	10
			Amino Acids and Carbohydrates	10
		CHEMGPDSE-2	Hydrolysis of amides/imides	02
			Acetylation of aromatic amines	02
Saleha Khatun	VI	CHEMGTDSE-2	Synthetic dyes	02
			Drugs and Phermaceuticals	03
			Pesticides	03
			Fermentation Chemicals	03
		CHEMGPDSE-2	Estimation of acetic acid in commercial vinegar	01
			Estimation of amino acid by formol titration	02
Md Muttakin Sarkar	VI	CHEMGTDSE-2	Carboxylic Acids and Their Derivatives	06
			Industrial Chemistry Food additives	02
		CHEMGPDSE-2	Nitration of aromatic compounds	02

			Purification of the crude product is to be made by crystallization from water/alcohol.	01

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Dr. Nabin Chandra Maity	I	CEMHCC-TH-1	Periodic properties Bohr's model and atomic spectrum of hydrogen, Limitations of Bohr's model and Sommerfeld's modifications, de Broglie's concept, Heisenberg's uncertainty principle and its significance,	7
			Time independent Schrödinger's wave equation (without application and solution detail), Significance of ψ and ψ2, Radial and angular wave functions for hydrogen atom (qualitative idea), radial probability distribution curves, shapes of s, p, d and f orbitals (qualitative idea), Quantum numbers and their significance, Pauli's exclusion principle, Aufbau principle and limitations, Hund's rules, exchange energy, electronic configurations of atoms. Elementary idea of microstates.	7
			Acidimetry and alkalimetry	10
Mrs. Saleha Khatun	I	CEMHCC-TH-1	Inorganic chemistry-I Theory Extranuclear structure of atom Bohr's model and atomic spectrum of hydrogen, Limitations of Bohr's model and Sommerfeld's modifications, de Broglie's concept, Heisenberg's uncertainty principle and its significance, Time independent Schrödinger's wave equation (without application and solution detail)	06
			Significance of ψ and ψ2, Radial and angular wave functions for hydrogen atom (qualitative idea), radial probability	04

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			distribution curves, shapes of s, p, d and f orbitals (qualitative idea)	
			Quantum numbers and their significance, Pauli's exclusion principle, Aufbau principle and limitations, Hund's rules, exchange energy, Electronic configurations of atoms.	04
			Elementary idea of microstates	02
		CEMHCC-P-1 Inorganic Chemistry-IA practical	Method of Preparation of standard solutions of titrants	02
			Estimation of Carbonate and hydroxide present together in a mixture	02
			Estimation of carbonate and bicarbonate present together in a mixture	02
Dr.Sandip Kumar Rajak	I	CHEMHT-IA Physical Chemistry-IA	Kinetic Theory and Gaseous state Kinetic Theory of gases	06
			Maxwell's distribution of speed and energy	06
			Real gas and virial equation	06
		CHEMHP-IA Physical Chemistry-IA	Determination of heat of neutralization of a strong acid by a strong base.	02
			Determination of heat of solute ion of oxalic acid from solubilitymeasurement	02
Mr. Delwar Ansary	I	CHEMHT-IA Physical Chemistry-IA	Chemical Thermodynamics-1: Zeroth and 1st law of Thermodynamics	07
		CHEMHT-IA Physical Chemistry-IA	Chemical Thermodynamics-1: Thermochemistry	05
			Kinetic Theory and Gaseous state Kinetic Theory of gases	06
Mr. Yaseen Nuree	I	CEMHCC-T-2 Organic Chemistry-1 Theory	General Treatment of Reaction Mechanism – I Mechanistic classification:	07
			Reactive intermediates:	07
			Stereochemistry-I Bonding geometries of carbon compounds and representation	06

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			of molecules	
			Concept of chirality and symmetry:	07
		CEMHCC-P-2 Organic Chemistry-1 Practical	Separation	04
			Determination of boiling point	04
			Identification of a Pure Organic Compound by chemical test	08
Mr. Md Muttakin Sarkar	I	CEMHCC-T-2 Organic Chemistry-1 Theory	Bonding and Physical Properties Valence Bond Theory	02
			Electronic displacements	04
			MO theory	04
			Physical properties	03
			Stereochemistry-I Relative and absolute configuration	03
			Optical activity of chiral compounds	04

Dr. Nabin Chandra Maity	II	CHEMHT-3	Acid-Base Concepts and Solvents Recapitulation of Arrhenius concept, Bronsted-Lowry concept, Solvent system concept (in H_2O, liq. NH_3, liq. SO_2 and liq. HF), Lux-Flood concept, Lewis concept	8
			Drago-Wayland equation, Solvent levelling and differentiating effects, Relative strength of different acids and bases, Pauling's rules, Hammett acidity function and super acids, HSAB principle and its applications, Acid-base equilibria in aqueous solution, pH, Buffer, Acid-base neutralization curves and choice of indicators. Gas phase acidity.	7
			Quantitative Chemical Analysis	10

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			I. Estimation of Fe(II) using $K_2Cr_2O_7$ solution II. Estimation of Fe(III) using $K_2Cr_2O_7$ and $KMnO_4$ solution iii. Estimation of Ca^{2+} using $KMnO^4$ solution iv. Estimation of Cu^{2+} iodometrically v. Estimation of Cr^{3+} using $K_2Cr_2O_7$ solution	
Mrs. Saleha Khatun	II	CEMHCC-T-3 Inorganic Chemistry-IB Theory	Redox reactions and Precipitation reactions Qualitative idea about complimentary, noncomplimentary, disproportionation and comproportionation reactions, standard redox potentials with sign conventions, Electrochemical series and its application to explore the feasibility of reactions and equilibrium constants	06
			Nernst equation; effect of pH, complexation and precipitation on redox potentials, formal potential; Basis of redox titration and redox indicators, Redox potential diagrams (Latimer and Frost) of common elements and their applications.	05
			Solubility product principle, common ion effect and their applications to the precipitation and separation of common metallic ions as hydroxides, sulphides, carbonates, sulphates and halides.	04
		CEMHCC-P-3 Inorganic Chemistry Practical-IB	Estimation of Fe(II) using $K_2Cr_2O_7$ solution	01
			Estimation of Fe(III) using $K_2Cr_2O_7$ Solution	01
			Estimation of Cu^{2+} iodometrycally	02

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			Estimation of Cr^{3+} using $K_2Cr_2O_7$ Solution	01
Dr. Sandip Kumar Rajak	II	CHEMHT-3 Physical chemistry-IB	Chemical kinetics Rate law, order and molecularity:	05
			Chemical kinetics Role of Temperature and theories of reaction rate:	07
			Chemical kinetics Homogeneous catalysis:	06
		CHEMHP-3 Physical chemistry-IB	Study of kinetics of acid-catalyzed hydrolysis of methyl acetate	04
			Study of kinetics of decomposition of H_2O_2.	04
Mr. Delwar Ansary	II	CHEMHT-3 Physical chemistry-IB	Chemical Thermodynamics-II: Second Law	05
			Chemical Thermodynamics-II: Clausius inequality, Criteria for spontaneity and equilibrium.	05
			Chemical Thermodynamics-II: Thermodynamic relations:	02
Mr. Sourajit Sarkar	II	CEMHCC-T-4 Organic Chemistry-2 Theory	Stereochemistry-II Stereochemistry-II Concept of pro-stereoisomerism:	06 04
			Conformation:	06
			Substitution and Elimination Reactions Elimination reactions:	08
		CEMHCC-P-4 Organic Chemistry-2 Practical	Organic Preparations	18
Mr. Md Muttakin Sarkar	II	CEMHCC-T-4 Organic Chemistry-2	General Treatment of Reaction Mechanism II Reaction thermodynamics	02
			Concept of organic acids and bases	02
			Tautomerism	04
			Reaction kinetics	05

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			Substitution and Elimination Reactions Free-radical substitution reaction	03
			Nucleophilic substitution reactions	04

Dr. Sandip Kumar Rajak	III	CHEMHT-5 Physical Chemistry – II	Transport processes Viscosity:	10
			Transport processes Conductance and transport number:	10
			Foundation of Quantum Mechanics Beginning of Quantum Mechanics:	04
			Foundation of Quantum Wave function:Mechanics	06
			Foundation of Quantum Mechanics Concept of Operators:	05
			Foundation of Quantum Mechanics Particle in a box:	05
		CHEMHP-5 Physical Chemistry – II	Determination of partition coefficient for the distribution of I_2 between water andCCl_4	04
			Determination of K_{eq} for KI + I_2= KI_3, using partition coefficient between water and CCl_4.	04
			Conductometric titration of an acid (strong, weak/ monobasic, dibasic) againststrong base.	04
Mr. Delwar Ansary	III	CHEMHT-5 Physical Chemistry – II	Application of Thermodynamics-I: Partial properties and chemical potential:	03
			Application of Thermodynamics-I: Chemical Equilibrium:	03
			Application of	03

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			Thermodynamics-I:	
			Application of Thermodynamics-I: Nernst's distribution law;	04
			Chemical potential and other properties of ideal substances-pure and mixtures: Pure ideal gas:	04
			Application of Thermodynamics-I: Condensed Phase	03
		CHEMHP-5 Physical Chemistry – II	Study of viscosity of unknown liquid (glycerol, sugar) with respect to water.	04
			Application of Thermodynamics-I: Partial properties and chemical potential:	03
Dr. Nabin Chandra Maity	III	CHEMHT-6	Chemical Bonding–II Covalent Bond: Lewis structures, formal charge; Qualitative idea of V. B. Theory, directional properties of covalent bond, Concept of Equivalent and non equivalent Hybridization and shapes of simple molecules and ions (examples from main groups), Stereochemically non-rigid molecules – Berry's pseudorotation, Resonance and Dipole moments of inorganic molecules and ions.	14
			VSEPR theory and Bent's rule and their applications; M.O. Theory (elementary pictorial approach), concept of bond order, MO diagram of homo-nuclear diatomics (1^{st} and 2^{nd} period elements), hetero-nuclear diatomics (HF, CO, NO, NO^+ and CN^-) and triatomics (H_2O and BeH_2). Electron sea model and elementary idea about band theory, classification of inorganic solids and their conduction properties	14

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			according to band theory; Hydrogen bonding: classifications, its effect on the properties of compounds and its importance in biological systems, Vander Waal's forces.	
			Metal extraction and purification: Basic Metallurgy Idea about ores and minerals, operations involved in metallurgy, Flow chart diagram for the extraction of pure Ti, Ni and U (including reactions) from their important ores and their uses.	10
		CHEMHP-6	Quantitative inorganic analysis i. Estimation of Fe(II) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution ii. Estimation of Fe(III) and Cu(II) in a given mixture using $K_2Cr_2O_7$ solution iii. Estimation of Cr(VI) and Mn(II) in a given mixture using $K_2Cr_2O_7$ solution iv. Estimation of Fe(III) and Cr(VI) in a given mixture using $K_2Cr_2O_7$ solution v. Estimation of Fe(II) and Mn(II) in a given mixture using $KMnO_4$ solution vi. Estimation of Fe(III) and Ca(II) in a given mixture using $KMnO_4$ solution	10
Mrs. Saleha Khatun	III	CEMHCC-T-6 Inorganic Chemistry-II Theory	Ionic Bond: Lattice energy, Born-Lande equation with derivation and importance of Kapustinskii expression for lattice energy	05
			Born-Haber cycle and its applications, Polarising power and polarisability of ions, Fajan's rules and its applications	05

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			radius ratio rules – its applications and limitations, salvation energy and solubility energetics of dissolution process;	05
			Packing in crystals, voids in crystal lattice, packing efficiency, Structure of ionic solids: rock salt, zinc blende, wurtzite, fluorite, antifluorite, perovskite and layer lattice.	05
			Qualitative idea about stoichiometric and non-stoichiometric crystal defects.	02
		CEMHCC-P-6 Inorganic Chemistry-II Practical	Estimation of Fe(II) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution	02
			Estimation of Cu(II) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution	02
			Estimation of Cr(VI) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution	02
			Estimation of Ca(II) and Fe(III) in a given mixture using K_2Cr_2O7 solution	02
Mr. Yaseen Nuree	III	CEMHCC-T-7 Organic Chemistry-3 Theory	Carbonyl and Related Compounds Addition to C=O	09
			Exploitation of acidity of α-H of C=O	08
			Elementary ideas of Green Chemistry	03
			Nucleophilic addition to α,β-unsaturated carbonyl system: Nucleophilic addition to α,β-unsaturated carbonyl system:	03
			Substitution at sp2 carbon (C=O system)	03
		CEMHCC-P-7 Organic Chemistry-3 Practical	Qualitative Organic Analysis of single solid organic compound	16
Mr. Md Muttakin Sarkar	III	CEMHCC-T-7 Organic Chemistry-3 Theory	Chemistry of alkenes and alkynes Addition to C=C	06
			Addition to C≡C (in comparison to C=C)	04

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		CEMHCC-P-7 Organic Chemistry-3 Practical	Aromatic Substitution Electrophilic aromatic substitution	04
			Organo-metallics Free-radical substitution Reaction	04
Mr. Sourajit Sarkar	III	SEC-1B Basic Analytical Chemistry	Introduction	04
			Complexometry	02
			Soil Analysis	02
			Analysis of water	03
			Analysis of food products	03
			Chromatography	03
			Ion-exchange	02
			Analysis of cosmetics	03
			Suggested Applications (Any one)	02
			Suggested Instrumental demonstrations	03

Dr. Sandip Kumar Rajak	IV	CHEMHT-8 Physical Chemistry–III	Application of Thermodynamics – II: Colligative properties:	08
			Application of Thermodynamics – II: Phase rule:	06
			Application of Thermodynamics – II: Binary solutions:	06
			Quantum Chemistry Angular momentum:	06
			Quantum Chemistry Qualitative treatment of hydrogen atom and hydrogen-like ions	08
			Quantum Chemistry LCAO and HF-SCF:	06
		CHEMHP-8 Physical Chemistry – II	Determination of solubility of sparingly soluble salt in water, in electrolyte. with common ions and in neutral electrolyte	02

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			(using common indicator).	
			pH-metric titration of acid (mono-and di-basic) against strong base.	02
			Determination of K_{sp} for AgCl by potentiometric titration of $AgNO_3$solution against standard KCl solution.	02
Mr. Delwar Ansary	IV	CHEMHT-8 Physical Chemistry–III CHEMHP-8 Physical Chemistry – II	Electrical Properties of molecules: Ionic equilibria	08
			Electrical Properties of molecules: Electromotive Force:	06
			Electrical Properties of molecules: Dipole moment and polarizability	06
			Potentiometric titration of Mohr's salt solution against standard K_2Cr_2O-solution.	02
		CHEMHT-8 Physical Chemistry–III	Effect of ionic strength on the rate of Persulphate –Iodide reaction.	02
			Study of phenol-water phase diagram.	02
			Electrical Properties of molecules: Ionic equilibria	08
Dr. Nabin Chandra Maity	IV	CHEMHT-9	Radioactivity and Nuclear Chemistry Atomic nucleus – nuclear stability, n/p ratio and different modes of decay, mass defect, packing fraction and nuclear binding energy. Nuclear forces: Meson exchange theory, elementary idea of nuclear shell model and magic numbers. Fission, fusion and spallation reactions, artificial radioactivity, super heavy elements and their IUPAC	8

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			nomenclature. Moderators, slow and fast neutrons, Applications of radio-isotopes in: determination of structures, establishment of reaction mechanisms and radio-carbon dating, hazards of radiation and safety measures.	
			Chemistry of s and p-block elements Diagonal relationship (Li-Mg; B-Si) and anomalous behavior of first member of each group, Allotropy and catenation (examples of C, P and S compounds). Study of the following compounds with emphasis on preparation, properties, structure and bonding: Berylium hydrides and halides; diborane; borazine; boron nitride, boric acid, borax, fluorocarbons (with environmental effect); oxides and oxyacids of nitrogen, phosphorous, sulphur and chlorine; Peroxo acids of sulphur; tetrasulphur trtranitride; interhalogens, pseudohalogens, polyhalides, fluorides and oxides of xenon. Noble gas clathrates; basic properties of iodine. Synthesis, structural aspects and applications of silicones and phosphazines; Structural properties of various silicates.	7
		CHEMHP-9	Complexometric Titration	10
			Inorganic Preparation	
Mrs. Saleha Khatun	IV	CEMHCC-T-9	Coordination Chemistry-I Idea about double salts and complex salts, Werner's theory	03
			EAN rule, classification of ligands and their binding modes	03
			IUPAC nomenclature of coordination compounds (up to	03

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			two metal centres)	
			overall and stepwise stability constants, chelates, inner metallic complexes	03
			Stereochemistry and isomerism (constitutional and stereo) of complexes with coordination no. 4 and 6.	03
		CEMHCC-P-9	Complexometric Titration: i)Estimation of Hardness of Water ii)Estimation of Ca(II) and Mg(II) in a mixture	04
			Inorganic Preparation: i)Mohr's Salt ii)Tetraamminecarbonatocobalt (III) trihydrate	02
Mr. Sourajit Sarkar	IV	CEMHCC-T-10 Organic Chemistry-4 Theory	Nitrogen Compounds Amines: Aliphatic & Aromatic:	03
			Nitro compounds (aliphatic and aromatic):	02
			Alkylnitrile and isonitrile	02
			Diazonium salts and their related compounds	02
			The Logic of Organic Synthesis Retrosynthetic analysis:	08
			Strategy of ring synthesis:	04
			Asymmetric synthesis:	06
		CEMHCC-P-10 Organic Chemistry-4 Practical	Organic Quantative Estimation	14
Mr. Md Muttakin Sarkar	IV	CEMHCC-T-10 Organic Chemistry-4	Rearrangements: Mechanism with evidence and stereochemical Features for the following Rearrangement to electron-deficient carbon	03
			Rearrangement to electron-deficient nitrogen	01
		CEMHCC-P-10 Organic Chemistry-4 Practical	Rearrangement to electron-deficient oxygen	02
			Aromatic rearrangements	01

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			Migration from nitrogen to ring carbon	01
			Rearrangement reactions by green approach	01
			Organic Spectroscopy UV Spectroscopy	02
			IR Spectroscopy	02
			NMR Spectroscopy	05
Mr Sourajit Sarkar	IV	SEC-1B CHEMHS – 2A Pharmaceutical Chemistry	Drugs & Pharmaceuticals Introduction	08
			Fermentation	06
			Hands On Practical	06

Dr. Nabin Chandra Maity	V	CHEMHT-11	Magnetochemistry Classification of magnetic substances, Origin of para magnetic moments, temperature dependence of para magnetism – Curie and Curie-Weiss law, TIP, magnetic susceptibility and its measurement (Gouy method), diamagnetic correction, effective magnetic moment, spin only moment for 3d metals, Orbital contribution to magnetic moment, spin-orbit coupling, quenching of orbital contribution, Sub-normal magnetic moments and antiferromagnetic interactions (elementary idea with examples).	12
			Chemistry of d- and f-block elements d-block elements: Characteristic properties, Comparison among the elements of 3d series with	12

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			reference to electronic configuration, oxidation states and E^0 values; General comparison between 3d, 4d and 5d series elements in term of electronic configuration, oxidation states, atomization energy, magnetic properties and coordination chemistry. f-block elements: Comparison between d and f-block elements; Electronic configuration, oxidation states, variation of magnetic properties (Ln^{3+}), atomic and ionic (3+) radii of lanthanoids; consequences of lanthanide contraction, separation of lanthanides by ion exchange and solvent extraction methods; comparison between lanthanoids and actinoids.	
		CHEMHP-11	Quantitative estimation A. Quantitative: i. Estimation of available chlorine in bleaching powder using iodometry ii. Estimation of available oxygen in pyrolusite using permanganometry iii. Estimation of Cu in brass using iodometry iv. Estimation of Fe in cement using permanganometry v. Estimation of chloride gravimetrically vi. Estimation of Ni(II) using DMG gravimetrically B.	10
			Experiment: i. Paper chromatographic separation of Ni(II) and Co(II) ii. Measurement of 10Dq by spectrophotometric method iii. Preparation of Mn(acac)3 and determination of its λmax colorimetrically	
Mrs. Saleha Khatun	V	CEMHCC-T-11 Inorganic chemistry-	structure and bonding of coordination compounds on	04

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		III Theory Coordination Chemistry-II	the basis of V. B. Theory and its limitations.	
			Elementary idea about CFT, splitting of d^n configuration in ML4 to ML6 and ML8 systems, factors affecting, measurement of o, spectrochemical series of ligands,	06
			CFSE in weak and strong fields, OSSE, High spin and low spin complexes, spin isomerism,	02
			tetragonal distortion, Jahn Teller theorem and applications, achievements and limitations of CFT, nephalauxetic effect, stabilisation of unusually high and low oxidation states of 3d series elements	06
			MOT (elementary idea), σ and π bonding in octahedral complexes (a pictorial approach). Colour and electronic spectra of complexes: selection rules for electronic transitions, d-d transition, charge transfer transition (qualitative idea)	04
			L-S coupling and R-S ground state term for atomic no. up to 30, qualitative ORGEL diagram for 3d1 – 3d9 ions with appropriate symbols for the energy levels.	06
		CEMHCC-P-11 Inorganic Chemistry-IV Practical	Estimation of available chlorine in bleaching powder using iodometry	01
			Estimation of available oxygen in pyrolusite using permanganometry	02
			Estimation of Fe in cement using permanganometry	02
			Estimation of Ni(II) using	01

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			DMG gravimetrically	
			Estimation of chloride gravimetrically	01
Dr. Sandip Kumar Rajak	V	CHEMHT-12 Physical Chemistry – IV	Molecular Spectroscopy Interaction of electromagnetic radiation	04
			Molecular Spectroscopy Rotation spectroscopy:	06
			Vibrational spectroscopy:	06
			Molecular Spectroscopy Raman spectroscopy:	04
			Molecular Spectroscopy Nuclear Magnetic Resonance (NMR) spectroscopy, Electron Spin Resonance (ESR) spectroscopy:	04
			Surface phenomenon Surface tension and energy:	06
			Surface phenomenon Adsorption:	06
			Surface phenomenon Colloids:	06
		CHEMHP-12 Physical Chemistry – IV	Verification of Beer and Lambert's Law for $KMnO_4$and $K_2Cr_2O_7$solution	02
			Study of kinetics of $K_2S_2O_8$+ KI reaction, spectrophotometrically.	02
			Determination of CMC from surface tension measurements.	02
Mr. Delwar Ansary	V	CHEMHT-12 Physical Chemistry – IV	Phtochemistry: Lambert-Beer's law	06
			Photochemistry: Photochemical Processes	06
			Photochemistry: Rate of Photochemical processes	06
		CHEMHP-12 Physical Chemistry – IV	Determination of surface tension of a liquid using Stalagmometer.	02
			Determination of pH of unknown buffer, spectrophotometrically.	02

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Dr. Nabin Chandra Maity	V	CHEMHTDSE-1B Inorganic Materials of Industrial Importance	Silicate Industries	9
			Fertilizers	9
			Surface Coatings	9
			Batteries	9
			Alloys	9
			Catalysis	9
			Chemical explosives	6
Mr. Yaseen Nuree	V	CEMH-DSE-T-2C Green Chemistry Theory	Twelve principles of Green Chemistry	06
			Prevention/ minimization of hazardous/ toxic products	05
			Energy requirements for reactions – alternative sources of energy	05
			Prevention of chemical accidents designing greener processes	06
			Future Trends in Green Chemistry Oxidation reagents and catalysts	04
		CEMH-DSE-P-2C Green Chemistry Practical	Green Chemistry Practical	15
Mr. Md. Muttakin Sarkar	V	CEMHDSE-T-2C Green Chemistry	Green Chemistry Introduction to Green Chemistry	05
			Examples of Green Synthesis/ Reactions and some real-World cases	10
		CEMHDSE-T-2C Green Chemistry Theory	Green Chemistry Practical	05

Dr. Nabin Chandra Maity	VI	CHEMHT-13	Bio-inorganic Chemistry Essential elements of life, Role of metal ions in living systems-a brief review, Elementary idea about proteins, enzymes and ionophores; Structure of ATP,	25

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			Na^+ ion pump and transport of Na^+ and K^+ across cell membrane; active site structures and bio-functions of haemoglobin, myoglobin, carboxy peptidase A, carbonic anhydrase B, cytochrome c, ferredoxins and chlorophyll; biological nitrogen fixation; toxic metals (Pb, Cd and Hg) and their effects, Wilson disease, chelation therapy; platinum and gold complexes as drugs (examples only).	
			Organometallic chemistry and catalysis Definition, Classification of organometallic compounds, hapticity of ligands, nomenclature, 16- electron & 18-electron rule and its applications; preparation and structure of mono- and bi-nuclear carbonyls of 3d series, synergic effect of CO and use of IR data to explain extent of back bonding; General methods of preparation of metal-carbon σ-bonded complexes, Zeise's salt, Metal-carbon multiple bonding; Preparation, structures, properties and reactions of ferrocene; elementary idea about oxidative addition, reductive elimination, insertion reactions; Study of the following catalytic processes: alkene hydrogenation (Wilkinson's catalyst), hydroformylation, Wacker process, Synthetic gasoline (Fischer Tropsch reaction) and Olefin polymerization reaction (Ziegler-Natta catalyst)	25
		CHEMHP-13	Qualitative semimicro analysis	10
Mrs. Saleha Khatun	VI	CEMHCC-T-13	Symmetry as a universal theme, concept of symmetry	02

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		Molecular Symmetry and Point group	elements and operations (with examples);	
			symmetry properties of atomic orbitals (s, p and d);	02
			identification of molecular point groups in some simple molecules and ions;	04
			applications of symmetry for polarity and chirality.	02
		Bio-inorganic Chemistry	Essential elements of life, Role of metal ions in living systems- a brief review, Elementary idea about proteins, enzymes and ionophores; Structure of ATP, Na+ ion pump and transport of Na+ and K+ across cell membrane;	06
			active site structures and bio-functions of haemoglobin, myoglobin,	03
			carboxy peptidase A, carbonic anhydrase B, cytochrome c, ferredoxins and chlorophyll; biological nitrogen fixation;	06
			toxic metals (Pb, Cd and Hg) and their effects, Wilson disease,	04
			chelation therapy; platinum and gold complexes as drugs (examples only)	04
		CEMHCC-P-13 Qualitative semimicro analysis	Qualitative semimicro analysis of mixtures containing four radicals (excluding oxide and carbonate). Emphasis should be given to the understanding of the chemistry of different reactions and to assign the most probable composition. Basic Radicals: K^+, $NH4^+$, $Mg^{2+,}$ Ca^{2+}, Ba^{2+}, Sr^{2+}, Al^{3+}, Cr^{3+}, Mn^{2+}, Fe^{3+}/ Fe^{2+}, Co^{2+}, $Ni^{2+,}$ Cu^{2+}, Zn^{2+}, $Pb^{2+,}$ Cd^{2+}, Bi^{3+}, Sn^{2+} / Sn^{4+}, As^{3+}/$As^{5+,}$ $Sb^{3+/}$	06

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			Sb^{5+}	
			Acid Radicals: Cl^-, Br^-, I^-, S^{2-}, SO_4^{2-}, $S_2O_3^{2-}$, SCN^-, NO_3^-, NO_2^-, BO_3^{3-}, PO_4^{3-}, AsO_4^{3-} and H_3BO_3	02
			Insoluble Materials: Cr_2O_3(ig), Fe_2O_3(ig), Al_2O_3, SnO_2, $PbSO_4$, $BaSO_4$, $SrSO_4$	03
Mr. Sourajit Sarkar	VI	CEMHCC-T-14 Organic Chemistry-4 Theory	Carbocycles and Heterocycles Polynuclear hydrocarbons and their derivatives	06
			Heterocyclic compounds	04
			Synthesis (including retrosynthetic approach and mechanistic details)	04
			Pyridine	06
			Cyclic Stereochemistry Alicyclic compounds	06
		CHEMHCC-P-14 Organic Chemistry-4 Practical	Chromatographic Separations	08
			Spectroscopic Analysis of Organic Compounds	06
Mr. Md Muttakin Sarkar	VI	CEMHCC-T-14 Organic Chemistry-4 Theory	Pericyclic reactions Mechanism, stereochemistry, regioselectivity in case of Electrocyclic reactions	03
			Cycloaddition reactions	02
			Sigmatropic reactions	02
		CHEMHCC-P-14	Carbohydrates Monosaccharides, disaccharides, polysaccharides	05
			Biomolecules Amino acids, peptides	05
			Chromatographic Separations	05
Dr. Sandip Kumar Rajak	VI	CHEMHTDSE-3 Advanced Physical Chemistry	Statistical Thermodynamics Configuration:	06
			Statistical Thermodynamics Boltzmann distribution:	06
			Statistical Thermodynamics Partition function:	06
			Special selected topics Specific heat of solid:	07
			Special selected topics 3rd law:	07

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			Special selected topics Polymers	07
		CHEMHTDSE-3 Advanced Physical Chemistry	Roots of equations: (e.g. volume of van der Waals gas and comparison with ideal gas, pH of a weak acid).	02
			Numerical differentiation (e.g., change in pressure for small change involume of a van der Waals gas, potentiometric titrations).	02
			Numerical integration (e.g. entropy/ enthalpy changes from heat capacity data), probability distributions (gas kinetic theory) and mean values.	02
Mr. Delwar Ansary	VI	CHEMHTDSE-3 Advanced Physical Chemistry	Crystal Structure: Bravais Lattice and Laws of Crystallography:	08
			Crystal Structure: Crystal planes:	06
			Crystal Structure: Determination of crystal structure	06

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Saleha Khatun	I	CHEMG-T-01	Atomic Structure	09
			Chemical Periodicity	09
			Redox Reactions	04
		CHEMG-P-01	Estimation of Fe(II) ions with $K_2Cr_2O_7$	01
			Estimation of carbonate and bicarbonate present together in a mixture	02
Delwar Ansary	I	CHEMG-T-01	**Acids and bases** Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents.	03
			Acids and bases Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept.	03
			Acids and bases Hard and soft acids and bases (HSAB concept), applications of HSAB process.	02
			Aliphatic Hydrocarbons Introduction	02
			Alkanes (up to 5 Carbons)	03
			Alkenes: (up to 5 Carbons).	04
			Alkynes: (up to 5 Carbons).	03
		CHEMG-P-01	Estimation of oxalic acid by titrating it with $KMnO_4$.	02
			Estimation of Cu (II) ions iodometrically using $Na_2S_2O_3$.	02
Md Muttakin Sarkar	I	CHEMG-T-01	**Fundamentals of Organic Chemistry** 1.Electronic displacements	05
			2.Stereochemistry	05

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			3. Nucleophilic Substitution and Elimination Reactions	04
		CHEMGP-1 Organic Chemistry -1	Qualitative Analysis of Single Solid Organic Compound(s)	05

Saleha Khatun	II	CHEMG-T-02	Chemical Bonding and Molecular structure: a) Ionic Bonding	06
			b) Covalent Bonding	07
			c) MO Approach	07
			Comparative study of p-block elements : a)Group trends in electronic configuration, modification of pure elements,	04
			b) Common oxidation states,inert pair effect,and their important compounds in respect of the following groups of elements i. B-Al-Ga-In-Tl ii. C-Si-Ge-Sn-Pb	04
			iii. N-P-As-Sb-Bi iv. O-S-Se-Te v. F-Cl-Br-I	02
		CHEMG-P-02	Qualitative semi-micro analysis of mixtures containing three radicals. Emphasis should be given to the understanding of the chemistry of different reactions. Acid Radicals: Cl^-, Br^-, I^-, NO_2^-, NO_3^-, S^{2-}, SO_4^{2-}, BO_3^{3-}, H_3BO_3.	03
			Basic Radicals: Na^+, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Cr^{3+}, Mn^{2+}, Fe^{3+}, Ni^{2+}, Cu^{2+}, NH_4^+.	02
Delwar Ansary	II	CHEMG-T-02	Kinetic Theory of Gases and Real gases	12
			Liquids	05

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		CHEMG-P-02	Surface tension measurement (use of organic solvents excluded)	02
			Viscosity measurement (use of organic solvents excluded)	02
Md Muttakin Sarkar	II	CHEMG-T-02	Solids	05
			Chemical kinetics	05
		CHEMG-P-02 Physical Chemistry – I	Viscosity measurement (use of organic solvents excluded)	02

Delwar Ansary	I	CHEMG-T-01	**Acids and bases** Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents.	03
			Acids and bases Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept.	03
			Acids and bases Hard and soft acids and bases (HSAB concept), applications of HSAB process.	02
			Aliphatic Hydrocarbons *Introduction*	02
			Alkanes (up to 5 Carbons)	03
			Alkenes: (up to 5 Carbons).	04
			Alkynes: (up to 5 Carbons).	03
		CHEMG-P-01	Estimation of oxalic acid by titrating it with $KMnO_4$.	02
			Estimation of Cu (II) ions iodometrically using $Na_2S_2O_3$.	02
Saleha Khatun	III	CHEMG-T-01	Atomic Structure	09
			Chemical Periodicity	09

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			Redox Reactions	04
		CHEMG-P-01	Estimation of Fe(II) ions with $K_2Cr_2O_7$	01
			Estimation of carbonate and bicarbonate present together in a mixture	02
Md Muttakin Sarkar	III	CHEMG-T-01	**Fundamentals of Organic Chemistry** 1.Electronic displacements	05
			2.Stereochemistry	05
			3. Nucleophilic Substitution and Elimination Reactions	04
		CHEMGP-1 Organic Chemistry -1	Qualitative Analysis of Single Solid Organic Compound(s)	05

Delwar Ansary	II	CHEMG-T-02	Kinetic Theory of Gases and Real gases	12
			Liquids	05
			Surface tension measurement (use of organic solvents excluded)	02
		CHEMG-P-02	Viscosity measurement (use of organic solvents excluded)	02
Saleha Khatun	IV	CHEMG-T-02	Chemical Bonding and Molecular structure: d) Ionic Bonding	06
			Covalent Bonding	07
			MO Approach	07
			Comparative study of p-block elements : a)Group trends in electronic configuration, modification of pure elements,	04
			b) Common oxidation states,inert pair effect,and their important compounds in respect of the following groups of elements i. B-Al-Ga-In-Tl ii. C-Si-Ge-Sn-Pb	04

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			iii. N-P-As-Sb-Bi iv. O-S-Se-Te v. F-Cl-Br-I	02
		CHEMG-P-02	Qualitative semi-micro analysis of mixtures containing three radicals. Emphasis should be given to the understanding of the chemistry of different reactions. Acid Radicals: Cl^-, Br^-, I^-, NO_2^-, NO_3^-, S^{2-}, SO_4^{2-}, BO_3^{3-}, H_3BO_3.	03
			Basic Radicals: Na^+, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Cr^{3+}, Mn^{2+}, Fe^{3+}, Ni^{2+}, Cu^{2+}, NH_4^+.	02
Md Muttakin Sarkar	IV	CHEMG-T-02	Solids	05
			Chemical kinetics	05
		CHEMG-P-02 Physical Chemistry – I	Viscosity measurement (use of organic solvents excluded)	02

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Name of Teacher	Semester	Paper	Content	No. of Lecture
Saleha Khatun	I	CHEMG-T-01	Atomic Structure	09
			Chemical Periodicity	09
			Redox Reactions	04
		CHEMG-P-01	Estimation of Fe(II) ions with $K_2Cr_2O_7$	01
			Estimation of carbonate and bicarbonate present together in a mixture	02
Delwar Ansary	I	CHEMG-T-01	**Acids and bases** Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents.	03
			Acids and bases Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept.	03
			Acids and bases Hard and softacids and bases (HSAB concept), applications of HSAB process.	02
			Aliphatic Hydrocarbons Introduction	02
			Alkanes (up to5 Carbons)	03
			Alkenes:(upto5 Carbons).	04
			Alkynes:(upto5 Carbons)	03
		CHEMG-P-01	Estimation of oxalic acid by titrating it with $KMnO_4$.	02
			Estimation of Cu(II)ions iodometrically using $Na_2S_2O_3$.	02
Md Muttakin Sarkar	I	CHEMG-T-01	**Fundamentals of Organic Chemistry** Electronic displacements	05
			Stereochemistry	05
			Nucleophilic Substitution and Elimination Reactions	04
		CHEMGP-1 Organic Chemistry -1	Qualitative Analysis of Single Solid Organic Compound(s)	05

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Saleha Khatun	II	CHEMG-T-02	Chemical Bonding and Molecular structure: a) Ionic Bonding	06
			b) Covalent Bonding	07
			c) MO Approach	07
			Comparative study of p-block elements: a) Group trends in electronic configuration, modification of pure elements,	04
			b) Common oxidation states, inert pair effect, and their important compounds in respect of the following groups of elements i. B-Al-Ga-In-Tl ii. C-Si-Ge-Sn-Pb	04
			iii. N-P-As-Sb-Bi iv. O-S-Se-Te v. F-Cl-Br-I	02
		CHEMG-P-02	Qualitative semi-micro analysis of mixtures containing three radicals. Emphasis should be given to the understanding of the chemistry of different reactions. Acid Radicals: Cl^-, Br^-, I^-, NO_2^-, NO_3^-, S^{2-}, SO_4^{2-}, BO_3^{3-}, H_3BO_3.	03
			Basic Radicals: Na^+, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Cr^{3+}, Mn^{2+}, Fe^{3+}, Ni^{2+}, Cu^{2+}, NH_4^+.	02
Delwar Ansary	II	CHEMG-T-02	Kinetic Theory of Gases and Real gases	12
			Liquids	05
		CHEMG-P-02	Surface tension measurement (use of organic solvents excluded)	02
			Viscosity measurement (use of organic solvents excluded)	02
MdMuttakin Sarkar	II	CHEMG-T-02	Solids	05
			Chemical kinetics	05
		CHEMG-P-02 Physical Chemistry – I	Viscosity measurement (use of organic solvents excluded)	02

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Nabin Chandra Maity	III	CHEMG-T-03	Ionic Equilibria	09
			Aryl Halides	04
		CHEMG-P-03	Determination of enthalpy of hydration of copper sulphate	02
Delwar Ansary	III	CHEMG-T-03	Chemical Energetics	12
			Carbonyl Compounds	07
		CHEMG-P-03	Determination of heat capacity of calorimeter for different volumes	02
			Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide	02
Saleha Khatun	III	CHEMG-T-03	Chemical Equilibrium	09
			Alcohols, Phenols and Ethers	08
		CHEMG-P-03	Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH meter and compare it with the indicator method	02
			Preparation of buffer solutions and find the pH of an unknown buffer solution by colour matching method (using following buffers) a. Sodium acetate-acetic acid b. Ammonium chloride-ammonium hydroxide	02
Md Muttakin Sarkar	III	CHEMG-T-03	Aromatic hydrocarbons	06
			Organometallic compounds	04
		CHEMGP-3 Organic Chemistry -1	Identification of a pure organic compound	04

Nabin Chandra Maity	IV	CHEMG-T-04	Coordination Chemistry	10
			Crystal Field Theory	10
		CHEMG-P-04	Complexometric estimation of (i) Mg2+ or (ii) Zn2+ using EDTA.	02
			Preparation of any two of the following complexes: a.tetraammine	01

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			carbonatocobalt (III) nitrate	
Delwar Ansary	IV	CHEMG-T-04	Phase Equilibrium	07
		CHEMG-P-04	Study of the equilibrium of one of the following reactions by the distribution method: $I_2(aq) + I^-(aq) = I^-(aq)$	02
			Perform the following potentiometric titrations: Weak acid vs. strong base	02
			Potassium dichromate. Mohr's salt	02
Saleha Khatun	IV	CHEMG-T-04	Conductance	08
			Transition Elements (3d Series)	10
		CHEMG-P-04	Preparation of any two of the following complexes: b. tetraamminecopper(II) sulphate	01
			c. potassium trioxalatochromate(III) trihydrate	01
			d. potassium bisoxalatocuprate(II) trihydrate	01
Md Muttakin Sarkar	IV	CHEMG-T-04	Solutions	05
			Electromotive force	05
		CHEMG-P-4	conductometric titrations: Strong acid vs. strong base	02
Nabin Chandra Maity	V	CHEMGTDSE-1	Chemical Analysis	14
		CHEMGPDSE-1	To find the total hardness of water by EDTA titration	02
			Determination of the strength of the H2O2 sample	02
Delwar Ansary	V	CHEMGTDSE-1	Error Analysis and Computer Applications	12
		CHEMGPDSE-1	To determine the rate constant for the acid catalysed hydrolysis of an ester.	02

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			TitrationofHClandCH$_3$COOHmixturevsNaOHusingtwodifferentindicatorstofindtheconcentration.	02
Saleha Khatun	V	CHEMGTDSE-1	Industrial Chemistry	18
		CHEMGPDSE-1	Titration of Na2CO3 and NaHCO3 mixture vs HCl using phenolphthalein and methyl orange indicators	02
Md Muttakin Sarkar	V	CHEMGTDSE-1	Environmental Chemistry	16
		CHEMGPDSE-1	Estimation of available oxygen in pyrolusite	02
Nabin Chandra Maity	VI	CHEMGTDSE-2	Polymers	04
			Paints	03
			Varnishes	02
			Fats and Oils	03
		CHEMGPDSE-2	Purification of the crude product is to be made by crystallisation from water/alcohol	02
			Estimation of saponification value of oil / ester / fat.	02
Delwar Ansary	VI	CHEMGTDSE-2	Amines and Diazonium Salts	10
			Amino Acids and Carbohydrates	10
		CHEMGPDSE-2	Hydrolysis of amides/imides	02
			Acetylation of aromatic amines	02
Saleha Khatun	VI	CHEMGTDSE-2	Synthetic dyes	02
			Drugs and Phermaceuticals	03
			Pesticides	03
			Fermentation Chemicals	03
		CHEMGPDSE-2	Estimation of acetic acid in commercial vinegar	01
			Estimation of amino acid by formol titration	02
Md Muttakin Sarkar	VI	CHEMGTDSE-2	Carboxylic Acids and Their Derivatives	06
			Industrial Chemistry Food additives	02
		CHEMGPDSE-2	Nitration of aromatic compounds	02

			Purification of the crude product is to be made by crystallization from water/alcohol.	01

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Mrs Saleha Khatun	I	CEMHCC-TH-1	Periodic properties Bohr's model and atomic spectrum of hydrogen, Limitations of Bohr's model and Sommerfeld's modifications, de Broglie's concept, Heisenberg's uncertainty principle and its significance,	7
			Time independent Schrödinger's wave equation (without application and solution detail), Significance of ψ and ψ2, Radial and angular wave functions for hydrogen atom (qualitative idea), radial probability distribution curves, shapes of s, p, d and f orbitals (qualitative idea), Quantum numbers and their significance, Pauli's exclusion principle, Aufbau principle and limitations, Hund's rules, exchange energy, electronic configurations of atoms. Elementary idea of microstates.	7
			Acidimetry and alkalimetry	10
Mrs. Saleha Khatun	I	CEMHCC-TH-1	Inorganic chemistry-I Theory Extranuclear structure of atom Bohr's model and atomic spectrum of hydrogen, Limitations of Bohr's model and Sommerfeld's modifications, de Broglie's concept, Heisenberg's uncertainty principle and its significance, Time independent Schrödinger's wave equation (without application and solution detail)	06
			Significance of ψ and ψ2, Radial and angular wave functions for hydrogen atom (qualitative idea), radial probability	04

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			distribution curves, shapes of s, p, d and f orbitals (qualitative idea)	
			Quantum numbers and their significance, Pauli's exclusion principle, Aufbau principle and limitations, Hund's rules, exchange energy, Electronic configurations of atoms.	04
			Elementary idea of microstates	02
		CEMHCC-P-1 Inorganic Chemistry-IA practical	Method of Preparation of standard solutions of titrants	02
			Estimation of Carbonate and hydroxide present together in a mixture	02
			Estimation of carbonate and bicarbonate present together in a mixture	02
Dr. Sandip Kumar Rajak	I	CHEMHT-IA Physical Chemistry-IA	Kinetic Theory and Gaseous state Kinetic Theory of gases	06
			Maxwell's distribution of speed and energy	06
			Real gas and virial equation	06
		CHEMHP-IA Physical Chemistry-IA	Determination of heat of neutralization of a strong acid by a strong base.	02
			Determination of heat of solute ion of oxalic acid from solubilitymeasurement	02
Mr. Delwar Ansary	I	CHEMHT-IA Physical Chemistry-IA	Chemical Thermodynamics-1: Zeroth and 1st law of Thermodynamics	07
		CHEMHT-IA Physical Chemistry-IA	Chemical Thermodynamics-1 : Thermochemistry	05
			Kinetic Theory and Gaseous state Kinetic Theory of gases	06
Mr Sourajit Sarkar	I	CEMHCC-T-2 Organic Chemistry-1 Theory	General Treatment of Reaction Mechanism – I Mechanistic classification:	07
			Reactive intermediates:	07
			Stereochemistry-I Bonding geometries of carbon compounds and representation	06

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			of molecules	
			Concept of chirality and symmetry:	07
		CEMHCC-P-2 Organic Chemistry-1 Practical	Separation	04
			Determination of boiling point	04
			Identification of a Pure Organic Compound by chemical test	08
Mr. Md Muttakin Sarkar	I	CEMHCC-T-2 Organic Chemistry-1 Theory	Bonding and Physical Properties Valence Bond Theory	02
			Electronic displacements	04
			MO theory	04
			Physical properties	03
			Stereochemistry-I Relative and absolute configuration	03
			Optical activity of chiral compounds	04

Mrs Saleha Khatun	II	CHEMHT-3	Acid-Base Concepts and Solvents Recapitulation of Arrhenius concept, Bronsted-Lowry concept, Solvent system concept (in H_2O, liq. NH_3, liq. SO_2 and liq. HF), Lux-Flood concept, Lewis concept	8
			Drago-Wayland equation, Solvent levelling and differentiating effects, Relative strength of different acids and bases, Pauling's rules, Hammett acidity function and super acids, HSAB principle and its applications, Acid-base equilibria in aqueous solution, pH, Buffer, Acid-base neutralization curves and choice of indicators. Gas phase acidity.	7
			Quantitative Chemical Analysis	10

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			I. Estimation of Fe(II) using $K_2Cr_2O_7$ solution II. Estimation of Fe(III) using $K_2Cr_2O_7$ and $KMnO_4$ solution iii. Estimation of Ca^{2+} using $KMnO^4$ solution iv. Estimation of Cu^{2+} iodometrically v. Estimation of Cr^{3+} using $K_2Cr_2O_7$ solution	
Mrs. Saleha Khatun	II	CEMHCC-T-3 Inorganic Chemistry-IB Theory	Redox reactions and Precipitation reactions Qualitative idea about complimentary, noncomplimentary, disproportionation and comproportionation reactions, standard redox potentials with sign conventions, Electrochemical series and its application to explore the feasibility of reactions and equilibrium constants	06
			Nernst equation; effect of pH, complexation and precipitation on redox potentials, formal potential; Basis of redox titration and redox indicators, Redox potential diagrams (Latimer and Frost) of common elements and their applications.	05
			Solubility product principle, common ion effect and their applications to the precipitation and separation of common metallic ions as hydroxides, sulphides, carbonates, sulphates and halides.	04
		CEMHCC-P-3 Inorganic Chemistry Practical-IB	Estimation of Fe(II) using $K_2Cr_2O_7$ solution	01
			Estimation of Fe(III) using $K_2Cr_2O_7$ Solution	01
			Estimation of Cu^{2+} iodometrycally	02

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			Estimation of Cr^{3+} using $K_2Cr_2O_7$ Solution	01
Dr. Sandip Kumar Rajak	II	CHEMHT-3 Physical chemistry-IB	Chemical kinetics Rate law, order and molecularity:	05
			Chemical kinetics Role of Temperature and theories of reaction rate:	07
			Chemical kinetics Homogeneous catalysis:	06
		CHEMHP-3 Physical chemistry-IB	Study of kinetics of acid-catalyzed hydrolysis of methyl acetate	04
			Study of kinetics of decomposition of H_2O_2.	04
Mr. Delwar Ansary	II	CHEMHT-3 Physical chemistry-IB	Chemical Thermodynamics-II: Second Law	05
			Chemical Thermodynamics-II: Clausius inequality, Criteria for spontaneity and equilibrium.	05
			Chemical Thermodynamics-II: Thermodynamic relations:	02
Mr Sourajit Sarkar	II	CEMHCC-T-4 Organic Chemistry-2 Theory	Stereochemistry-II Stereochemistry-II Concept of pro-stereoisomerism:	06 04
			Conformation:	06
			Substitution and Elimination Reactions Elimination reactions:	08
		CEMHCC-P-4 Organic Chemistry-2 Practical	Organic Preparations	18
Mr. Md Muttakin Sarkar	II	CEMHCC-T-4 Organic Chemistry-2	General Treatment of Reaction Mechanism II Reaction thermodynamics	02
			Concept of organic acids and bases	02
			Tautomerism	04
			Reaction kinetics	05

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			Substitution and Elimination Reactions Free-radical substitution reaction	03
			Nucleophilic substitution reactions	04

Dr. Sandip Kumar Rajak	III	CHEMHT-5 Physical Chemistry – II	Transport processes Viscosity:	10
			Transport processes Conductance and transport number:	10
			Foundation of Quantum Mechanics Beginning of Quantum Mechanics:	04
			Foundation of Quantum Wave function:Mechanics	06
			Foundation of Quantum Mechanics Concept of Operators:	05
			Foundation of Quantum Mechanics Particle in a box:	05
		CHEMHP-5 Physical Chemistry – II	Determination of partition coefficient for the distribution of I_2 between water andCCl_4	04
			Determination of K_{eq} for KI + I_2= KI_3, using partition coefficient between water and CCl_4.	04
			Conductometric titration of an acid (strong, weak/ monobasic, dibasic) againststrong base.	04
Mr. Delwar Ansary	III	CHEMHT-5 Physical Chemistry – II	Application of Thermodynamics-I: Partial properties and chemical potential:	03
			Application of Thermodynamics-I: Chemical Equilibrium:	03
			Application of	03

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			Thermodynamics-I:	
			Application of Thermodynamics-I: Nernst's distribution law;	04
			Chemical potential and other properties of ideal substances-pure and mixtures: Pure ideal gas:	04
			Application of Thermodynamics-I: Condensed Phase	03
		CHEMHP-5 Physical Chemistry – II	Study of viscosity of unknown liquid (glycerol, sugar) with respect to water.	04
			Application of Thermodynamics-I: Partial properties and chemical potential:	03
Mrs Saleha Khatun	III	CHEMHT-6	Chemical Bonding–II Covalent Bond: Lewis structures, formal charge; Qualitative idea of V. B. Theory, directional properties of covalent bond, Concept of Equivalent and non equivalent Hybridization and shapes of simple molecules and ions (examples from main groups), Stereochemically non-rigid molecules – Berry's pseudorotation, Resonance and Dipole moments of inorganic molecules and ions.	14
			VSEPR theory and Bent's rule and their applications; M.O. Theory (elementary pictorial approach), concept of bond order, MO diagram of homo-nuclear diatomics (1^{st} and 2^{nd} period elements), hetero-nuclear diatomics (HF, CO, NO, NO^+ and CN^-) and triatomics (H_2O and BeH_2). Electron sea model and elementary idea about band theory, classification of inorganic solids and their conduction properties	14

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			according to band theory; Hydrogen bonding: classifications, its effect on the properties of compounds and its importance in biological systems, Vander Waal's forces.	
			Metal extraction and purification: Basic Metallurgy Idea about ores and minerals, operations involved in metallurgy, Flow chart diagram for the extraction of pure Ti, Ni and U (including reactions) from their important ores and their uses.	10
		CHEMHP-6	Quantitative inorganic analysis i. Estimation of Fe(II) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution ii. Estimation of Fe(III) and Cu(II) in a given mixture using $K_2Cr_2O_7$ solution iii. Estimation of Cr(VI) and Mn(II) in a given mixture using $K_2Cr_2O_7$ solution iv. Estimation of Fe(III) and Cr(VI) in a given mixture using $K_2Cr_2O_7$ solution v. Estimation of Fe(II) and Mn(II) in a given mixture using $KMnO_4$ solution vi. Estimation of Fe(III) and Ca(II) in a given mixture using $KMnO_4$ solution	10
Mrs. Saleha Khatun	III	CEMHCC-T-6 Inorganic Chemistry-II Theory	Ionic Bond: Lattice energy, Born-Lande equation with derivation and importance of Kapustinskii expression for lattice energy	05
			Born-Haber cycle and its applications, Polarising power and polarisability of ions, Fajan's rules and its applications	05

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			radius ratio rules – its applications and limitations, salvation energy and solubility energetics of dissolution process;	05
			Packing in crystals, voids in crystal lattice, packing efficiency, Structure of ionic solids: rock salt, zinc blende, wurtzite, fluorite, antifluorite, perovskite and layer lattice.	05
			Qualitative idea about stoichiometric and non-stoichiometric crystal defects.	02
		CEMHCC-P-6 Inorganic Chemistry-II Practical	Estimation of Fe(II) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution	02
			Estimation of Cu(II) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution	02
			Estimation of Cr(VI) and Fe(III) in a given mixture using $K_2Cr_2O_7$ solution	02
			Estimation of Ca(II) and Fe(III) in a given mixture using K_2Cr_2O7 solution	02
Mr Sourajit Sarkar	III	CEMHCC-T-7 Organic Chemistry-3 Theory	Carbonyl and Related Compounds Addition to C=O	09
			Exploitation of acidity of α-H of C=O	08
			Elementary ideas of Green Chemistry	03
			Nucleophilic addition to α,β-unsaturated carbonyl system: Nucleophilic addition to α,β-unsaturated carbonyl system:	03
			Substitution at sp2 carbon (C=O system)	03
		CEMHCC-P-7 Organic Chemistry-3 Practical	Qualitative Organic Analysis of single solid organic compound	16
Mr. Md Muttakin Sarkar	III	CEMHCC-T-7 Organic Chemistry-3 Theory	Chemistry of alkenes and alkynes Addition to C=C	06
			Addition to C≡C (in comparison to C=C)	04

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		CEMHCC-P-7 Organic Chemistry-3 Practical	Aromatic Substitution Electrophilic aromatic substitution	04
			Organo-metallics Free-radical substitution Reaction	04
Mr Sourajit Sarkar	III	SEC-1B Basic Analytical Chemistry	Introduction	04
			Complexometry	02
			Soil Analysis	02
			Analysis of water	03
			Analysis of food products	03
			Chromatography	03
			Ion-exchange	02
			Analysis of cosmetics	03
			Suggested Applications (Any one)	02
			Suggested Instrumental demonstrations	03

Dr. Sandip Kumar Rajak	IV	CHEMHT-8 Physical Chemistry–III	Application of Thermodynamics – II: Colligative properties:	08
			Application of Thermodynamics – II: Phase rule:	06
			Application of Thermodynamics – II: Binary solutions:	06
			Quantum Chemistry Angular momentum:	06
			Quantum Chemistry Qualitative treatment of hydrogen atom and hydrogen-like ions	08
			Quantum Chemistry LCAO and HF-SCF:	06
		CHEMHP-8 Physical Chemistry – II	Determination of solubility of sparingly soluble salt in water, in electrolyte.with common ions and in neutral electrolyte	02

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			(using common indicator).	
			pH-metric titration of acid (mono-and di-basic) against strong base.	02
			Determination of K_{sp} for AgCl by potentiometric titration of $AgNO_3$solution against standard KCl solution.	02
Mr. Delwar Ansary	IV	CHEMHT-8 Physical Chemistry–III CHEMHP-8 Physical Chemistry – II	Electrical Properties of molecules: Ionic equilibria	08
			Electrical Properties of molecules: Electromotive Force:	06
			Electrical Properties of molecules: Dipole moment and polarizability	06
			Potentiometric titration of Mohr's salt solution against standard K_2Cr_2O-solution.	02
		CHEMHT-8 Physical Chemistry–III	Effect of ionic strength on the rate of Persulphate –Iodide reaction.	02
			Study of phenol-water phase diagram.	02
			Electrical Properties of molecules: Ionic equilibria	08
Mrs Saleha Khatun	IV	CHEMHT-9	Radioactivity and Nuclear Chemistry Atomic nucleus – nuclear stability, n/p ratio and different modes of decay, mass defect, packing fraction and nuclear binding energy. Nuclear forces: Meson exchange theory, elementary idea of nuclear shell model and magic numbers. Fission, fusion and spallation reactions, artificial radioactivity, super heavy elements and their IUPAC nomenclature. Moderators, slow and fast neutrons, Applications of radio-isotopes in: determination of structures, establishment of reaction	8

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			mechanisms and radio-carbon dating, hazards of radiation and safety measures.	
			Chemistry of s and p-block elements Diagonal relationship (Li-Mg; B-Si) and anomalous behavior of first member of each group, Allotropy and catenation (examples of C, P and S compounds). Study of the following compounds with emphasis on preparation, properties, structure and bonding: Berylium hydrides and halides; diborane; borazine; boron nitride, boric acid, borax, fluorocarbons (with environmental effect); oxides and oxyacids of nitrogen, phosphorous, sulphur and chlorine; Peroxo acids of sulphur; tetrasulphur trtranitride; interhalogens, pseudohalogens, polyhalides, fluorides and oxides of xenon. Noble gas clathrates; basic properties of iodine. Synthesis, structural aspects and applications of silicones and phosphazines; Structural properties of various silicates.	7
		CHEMHP-9	Complexometric Titration	10
			Inorganic Preparation	
Mrs. Saleha Khatun	IV	CEMHCC-T-9	Coordination Chemistry-I Idea about double salts and complex salts, Werner's theory	03
			EAN rule, classification of ligands and their binding modes	03
			IUPAC nomenclature of coordination compounds (up to two metal centres)	03
			overall and stepwise stability constants, chelates, inner metallic complexes	03
			Stereochemistry and	03

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			isomerism (constitutional and stereo) of complexes with coordination no. 4 and 6.	
		CEMHCC-P-9	Complexometric Titration: i)Estimation of Hardness of Water ii)Estimation of Ca(II) and Mg(II) in a mixture	04
			Inorganic Preparation: i)Mohr's Salt ii)Tetraamminecarbonatocobalt (III) trihydrate	02
Mr Sourajit Sarkar	IV	CEMHCC-T-10 Organic Chemistry-4 Theory	Nitrogen Compounds Amines: Aliphatic & Aromatic:	03
			Nitro compounds (aliphatic and aromatic):	02
			Alkylnitrile and isonitrile	02
			Diazonium salts and their related compounds	02
			The Logic of Organic Synthesis Retrosynthetic analysis:	08
			Strategy of ring synthesis:	04
			Asymmetric synthesis:	06
		CEMHCC-P-10 Organic Chemistry-4 Practical	Organic Quantative Estimation	14
Mr. Md Muttakin Sarkar	IV	CEMHCC-T-10 Organic Chemistry-4	Rearrangements: Mechanism with evidence and stereochemical Features for the following Rearrangement to electron-deficient carbon	03
			Rearrangement to electron-deficient nitrogen	01
		CEMHCC-P-10 Organic Chemistry-4 Practical	Rearrangement to electron-deficient oxygen	02
			Aromatic rearrangements	01
			Migration from nitrogen to ring carbon	01
			Rearrangement reactions by green approach	01

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			Organic Spectroscopy UV Spectroscopy	02
			IR Spectroscopy	02
			NMR Spectroscopy	05
Mr Sourajit Sarkar	IV	SEC-1B CHEMHS – 2A Pharmaceutical Chemistry	Drugs & Pharmaceuticals Introduction	08
			Fermentation	06
			Hands On Practical	06

Mrs Saleha Khatun	V	CHEMHT-11	Magnetochemistry Classification of magnetic substances, Origin of para magnetic moments, temperature dependence of para magnetism – Curie and Curie-Weiss law, TIP, magnetic susceptibility and its measurement (Gouy method), diamagnetic correction, effective magnetic moment, spin only moment for 3d metals, Orbital contribution to magnetic moment, spin-orbit coupling, quenching of orbital contribution, Sub-normal magnetic moments and antiferromagnetic interactions (elementary idea with examples).	12
			Chemistry of d- and f-block elements d-block elements: Characteristic properties, Comparison among the elements of 3d series with reference to electronic configuration, oxidation states and E^0 values; General comparison between 3d, 4d and 5d series elements in term	12

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			of electronic configuration, oxidation states, atomization energy, magnetic properties and coordination chemistry. f-block elements: Comparison between d and f-block elements; Electronic configuration, oxidation states, variation of magnetic properties (Ln^{3+}), atomic and ionic (3+) radii of lanthanoids; consequences of lanthanide contraction, separation of lanthanides by ion exchange and solvent extraction methods; comparison between lanthanoids and actinoids.	
		CHEMHP-11	Quantitative estimation A. Quantitative: i. Estimation of available chlorine in bleaching powder using iodometry ii. Estimation of available oxygen in pyrolusite using permanganometry iii. Estimation of Cu in brass using iodometry iv. Estimation of Fe in cement using permanganometry v. Estimation of chloride gravimetrically vi. Estimation of Ni(II) using DMG gravimetrically B.	10
			Experiment: i. Paper chromatographic separation of Ni(II) and Co(II) ii. Measurement of 10Dq by spectrophotometric method iii. Preparation of Mn(acac)3 and determination of its λmax colorimetrically	
Mrs. Saleha Khatun	V	CEMHCC-T-11 Inorganic chemistry-III Theory	structure and bonding of coordination compounds on the basis of V. B. Theory and its limitations.	04
		Coordination Chemistry-II	Elementary idea about CFT, splitting of d^n configuration in	06

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			ML4 to ML6 and ML8 systems, factors affecting, measurement of o, spectrochemical series of ligands,	
			CFSE in weak and strong fields, OSSE, High spin and low spin complexes, spin isomerism,	02
			tetragonal distortion, Jahn Teller theorem and applications, achievements and limitations of CFT, nephalauxetic effect, stabilisation of unusually high and low oxidation states of 3d series elements	06
			MOT (elementary idea), σ and π bonding in octahedral complexes (a pictorial approach). Colour and electronic spectra of complexes: selection rules for electronic transitions, d-d transition, charge transfer transition (qualitative idea)	04
			L-S coupling and R-S ground state term for atomic no. up to 30, qualitative ORGEL diagram for 3d1 – 3d9 ions with appropriate symbols for the energy levels.	06
		CEMHCC-P-11 Inorganic Chemistry-IV Practical	Estimation of available chlorine in bleaching powder using iodometry	01
			Estimation of available oxygen in pyrolusite using permanganometry	02
			Estimation of Fe in cement using permanganometry	02
			Estimation of Ni(II) using DMG gravimetrically	01
			Estimation of chloride gravimetrically	01
Dr. Sandip Kumar	V	CHEMHT-12	Molecular Spectroscopy	04

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Rajak		Physical Chemistry – IV	Interaction of electromagnetic radiation	
			Molecular Spectroscopy Rotation spectroscopy:	06
			Vibrational spectroscopy:	06
			Molecular Spectroscopy Raman spectroscopy:	04
			Molecular Spectroscopy Nuclear Magnetic Resonance (NMR) spectroscopy, Electron Spin Resonance (ESR) spectroscopy:	04
			Surface phenomenon Surface tension and energy:	06
			Surface phenomenon Adsorption:	06
			Surface phenomenon Colloids:	06
		CHEMHP-12 Physical Chemistry – IV	Verification of Beer and Lambert's Law for $KMnO_4$and $K_2Cr_2O_7$solution	02
			Study of kinetics of $K_2S_2O_8$+ KI reaction, spectrophotometrically.	02
			Determination of CMC from surface tension measurements.	02
Mr. Delwar Ansary	V	CHEMHT-12 Physical Chemistry – IV	Phtochemistry: Lambert-Beer's law	06
			Photochemistry: Photochemical Processes	06
			Photochemistry: Rate of Photochemical processes	06
		CHEMHP-12 Physical Chemistry – IV	Determination of surface tension of a liquid using Stalagmometer.	02
			Determination of pH of unknown buffer, spectrophotometrically.	02
Mrs Saleha Khatun	V	CHEMHTDSE-1B Inorganic Materials of Industrial Importance	Silicate Industries	9
			Fertilizers	9
			Surface Coatings	9
			Batteries	9
			Alloys	9

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			Catalysis	9
			Chemical explosives	6
Mr Sourajit Sarkar	V	CEMH-DSE-T-2C Green Chemistry Theory	Twelve principles of Green Chemistry	06
			Prevention/ minimization of hazardous/ toxic products	05
			Energy requirements for reactions – alternative sources of energy	05
			Prevention of chemical accidents designing greener processes	06
			Future Trends in Green Chemistry Oxidation reagents and catalysts	04
		CEMH-DSE-P-2C Green Chemistry Practical	Green Chemistry Practical	15
Mr. Md. Muttakin Sarkar	V	CEMHDSE-T-2C Green Chemistry	Green Chemistry Introduction to Green Chemistry	05
			Examples of Green Synthesis/ Reactions and some real-World cases	10
		CEMHDSE-T-2C Green Chemistry Theory	Green Chemistry Practical	05

Mrs Saleha Khatun	VI	CHEMHT-13	Bio-inorganic Chemistry Essential elements of life, Role of metal ions in living systems-a brief review, Elementary idea about proteins, enzymes and ionophores; Structure of ATP, Na^+ ion pump and transport of Na^+ and K^+ across cell membrane; active site structures and bio-functions of haemoglobin, myoglobin, carboxy peptidase A, carbonic anhydrase B, cytochrome c,	25

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			ferredoxins and chlorophyll; biological nitrogen fixation; toxic metals (Pb, Cd and Hg) and their effects, Wilson disease, chelation therapy; platinum and gold complexes as drugs (examples only).	
			Organometallic chemistry and catalysis Definition, Classification of organometallic compounds, hapticity of ligands, nomenclature, 16- electron & 18-electron rule and its applications; preparation and structure of mono- and bi-nuclear carbonyls of 3d series, synergic effect of CO and use of IR data to explain extent of back bonding; General methods of preparation of metal-carbon σ-bonded complexes, Zeise's salt, Metal-carbon multiple bonding; Preparation, structures, properties and reactions of ferrocene; elementary idea about oxidative addition, reductive elimination, insertion reactions; Study of the following catalytic processes: alkene hydrogenation (Wilkinson's catalyst), hydroformylation, Wacker process, Synthetic gasoline (Fischer Tropsch reaction) and Olefin polymerization reaction (Ziegler-Natta catalyst)	25
		CHEMHP-13	Qualitative semimicro analysis	10
Mrs. Saleha Khatun	VI	CEMHCC-T-13 Molecular Symmetry and Point group	Symmetry as a universal theme, concept of symmetry elements and operations (with examples);	02
			symmetry properties of atomic orbitals (s, p and d);	02
			identification of molecular point groups in some simple	04

			molecules and ions;	
			applications of symmetry for polarity and chirality.	02
		Bio-inorganic Chemistry	Essential elements of life, Role of metal ions in living systems- a brief review, Elementary idea about proteins, enzymes and ionophores; Structure of ATP, Na+ ion pump and transport of Na+ and K+ across cell membrane;	06
			active site structures and bio-functions of haemoglobin, myoglobin,	03
			carboxy peptidase A, carbonic anhydrase B, cytochrome c, ferredoxins and chlorophyll; biological nitrogen fixation;	06
			toxic metals (Pb, Cd and Hg) and their effects, Wilson disease,	04
			chelation therapy; platinum and gold complexes as drugs (examples only)	04
		CEMHCC-P-13 Qualitative semimicro analysis	Qualitative semimicro analysis of mixtures containing four radicals (excluding oxide and carbonate). Emphasis should be given to the understanding of the chemistry of different reactions and to assign the most probable composition. Basic Radicals: K^+, $NH4^+$, $Mg^{2+,}$ Ca^{2+}, Ba^{2+}, Sr^{2+}, Al^{3+}, Cr^{3+}, Mn^{2+}, Fe^{3+}/ Fe^{2+}, Co^{2+}, $Ni^{2+,}$ Cu^{2+}, Zn^{2+}, $Pb^{2+,}$ Cd^{2+}, Bi^{3+}, Sn^{2+} / Sn^{4+}, As^{3+}/$As^{5+,}$ $Sb^{3+/}$ Sb^{5+}	06
			Acid Radicals: Cl^-, Br^-, I^-, $S^{2-,}$ SO_4^{2-}, $S_2O_3^{2-}$, SCN^-, NO_3^-, NO_2^-, BO_3^{3-}, PO_4^{3-}, AsO_4^{3-} and H_3BO_3	02
			Insoluble Materials: Cr_2O_3(ig),	03

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			Fe_2O_3(ig), Al_2O_3, SnO_2, $PbSO_4$, $BaSO_4$, $SrSO_4$	
Mr Sourajit Sarkar	VI	CEMHCC-T-14 Organic Chemistry-4 Theory	Carbocycles and Heterocycles Polynuclear hydrocarbons and their derivatives	06
			Heterocyclic compounds	04
			Synthesis (including retrosynthetic approach and mechanistic details)	04
			Pyridine	06
			Cyclic Stereochemistry Alicyclic compounds	06
		CHEMHCC-P-14 Organic Chemistry-4 Practical	Chromatographic Separations	08
			Spectroscopic Analysis of Organic Compounds	06
Mr. Md Muttakin Sarkar	VI	CEMHCC-T-14 Organic Chemistry-4 Theory	Pericyclic reactions Mechanism, stereochemistry, regioselectivity in case of Electrocyclic reactions	03
			Cycloaddition reactions	02
			Sigmatropic reactions	02
		CHEMHCC-P-14	Carbohydrates Monosaccharides, disaccharides, polysaccharides	05
			Biomolecules Amino acids, peptides	05
			Chromatographic Separations	05
Dr. Sandip Kumar Rajak	VI	CHEMHTDSE-3 Advanced Physical Chemistry	Statistical Thermodynamics Configuration:	06
			Statistical Thermodynamics Boltzmann distribution:	06
			Statistical Thermodynamics Partition function:	06
			Special selected topics Specific heat of solid:	07
			Special selected topics 3rd law:	07
			Special selected topics Polymers	07
		CHEMHTDSE-3 Advanced Physical Chemistry	Roots of equations: (e.g. volume of van der Waals gas and comparison with ideal gas, pH of a weak acid).	02
			Numerical differentiation	02

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			(e.g., change in pressure for small change involume of a van der Waals gas, potentiometric titrations).	
			Numerical integration (e.g. entropy/ enthalpy change from heat capacity data), probability distributions (gas kinetic theory) and mean values.	02
Mr. Delwar Ansary	VI	CHEMHTDSE-3 Advanced Physical Chemistry	Crystal Structure: Bravais Lattice and Laws of Crystallography:	08
			Crystal Structure: Crystal planes:	06
			Crystal Structure: Determination of crystal structure	06

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Name of Teacher	Semester	Paper	Content	No. of Lecture
Saleha Khatun	I	CHEMG-T-01	Atomic Structure	09
			Chemical Periodicity	09
			Redox Reactions	04
		CHEMG-P-01	Estimation of Fe(II) ions with $K_2Cr_2O_7$	01
			Estimation of carbonate and bicarbonate present together in a mixture	02
Delwar Ansary	I	CHEMG-T-01	**Acids and bases** Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents.	03
			Acids and bases Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept.	03
			Acids and bases Hard and softacids and bases (HSAB concept), applications of HSAB process.	02
			Aliphatic Hydrocarbons Introduction (12L)	02
			Alkanes (up to5 Carbons)	03
			Alkenes:(upto5 Carbons).	04
			Alkynes:(upto5 Carbons)	03
		CHEMG-P-01	Estimation of oxalic acid by titrating it with $KMnO_4$.	02
			Estimation of Cu(II)ions iodometrically using $Na_2S_2O_3$.	02
Md Muttakin Sarkar	I	CHEMG-T-01	**Fundamentals of Organic Chemistry** Electronic displacements	05
			Stereochemistry	05
			Nucleophilic Substitution and Elimination Reactions	04
		CHEMGP-1 Organic Chemistry -1	Qualitative Analysis of Single Solid Organic Compound(s)	05

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Saleha Khatun	II	CHEMG-T-02	Chemical Bonding and Molecular structure: a) Ionic Bonding	06
			b) Covalent Bonding	07
			c) MO Approach	07
			Comparative study of p-block elements: a) Group trends in electronic configuration, modification of pure elements,	04
			b) Common oxidation states, inert pair effect, and their important compounds in respect of the following groups of elements i. B-Al-Ga-In-Tl ii. C-Si-Ge-Sn-Pb	04
			iii. N-P-As-Sb-Bi iv. O-S-Se-Te v. F-Cl-Br-I	02
		CHEMG-P-02	Qualitative semi-micro analysis of mixtures containing three radicals. Emphasis should be given to the understanding of the chemistry of different reactions. Acid Radicals: Cl^-, Br^-, I^-, NO_2^-, NO_3^-, S^{2-}, SO_4^{2-}, BO_3^{3-}, H_3BO_3.	03
			Basic Radicals: Na^+, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Cr^{3+}, Mn^{2+}, Fe^{3+}, Ni^{2+}, Cu^{2+}, NH_4^+.	02
Delwar Ansary	II	CHEMG-T-02	Kinetic Theory of Gases and Real gases	12
			Liquids	05
		CHEMG-P-02	Surface tension measurement (use of organic solvents excluded)	02
			Viscosity measurement (use of organic solvents excluded)	02
MdMuttakin Sarkar	II	CHEMG-T-02	Solids	05
			Chemical kinetics	05
		CHEMG-P-02 Physical Chemistry – I	Viscosity measurement (use of organic solvents excluded)	02

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Saleha khatun	III	CHEMG-T-03	Ionic Equilibria	09
			Aryl Halides	04
		CHEMG-P-03	Determination of enthalpy of hydration of copper sulphate	02
Delwar Ansary	III	CHEMG-T-03	Chemical Energetics	12
			Carbonyl Compounds	07
		CHEMG-P-03	Determination of heat capacity of calorimeter for different volumes	02
			Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide	02
Saleha Khatun	III	CHEMG-T-03	Chemical Equilibrium	09
			Alcohols, Phenols and Ethers	08
		CHEMG-P-03	Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH meter and compare it with the indicator method	02
			Preparation of buffer solutions and find the pH of an unknown buffer solution by colour matching method (using following buffers) a. Sodium acetate-acetic acid b. Ammonium chloride-ammonium hydroxide	02
Md Muttakin Sarkar	III	CHEMG-T-03	Aromatic hydrocarbons	06
			Organometallic compounds	04
		CHEMGP-3 Organic Chemistry -1	Identification of a pure organic compound	04

Saleha Khatun	IV	CHEMG-T-04	Coordination Chemistry	10
			Crystal Field Theory	10
		CHEMG-P-04	Complexometric estimation of (i) Mg^{2+} or (ii) Zn^{2+} using EDTA.	02
			Preparation of any two of the following complexes: a.tetraammine	01

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			carbonatocobalt (III) nitrate	
Delwar Ansary	IV	CHEMG-T-04	Phase Equilibrium	07
		CHEMG-P-04	Study of the equilibrium of one of the following reactions by the distribution method: $I_2(aq) + I^-(aq) = I^-(aq)$	02
			Perform the following potentiometric titrations: Weak acid vs. strong base	02
			Potassium dichromate. Mohr's salt	02
Saleha Khatun	IV	CHEMG-T-04	Conductance	08
			Transition Elements (3d Series)	10
		CHEMG-P-04	Preparation of any two of the following complexes: b. tetraamminecopper(II) sulphate	01
			c. potassium trioxalatochromate(III) trihydrate	01
			d. potassium bisoxalatocuprate(II) trihydrate	01
Md Muttakin Sarkar	IV	CHEMG-T-04	Solutions	05
			Electromotive force	05
		CHEMG-P-4	conductometric titrations: Strong acid vs. strong base	02
Saleha Khatun	V	CHEMGTDSE-1	Chemical Analysis	14
		CHEMGPDSE-1	To find the total hardness of water by EDTA titration	02
			Determination of the strength of the H2O2 sample	02
Delwar Ansary	V	CHEMGTDSE-1	Error Analysis and Computer Applications	12
		CHEMGPDSE-1	To determine the rate constant for the acid catalysed hydrolysis of an ester.	02
			TitrationofHClandCH3COOHmixturevsNaOHusingtwodifferentindicatorstofindtheconcentration.	02
Saleha Khatun	V	CHEMGTDSE-1	Industrial Chemistry	18
		CHEMGPDSE-1	Titration of Na2CO3 and NaHCO3 mixture vs HCl using phenolphthalein and	02

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			methyl orange indicators	
Md Muttakin Sarkar	V	CHEMGTDSE-1	Environmental Chemistry	16
		CHEMGPDSE-1	Estimation of available oxygen in pyrolusite	02
Saleha Khatun	VI	CHEMGTDSE-2	Polymers	04
			Paints	03
			Varnishes	02
			Fats and Oils	03
		CHEMGPDSE-2	Purification of the crude product is to be made by crystallisation from water/alcohol	02
			Estimation of saponification value of oil / ester / fat.	02
Delwar Ansary	VI	CHEMGTDSE-2	Amines and Diazonium Salts	10
			Amino Acids and Carbohydrates	10
		CHEMGPDSE-2	Hydrolysis of amides/imides	02
			Acetylation of aromatic amines	02
Saleha Khatun	VI	CHEMGTDSE-2	Synthetic dyes	02
			Drugs and Phermaceuticals	03
			Pesticides	03
			Fermentation Chemicals	03
		CHEMGPDSE-2	Estimation of acetic acid in commercial vinegar	01
			Estimation of amino acid by formol titration	02
Md Muttakin Sarkar	VI	CHEMGTDSE-2	Carboxylic Acids and Their Derivatives	06
			Industrial Chemistry Food additives	02
		CHEMGPDSE-2	Nitration of aromatic compounds	02
			Purification of the crude product is to be made by crystallization from water/alcohol.	01

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Saleha Khatun	I	CHEMG-T-01	Atomic Structure	09
			Chemical Periodicity	09
			Redox Reactions	04
		CHEMG-P-01	Estimation of Fe(II) ions with $K_2Cr_2O_7$	01
			Estimation of carbonate and bicarbonate present together in a mixture	02
Delwar Ansary	I	CHEMG-T-01	**Acids and bases** Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents.	03
			Acids and bases Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept.	03
			Acids and bases Hard and soft acids and bases (HSAB concept), applications of HSAB process.	02
			Aliphatic Hydrocarbons Introduction	02
			Alkanes (up to 5 Carbons)	03
			Alkenes: (up to 5 Carbons).	04
			Alkynes: (up to 5 Carbons).	03
		CHEMG-P-01	Estimation of oxalic acid by titrating it with $KMnO_4$.	02
			Estimation of Cu (II) ions iodometrically using $Na_2S_2O_3$.	02
Md Muttakin Sarkar	I	CHEMG-T-01	**Fundamentals of Organic Chemistry** 1.Electronic displacements	05
			2.Stereochemistry	05

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			3. Nucleophilic Substitution and Elimination Reactions	04
		CHEMGP-1 Organic Chemistry -1	Qualitative Analysis of Single Solid Organic Compound(s)	05

Saleha Khatun	II	CHEMG-T-02	Chemical Bonding and Molecular structure: a) Ionic Bonding	06
			b) Covalent Bonding	07
			c) MO Approach	07
			Comparative study of p-block elements : a)Group trends in electronic configuration, modification of pure elements,	04
			b) Common oxidation states,inert pair effect,and their important compounds in respect of the following groups of elements i. B-Al-Ga-In-Tl ii. C-Si-Ge-Sn-Pb	04
			iii. N-P-As-Sb-Bi iv. O-S-Se-Te v. F-Cl-Br-I	02
		CHEMG-P-02	Qualitative semi-micro analysis of mixtures containing three radicals. Emphasis should be given to the understanding of the chemistry of different reactions. Acid Radicals: Cl^-, Br^-, I^-, NO_2^-, NO_3^-, S^{2-}, SO_4^{2-}, BO_3^{3-}, H_3BO_3.	03
			Basic Radicals: Na^+, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Cr^{3+}, Mn^{2+}, Fe^{3+}, Ni^{2+}, Cu^{2+}, NH_4^+.	02
Delwar Ansary	II	CHEMG-T-02	Kinetic Theory of Gases and Real gases	12
			Liquids	05

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		CHEMG-P-02	Surface tension measurement (use of organic solvents excluded)	02
			Viscosity measurement (use of organic solvents excluded)	02
Md Muttakin Sarkar	II	CHEMG-T-02	Solids	05
			Chemical kinetics	05
		CHEMG-P-02 Physical Chemistry – I	Viscosity measurement (use of organic solvents excluded)	02

Delwar Ansary	I	CHEMG-T-01	**Acids and bases** Brönsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents.	03
			Acids and bases Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept.	03
			Acids and bases Hard and soft acids and bases (HSAB concept), applications of HSAB process.	02
			Aliphatic Hydrocarbons *Introduction*	02
			Alkanes (up to 5 Carbons)	03
			Alkenes: (up to 5 Carbons).	04
			Alkynes: (up to 5 Carbons).	03
		CHEMG-P-01	Estimation of oxalic acid by titrating it with $KMnO_4$.	02
			Estimation of Cu (II) ions iodometrically using $Na_2S_2O_3$.	02
Saleha Khatun	III	CHEMG-T-01	Atomic Structure	09
			Chemical Periodicity	09

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			Redox Reactions	04
		CHEMG-P-01	Estimation of Fe(II) ions with $K_2Cr_2O_7$	01
			Estimation of carbonate and bicarbonate present together in a mixture	02
Md Muttakin Sarkar	III	CHEMG-T-01	**Fundamentals of Organic Chemistry** 1.Electronic displacements	05
			2.Stereochemistry	05
			3. Nucleophilic Substitution and Elimination Reactions	04
		CHEMGP-1 Organic Chemistry -1	Qualitative Analysis of Single Solid Organic Compound(s)	05

Delwar Ansary	II	CHEMG-T-02	Kinetic Theory of Gases and Real gases	12
			Liquids	05
			Surface tension measurement (use of organic solvents excluded)	02
		CHEMG-P-02	Viscosity measurement (use of organic solvents excluded)	02
Saleha Khatun	IV	CHEMG-T-02	Chemical Bonding and Molecular structure: d) Ionic Bonding	06
			Covalent Bonding	07
			MO Approach	07
			Comparative study of p-block elements : a)Group trends in electronic configuration, modification of pure elements,	04
			b) Common oxidation states,inert pair effect,and their important compounds in respect of the following groups of elements i. B-Al-Ga-In-Tl ii. C-Si-Ge-Sn-Pb	04

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			iii. N-P-As-Sb-Bi iv. O-S-Se-Te v. F-Cl-Br-I	02
		CHEMG-P-02	Qualitative semi-micro analysis of mixtures containing three radicals. Emphasis should be given to the understanding of the chemistry of different reactions. Acid Radicals: Cl^-, Br^-, I^-, NO_2^-, NO_3^-, S^{2-}, SO_4^{2-}, BO_3^{3-}, H_3BO_3.	03
			Basic Radicals: Na^+, K^+, Ca^{2+}, Sr^{2+}, Ba^{2+}, Cr^{3+}, Mn^{2+}, Fe^{3+}, Ni^{2+}, Cu^{2+}, NH_4^+.	02
Md Muttakin Sarkar	IV	CHEMG-T-02	Solids	05
			Chemical kinetics	05
		CHEMG-P-02 Physical Chemistry – I	Viscosity measurement (use of organic solvents excluded)	02

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NAME OF TEACHER	YEAR	PAPER	CONTENT	NO OF PERIOD
Ms Saleha Khatun	1st (Hons) I	I **Inorganic**	**Nuclear chemistry and radioactivity**	10
			Chemistry of elements **1. Diagonal Relationship,** **2. Extraction and Purification and use of Ti, V, Cr, Ni and U, 3. Preperation, properties bonding, stereochemistry of some compounds**	18
			Acid-bases and solvents	12
Mr. Masadul Shaikh	1st (Hons)	I **Inorganic**	**The nature of Chemical bond-I** **Ionic bonding**	12
			Periodic table	10
			Chemistry of elements **Comparative study of group 13 and 14.**	05
Mr. Arif Mohammad	1st (Hons)	I **Inorganic**	**Atomic structure (extra nuclear)**	12
			The nature of Chemical bond-I **Some mixed oxide structure, Bonding in metals**	11
Mr Sourajit Sarkar	1st (Hons)	II (Gr. A) **Organic**	**Bonding features in organic molecules**	07
			Organic acids and bases	03
			Tauto merism	02
			Reaction mechanism-I	07
			Stereochemistry-I	11
			Reaction mechanism-II	11
			Synthesis, physical properities and reactions of classes of compounds: Alkanes, alkens,alkadiens and arencs, alkyl halids, vinyl halides, allyl and benzyl halids	04
Dr. Sandip Kumar Rajak	1st (Hons)	II (Gr. B) **Physical**	**Chemical thermodynamics:** **1. General introduction of thermodynamics and zeroth law of thermodynamics** **2. Thermodynamics-I** **3. Thermo chemistry** **4. Thermodynamics-II**	16
			Chemical Equilibriam	04
			Colligative properities of solution	05
Mr Dilwar Ansari	1st (Hons)	II (Gr. B) **Physical**	**Kinetic theory and gaseous state** **1. Ideal gas** **2. Real Gas**	12

			Liquid State: **1. Vapour pressure** **2. Surface tension** **3. viscosity**	08
Dr. Sandip Kumar Rajak	1st (Hons)	III **Practical**	**Qualitative analysis of single organic compound and organic preparation**	10
Ms Saleha Khatun	1st (Hons)	III **Practical**	**Qualitative analysis of single organic compound and organic preparation**	10
Mr Sourajit Sarkar	1st (Hons)	III **Practical**	**Qualitative analysis of single organic compound and organic preparation**	07
Ms Saleha Khatun	2nd (Hons)	IV **Inorganic**	**Transition element and coordination compounds**	20
			Redox potential	10
			Lanthanides and Actinides	12
			Chromatographic Techniques	08
Mr. Masadul Shaikh	2nd (Hons)	IV **Inorganic**	**Nature of chemical bond-III**	15
			Organic Reagents in Chemical Analysis	12
			Complexometric tritration	08
			Mono nuclear metal carbonyls	05
Md. Muttakin Sarkar	2nd (Hons)	V (Gr. A) **Organic**	**Stereochemistry-II**	10
			Reaction mechanism-III	10
			Synthesis, physical properities and reactions of classes of compounds	20
			Organo metallic compounds	05
Dr. Sandip Kumar Rajak	2nd (Hons)	V (Gr. B) **Physical**	**Chemical Kinetics**	10
			Colloids and macro molecules	05
			Adsorption and surface phenomenon	05
Mr Dilwar Ansari	2nd (Hons)	V (Gr. B) **Physical**	**Electrochemistry**	20
Ms Saleha Khatun	2nd (Hons)	VI (**practical**)	**Inorganic quantitative analysis and Inorganic preparation**	10
Mr. Masadul	2nd	VI	**Inorganic quantitative analysis and**	08

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Shaikh	(Hons)	(**practical**)	**Inorganic preparation**	
Md. Muttakin Sarkar	2nd (Hons)	VI (**practical**)	**Inorganic quantitative analysis and Inorganic preparation**	10
Ms Saleha Khatun	3rd (Hons)	VII **Inorganic**	**Symmetry of the elements, symmetry operations and point group**	12
			The nature of Chemical bond III	26
			Chemistry of Elements **1. Oxides, halides, oxo halides of Mo, W etc.** **2. Separation of Nb and Ta**	12
Mr. Masadul Shaikh	3rd (Hons)	VII **Inorganic**	**Chemistry of Organo metallic compounds**	16
			Chemistry of Elements **1. Platinum metals**	06
Mr. Arif Mohammad			**Bioinorganic Chemistry**	16
			Magneto chemistry	12
Mr Sourajit Sarkar			**Stereochemistry-III**	10
			Reaction mechanism-IV	15
			Spectroscopy in Organic chemistry	25
			Organic Synthesis-I	12
			Organic Synthesis-II	12
			Heterocyclic compounds	10
			Synthetic dyes, pharmaceuticals and polymers	06
			Molecules of nature	10
Dr. Sandip Kumar Rajak	3rd (Hons)	IX **Physical**	**Quantum theory, atomic spectra and molecular structure**	20
			Atomic structure and atomic spectra	8
			Chemical bonding and molecular geometry	10
			Phase equilibria	12
			Statistical thermodynamics	05
Mr Dilwar Ansari	3rd (Hons)	IX **Physical**	**Eletrical and magnetic properties of matter**	10
			Rotational spectra	06
			Vibrational spectra	12
			Photo chemistry	17
Ms Saleha Khatun	3rd (Hons)	X Gr. A (**practical**)	**Inorganic qualitative analysis**	24
Mr. Masadul Shaikh	3rd (Hons)	X Gr. B (**practical**)	**Organic quantitative**	10
Dr. Sandip Kumar Rajak	3rd (Hons)	XI Gr. B+C **Physical**	**1.Physical Chemistry practical** **2. Computer application**	18
Mr Dilwar Ansari	3rd (Hons)	XI Gr. A **Physical**	**Physical Chemistry practical**	12

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GENERAL COURSE

NAME OF TEACHER	YEAR	PAPER	CONTENT	NO OF PERIOD
Arif Mohammad	1st (GEN)	I **Inorganic Gr. (A)**	**Atomic structure**	10
			Periodic Properties	05
			The nature of chemical bond	20
			Principles of chemical Analyses	15
Dr. Swadesh Mandal	1st (GEN)	I **Organic Gr.(B)**	**Aliphatic Hydrocarbons& Their Derivatives**	07
			Alcohols and Ethers	03
			Aldehydes and Ketones	05
			Organic compounds containing nitrogen	06
			Carbohydrates	04
Dr. Sandip Kumar Rajak	1st (GEN)	I (Gr. C) **Physical**	**Kinetic theory and gaseous state**	4
			Real Gas	4
			First and second laws of thermodynamics	7
			Principles of thermo chemistry	4
			Dilute solution	6
Arif Mohammad	1st (GEN)	**III Gr-B (Organic practical)**	**Qualitative analysis Quantitative analysis**	15
Dr. Swadesh Mandal	2nd (GEN)	II **Inorganic (Gr-A)**	**Coordination compounds**	14
			Chemistry of elements	28
			Radiochemistry	8
ARIF MOHAMMAD	2nd (GEN)	II (Gr. B) **Organic**	**Stereo chemistry of organic compounds**	9
			Mechanism of organic reactions	8
			Benzene and its derivatives	4
			Phenols	4
Ujjwal Mondal	2nd (GEN)	V (Gr. C) **Physical**	**Viscosity**	3
			Surface tension	2
			Electrolytic conductance	6
			EMF	4
			Ionic equilibria	5
			Chemical kinetics	5
Arif Mohammad	2rd (GEN)	III(Gr-A) **Inorganic practical**	**1. Qualitative analysis 2. Quantitative analysis**	15

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GENERAL COURSE

NAME OF TEACHER	YEAR	PAPER	CONTENT	NO OF PERIOD
ARIF MOHAMMAD	3rd (GEN)	IV **Gr-(A+B)**	**Amino acids and proteins**	5
			Nucleosides and nucleotides	5
			Industrially important compounds	20
Dr. Sandip Kumar Rajak	3rd (GEN)	IV **Gr-(A+C)**	**Bio-inorganic chemistry**	10
			Surface chemistry	5
			Colloids and macromolecules	5
			Catalysis	5
			Phase rule	5
Ujjwal Mondal	3rd (GEN)	V **Physical (Practical)**	**Physical Chemistry practical**	21

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Semester I

FACULTY NAME:SIRAJUL SK, DUMKAL COLLEGE

PHY-H-CC-T-01: MATHEMATICAL PHYSICS-I

Recapitulation: Limits, continuity, average and instantaneous quantities, differentiation. Plotting functions. Intuitive ideas of continuous, differentiable, etc. functions and plotting of curves. Approximation: Taylor and binomial series (statements only). First Order Differential Equations and Integrating Factor.
Second Order Differential equations: Homogeneous Equations with constant coefficients. Wronskian and general solution. Statement of existence and Uniqueness Theorem for Initial Value Problems. Particular Integral.
Calculus of functions of more than one variable: Partial derivatives, exact and inexact differentials. Integrating factor, with simple illustration. Constrained Maximization using Lagrange Multipliers.

PHY-H-CC-T-02: MECHANICS

Gravitation and Central Force Motion: Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere. (3**Lectures)**
Motion of a particle under a central force field: Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS). Physiological effectson astronauts. **(6 Lectures)**
Oscillations: SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor. (7 **Lectures)**
Non-Inertial Systems: Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of in rotating coordinate systems. Centrifugal force. Coriolis force and its applications. Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems.

PHY-H-GE-T-01: MECHANICS

Ordinary Differential Equations: 1st order homogeneous differential equations. 2nd order homogeneous differential equations with constant coefficients. **(6 Lectures)**
Gravitation: Newton's Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's Laws (statement only). Satellite in circular orbit and applications. Geosynchronous orbits. Basic idea of global positioning system (GPS). Weightlessness. Physiological effects on astronauts. **(8 Lectures)**
Oscillations: Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages.

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Damped oscillations. (6 **Lectures)**

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Semester I

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-CC-T-01: MECHANICS

Gravitation and Central Force Motion: Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere. (3 **Lectures)** Motion of a particle under a central force field. Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS). Physiological effects on astronauts. **(6 Lectures)**
Oscillations: SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor. (7 **Lectures)**
Non-Inertial Systems: Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of Physics in rotating coordinate systems. Centrifugal force. Coriolis force and its applications. Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems. **(4 Lectures)**

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Semester II

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-H-CC-T-03: ELECTRICITY AND MAGNETISM

Magnetic Properties of Matter:
Magnetization vector (M). Magnetic Intensity(H). Magnetic Susceptibility and permeability. Relation between B, H, M. B-H curve and hysteresis. **(3 Lectures)**
Electromagnetic Induction:
Faraday's Law. Lenz's Law. Self Inductance and Mutual Inductance. Reciprocity Theorem. Energy stored in a Magnetic Field. **(5 Lectures)**
Transients: Growth and decay of currents and voltages in L-R, C-R and L-C-R circuits; electrical oscillations in L-C circuits. **(2 Lectures)**

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Electrical Circuits: AC Circuits: Kirchhoff s laws for AC circuits. Complex Reactance and Impedance. Series LCR Circuit: (1) Resonance, (2) Power Dissipation and (3) Quality Factor, and (4) Band Width. Parallel LCR Circuit. **(4 Lectures)**
Network theorems: Ideal Constant-voltage and Constant-current Sources. Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem. Applications to dc circuits. **(4 Lectures)**
Ballistic Galvanometer: Torque on a current Loop. Ballistic Galvanometer: Current and Charge Sensitivity. Electromagnetic damping. Logarithmic damping. CDR. **(3 Lectures)**

PHY-H-CC-T-04: WAVES AND OPTICS

Diffraction: Kirchhoff s Integral Theorem, Fresnel-Kirchhoff s Integral formula and its application to rectangular slit. **(5 Lectures)**
Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope. Double slit. Multiple slits. Diffraction grating. Resolving power of grating. **(8 Lectures)**
Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire. (7 **Lectures)**

PHY-H-GE-T-02: WAVES AND OPTICS

Diffraction: Fraunhofer diffraction- Single slit; Double Slit. Multiple slits and Diffraction grating. Fresnel Diffraction: Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis.
(14 Lectures)
Polarization: Transverse nature of light waves. Plane polarized light - production and analysis. Circular and elliptical polarization. **(5 Lectures)**

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Semester II

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-CC-T-02: WAVES AND OPTICS

Diffraction: Kirchhoff s Integral Theorem, Fresnel-Kirchhoff s Integral formula and its application to rectangular slit. **(5 Lectures)**
Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope. Double slit. Multiple slits. Diffraction grating. Resolving power of grating. **(8 Lectures)**
Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire. (7 **Lectures**

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2nd Year

FACULTY NAME:SIRAJUL SK, DUMKAL COLLEGE

ELECTRICITY AND MAGNETISM

Electric Field and Electric Potential:
Electric field: Electric field lines. Electric flux. Gauss' Law with applications to charge distributions with spherical, cylindrical and planar symmetry.
(6 Lectures)
Conservative nature of Electrostatic Field. Electrostatic Potential. Laplace's and Poisson equations. The Uniqueness Theorem. Potential and Electric Field of a dipole. Force and Torque on a dipole.
(6 Lectures)
Electrostatic energy of system of charges. Electrostatic energy of a charged sphere. Conductors in an electrostatic Field. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Parallel-plate capacitor. Capacitance of an isolated conductor. Method of Images and its application to: (1) Plane Infinite Sheet and (2) Sphere. **(10 Lectures)**
Dielectric Properties of Matter:
Electric Field in matter. Polarization, Polarization Charges. Electrical Susceptibility and Dielectric Constant. Capacitor (parallel plate, spherical, cylindrical) filled with dielectric. Displacement vector D. Relations between E, P and D. Gauss' Law in dielectrics. **(8 Lectures)**

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3rd Year

FACULTY NAME:SIRAJUL SK, DUMKAL COLLEGE

QUANTUM MECHANICS AND APPLICATIONS

Time dependent Schrodinger equation: Time dependent Schrodinger equation and dynamical evolution of a quantum state; Properties of Wave Function. Linearity and Superposition Principles. Eigenvalues and Eigenfunctions. Position, momentum and Energy operators; commutator of position and momentum operators; Hermitian Operators, Expectation values of position and momentum. Wave Function of a Free Particle. (8 **Lectures)**

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Time independent Schrodinger equation-Hamiltonian, stationary states and energy eigenvalues; expansion of an arbitrary wavefunction as a linear combination of energy eigenfunctions; General solution of the time dependent Schrodinger equation in terms of linear combinations of stationary states. (5 **Lectures)**

General discussion of bound states in an arbitrary potential- continuity of wave function, boundary condition and emergence of discrete energy levels; Quantum mechanics of simple harmonic oscillator-energy levels and energy eigenfunctions using Frobenius method; Hermite polynomials; ground state, zero point energy & uncertainty principle. **(10 Lectures)**

Quantum theory of hydrogen-like atoms: time independent Schrodinger equation in spherical polar coordinates; separation of variables for second order partial differential equation; angular momentum operator & quantum numbers; Radial wavefunctions from Frobenius method; shapes of the probability densities for ground & first excited states; Orbital angular momentum quantum numbers l and m; s, p, d,..shells. **(11 Lectures)**

Atoms in Electric & Magnetic Fields: Electron angular momentum. Space quantization. Electron Spin and Spin Angular Momentum. Larmor's Theorem. Spin Magnetic Moment. Stern-Gerlach Experiment. Zeeman Effect: Electron Magnetic Moment and Magnetic Energy, Gyromagnetic Ratio and Bohr Magneton. **(11 Lectures)**

Atoms in External Magnetic Fields:- Normal and Anomalous Zeeman Effect. Paschen Back and Stark Effect (Qualitative Discussion only). **(5 Lectures)**

Many electron atoms: Pauli's Exclusion Principle. Symmetric & Antisymmetric Wave Functions. Periodic table. Fine structure. Spin orbit coupling. Spectral Notations for Atomic States. Total angular momentum. Vector Model. Spin-orbit coupling in atoms- L-S and J-J couplings. Hund's Rule. Term symbols. Spectra of Hydrogen and Alkali Atoms (Na etc.). **(10 Lectures**

DIGITAL SYSTEMS AND APPLICATIONS

Introduction to CRO: Block Diagram of CRO. Electron Gun, Deflection System and Time Base. Deflection Sensitivity. Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference. **(3 Lectures)**

Integrated Circuits (Qualitative treatment only): Active & Passive components. Discrete components. Wafer. Chip. Advantages and drawbacks of ICs. Scale of integration: SSI, MSI, LSI and VLSI (basic idea and definitions only). Classification of ICs. Examples of Linear and Digital ICs. **(3 Lectures)**

Digital Circuits: Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion. BCD, Octal and Hexadecimal numbers. AND, OR and NOT Gates (realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates and application as Parity Checkers. **(6 Lectures)**

Boolean algebra: De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Idea of Minterms and Maxterms. Conversion of a Truth table into Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map. **(6 Lectures)**

Data processing circuits: Basic idea of Multiplexers, De-multiplexers, Decoders, Encoders.**(4 Lectures)**

Arithmetic Circuits: Binary Addition. Binary Subtraction using 2's Complement. Half and Full Adders. Half & Full Subtractors, 4-bit binary Adder/Subtractor. **(5 Lectures)**

Sequential Circuits: SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered) Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop. M/S JK Flip-Flop. **(6 Lectures)**

Timers: IC 555: block diagram and applications: Astable multivibrator and Monostable multivibrator. **(3 Lectures)**

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Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits). **(2 Lectures)**
Counters(4 bits): Ring Counter. Asynchronous counters, Decade Counter. Synchronous Counter.

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(4 Lectures)
Computer Organization: Input/Output Devices. Data storage (idea of RAM and ROM). Computer memory. Memory organization & addressing. Memory Interfacing. Memory Map. **(6 Lectures)**
Intel 8085 Microprocessor Architecture: Main features of 8085. Block diagram. Components. Pin-out diagram. Buses. Registers. ALU. Memory. Stack memory. Timing & Control circuitry. Timing states. Instruction cycle, Timing diagram of MOV and MVI. **(8 Lectures)**
Introduction to Assembly Language: 1 byte, 2 byte & 3 byte instructions. **(4 Lectures)**

ANALOG SYSTEMS AND APPLICATIONS

Semiconductor Diodes: P and N type semiconductors. Energy Level Diagram. Conductivity and Mobility, Concept of Drift velocity. PN Junction Fabrication (Simple Idea). Barrier Formation in PN Junction Diode. Static and Dynamic Resistance. Current Flow Mechanism in Forward and Reverse Biased Diode. Drift Velocity. Derivation for Barrier Potential, Barrier Width and Current for Step Junction. **(10 Lectures)**
Two-terminal Devices and their Applications: (1) Rectifier Diode: Halfwave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency, (2) Zener Diode and Voltage Regulation. Principle and structure of (1) LEDs, (2) Photodiode, (3) Solar Cell. **(6 Lectures)**
Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC

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Configurations. Current gains α and β, Relations between α and β. Load Line analysis of Transistors. DC Load line and Q-point. Physical Mechanism of Current Flow. Active, Cutoff and Saturation Regions.
(6 Lectures)
Amplifiers: Transistor Biasing and Stabilization Circuits. Fixed Bias and Voltage Divider Bias. Transistor as 2-port Network. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Classification of Class A, B & C Amplifiers. **(10 Lectures)**
Coupled Amplifier: RC-coupled amplifier and its frequency response. **(4 Lectures)**
Feedback in Amplifiers: Effects of Positive and Negative Feedback on Input Impedance, Output Impedance, Gain, Stability, Distortion and Noise. (**4 Lectures)**
Sinusoidal Oscillators: Barkhausen's Criterion for self-sustained oscillations. RC Phase shift oscillator, determination of Frequency. Hartley & Colpitts oscillators. **(4 Lectures)**
Operational Amplifiers (Black Box approach): Characteristics of an Ideal and Practical Op-Amp. (IC 741) Open-loop and Closed-loop Gain. Frequency Response. CMRR. Slew Rate and concept of Virtual ground. (**4 Lectures)**
Applications of Op-Amps: (1) Inverting and non-inverting amplifiers, (2) Adder, (3)Subtractor, (4) Differentiator, (5) Integrator, (6) Log amplifier, (7) Zero crossing detector (8) Wein bridge oscillator. **(9 Lectures)**
Conversion: Resistive network (Weighted and R-2R Ladder). Accuracy and Resolution. A/D Conversion (successive approximation) **(3 Lectures)**

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Semester I

FACULTY NAME: SURAJITSAHA, DUMKAL COLLEGE

PHY-H-CC-T-01: MATHEMATICAL PHYSICS-I

Orthogonal Curvilinear Coordinates:
Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems. (4 **Lectures)**
Matrices: Addition and Multiplication of Matrices. Null Matrices. Diagonal, Scalar and Unit Matrices. Transpose of a Matrix. Symmetric and Skew-Symmetric Matrices. Conjugate of a Matrix. Hermitian and Skew- Hermitian Matrices. Singular and Non-Singular matrices. Orthogonal and Unitary Matrices. Trace of a Matrix. Eigen-values and Eigenvectors (Degenerate and non-degenerate). Cayley-Hamiliton Theorem. Diagonalization of Matrices. Solutions of Coupled Linear Ordinary homogeneous Differential Equations. Functions of a Matrix. (6 **Lectures)**
Introduction to probability:
Independent random variables: Sample space and Probability distribution functions. Binomial, Gaussian, and Poisson distribution with examples. Mean and variance. **(5 Lectures)**
Dirac Delta function and its properties: (2)
Definition of Dirac delta function. Representation as limit of a Gaussian function and rectangular function. Properties of Dirac delta function.

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PHY-H-CC-T-02: MECHANICS

Collisions: Elastic and inelastic collisions between particles. Centre of Mass and Laboratory frames.
Rotational Dynamics: Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation.
Elasticity: Relation between Elastic constants. Twisting torque on a Cylinder or Wire.
Fluid Motion: Kinematics of Moving Fluids: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube. Euler's Equation. Bernoulli's Theorem.

PHY-H-GE-T-01: MECHANICS

Rotational Motion: Angular velocity and angular momentum. Torque. Conservation of angular momentum. **(5 Lectures)**

Elasticity: Hooke's law - Stress-strain diagram - Elastic moduli-Relation between elastic constants - Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants - Work done in stretching and work done in twisting a wire - Twisting couple on a cylinder - Determination of Rigidity modulus by static torsion – Torsional pendulum-Determination of Rigidity modulus and moment of inertia -q, *r j* and o by Searles method. **(8 Lectures)**

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Semester II

FACULTY NAME: SURAJITSAHA, DUMKAL COLLEGE

PHY-H-CC-T-03: ELECTRICITY AND MAGNETISM

Dielectric Properties of Matter:
Electric Field in matter. Polarization, Polarization Charges. Electrical Susceptibility and Dielectric Constant. Capacitor (parallel plate, spherical, cylindrical) filled with dielectric. Displacement vector D. Relations between E, P and D. Gauss' Law in dielectrics. **(8 Lectures)**
Magnetic Field:
Magnetic force between current elements and definition of Magnetic Field B. Biot-Savart's Law and its simple applications: straight wire and circular loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital Law and its application to (1) Solenoid and (2) Toroid. Properties of B: curl and divergence. Vector Potential. Magnetic Force on (1) point charge (2) current carrying wire (3) between current elements. Torque on a current loop in a uniform Magnetic Field. **(9 Lectures)**

PHY-H-CC-T-04: WAVES AND OPTICS

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Superposition of Collinear Harmonic oscillations: Linearity and Superposition Principle. Superposition of two collinear oscillations having equal frequencies and (2) different frequencies (Beats). Superposition of N collinear Harmonic Oscillations with (1) equal phase differences and equal frequency differences. **(5 Lectures)**
Superposition of two perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses. **(2 Lectures)**
Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves. Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave. Water Waves: Ripple and Gravity Waves
(4 **Lectures)**
Velocity of Waves: Velocity of Transverse Vibrations of Stretched Strings. Velocity of Longitudinal Waves in a Fluid in a Pipe. Newton's Formula for Velocity of Sound. Laplace's Correction.**(6 Lectures)**

PHY-H-GE-T-02: WAVES AND OPTICS

Superposition of Two Collinear Harmonic oscillations: Linearity & Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats). **(4 Lectures)**
Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses. **(2 Lectures)**
Waves Motion- General: Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity. Plane waves. Spherical waves, Wave intensity. (7 **Lectures)**

CBCS CURRICULUM FOR SEMESTERIZED UNDER-GRADUATE COURSE IN PHYSICS (GENERAL) THE ACADEMIC SESSION 2018-19

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Semester I

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-CC-T-01: MECHANICS

Collisions: Elastic and inelastic collisions between particles. Centre of Mass and Laboratory frames. **(3 Lectures)**
Rotational Dynamics: Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation. (12 **Lectures)**
Elasticity: Relation between Elastic constants. Twisting torque on a Cylinder or Wire. **(3 Lectures)**
Fluid Motion: Kinematics of Moving Fluids: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube. (2 **Lectures)**

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Semester II

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-CC-T-02: WAVES AND OPTICS

Superposition of Collinear Harmonic oscillations: Linearity and Superposition Principle. Superposition of two collinear oscillations having (1) equal frequencies and (2) different frequencies (Beats). Superposition of N collinear Harmonic Oscillations with (1) equal phase differences and (2) equal frequency differences.
(5 Lectures)
Superposition of two perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses.
(2 Lectures)
Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves. Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave. Water Waves: Ripple and Gravity Waves.
(4 **Lectures)**
Velocity of Waves: Velocity of Transverse Vibrations of Stretched Strings. Velocity of Longitudinal Waves in a Fluid in a Pipe. Newton's Formula for Velocity of Sound. Laplace's Correction. **(6 Lectures)**

UNDER-GRADUATE COURSE IN PHYSICS (HONOURS) THE ACADEMIC SESSION 2018-19

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2nd Year

FACULTY NAME:SURAJIT SAHA, DUMKAL COLLEGE

Magnetic Field:
Magnetic force between current elements and definition of Magnetic FieldB. Biot-Savart's Law and its simple applications: straight wire and circular loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital Law and its application to (1) Solenoid and (2) Toroid. Properties of B: curl and divergence. Vector Potential. Magnetic Force on (1) point charge (2) current carrying wire (3) between current elements. Torque on a current loop in a uniform Magnetic Field.
(9 Lectures)
Magnetic Properties of Matter:

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Magnetization vector (M). Magnetic Intensity(H). Magnetic Susceptibility and permeability. Relation between B, H, M. Ferromagnetism. B-H curve and hysteresis. **(4 Lectures)**

Electromagnetic Induction:

Faraday's Law. Lenz's Law. Self Inductance and Mutual Inductance. Reciprocity Theorem. Energy stored in a Magnetic Field. Introduction to Maxwell's Equations. Charge Conservation and Displacement current.

(6 Lectures)

Electrical Circuits: AC Circuits: Kirchhoff s laws for AC circuits. Complex Reactance and Impedance. Series LCR Circuit: (1) Resonance, (2) Power Dissipation and (3) Quality Factor, and (4) Band Width. Parallel LCR Circuit.

(4 Lectures)

Network theorems: Ideal Constant-voltage and Constant-current Sources. Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem. Applications to dc circuits. **(4 Lectures)**

Ballistic Galvanometer: Torque on a current Loop. Ballistic Galvanometer: Current and Charge Sensitivity. Electromagnetic damping. Logarithmic damping. CDR.

(3 Lectures)

UNDER-GRADUATE COURSE IN PHYSICS (HONOURS) THE ACADEMIC SESSION 2018-19

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3rd Year

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

STATISTICAL MECHANICS

Classical Statistics: Macrostate & Microstate, Elementary Concept of Ensemble, Phase Space, Entropy and Thermodynamic Probability, Maxwell-Boltzmann Distribution Law, Partition Function, Thermodynamic Functions of an Ideal Gas, Classical Entropy Expression, Gibbs Paradox, Sackur Tetrode equation, Law of Equipartition of Energy (with proof) - Applications to Specific Heat and its Limitations, Thermodynamic Functions of a Two-Energy Levels System, Negative Temperature. **(18 Lectures)**

Classical Theory of Radiation: Properties of Thermal Radiation. Blackbody Radiation. Pure temperature dependence. Kirchhoff s law. Stefan-Boltzmann law: Thermodynamic proof. Radiation Pressure. Wien's Displacement law. Wien's Distribution Law. Saha's Ionization Formula. Rayleigh-Jean's Law. Ultraviolet Catastrophe. **(9 Lectures)**

Quantum Theory of Radiation: Spectral Distribution of Black Body Radiation. Planck's Quantum Postulates. Planck's Law of Blackbody Radiation: Experimental Verification. Deduction of (1) Wien's Distribution Law, (2) Rayleigh-Jeans Law, (3) Stefan-Boltzmann Law, (4) Wien's Displacement law from Planck's law. **(5 Lectures)**

Bose-Einstein Statistics: B-E distribution law, Thermodynamic functions of a strongly Degenerate Bose Gas, Bose Einstein condensation, properties of liquid He (qualitative description), Radiation as a photon gas and Thermodynamic functions of photon gas. Bose derivation of Planck's law. **(13 Lectures)**

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Fermi-Dirac Statistics: Fermi-Dirac Distribution Law, Thermodynamic functions of a Completely and strongly Degenerate Fermi Gas, Fermi Energy, Electron gas in a Metal, Specific Heat of Metals, Relativistic Fermi gas, White Dwarf Stars, Chandrasekhar Mass Limit. **(15 Lectures)**

SOLID STATE PHYSICS

Crystal Structure: Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis - Central and Non-Central Elements. Unit Cell. Miller Indices. Reciprocal Lattice. Types of Lattices. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Atomic and Geometrical Factor. **(12 Lectures)**

Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids, T^3 law. **(10 Lectures)**

Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia- and Paramagnetic Domains. Quantum Mechanical Treatment of Paramagnetism. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss. **(8 Lectures)**

Dielectric Properties of Materials: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability. Normal and Anomalous Dispersion. Cauchy and Sellmeir relations. Langevin-Debye equation. Complex Dielectric Constant. Optical Phenomena. Application: Plasma Oscillations, Plasma Frequency, Plasmons, TO modes. **(8 Lectures)**

Ferroelectric Properties of Materials: Structural phase transition, Classification of crystals, Piezoelectric effect, Pyroelectric effect, Ferroelectric effect, Electrostrictive effect, Curie-Weiss Law, Ferroelectric domains, PE hysteresis loop. **(6 lectures)**

Elementary band theory: Kronig Penny model. Band Gap. Conductor, Semiconductor (P and N type) and insulator. Conductivity of Semiconductor, mobility, Hall Effect. Measurement of conductivity (04 probe method) & Hall coefficient. **(10 Lectures)**

Superconductivity: Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory (No derivation) **(6 Lectures)**

ELECTROMAGNETIC THEORY

Maxwell Equations: Review of Maxwell's equations. Displacement Current. Vector and Scalar Potentials. Gauge Transformations: Lorentz and Coulomb Gauge. Boundary Conditions at Interface between Different Media. Wave Equations. Plane Waves in Dielectric Media. Poynting Theorem and Poynting Vector. Electromagnetic (EM) Energy Density. Physical Concept of Electromagnetic Field Energy Density, Momentum Density and Angular Momentum Density. **(12 Lectures)**

EM Wave Propagation in Unbounded Media: Plane EM waves through vacuum and isotropic dielectric medium, transverse nature of plane EM waves, refractive index and dielectric constant, wave impedance. Propagation through conducting media, relaxation time, skin depth. Wave propagation through dilute plasma, electrical conductivity of ionized gases, plasma frequency, refractive index, skin depth, application to propagation through ionosphere. **(10 Lectures)**

EM Wave in Bounded Media: Boundary conditions at a plane interface between two media. Reflection & Refraction of plane waves at plane interface between two dielectric media-Laws of Reflection & Refraction. Fresnel's Formulae for perpendicular & parallel polarization cases, Brewster's law. Reflection & Transmission coefficients. Total internal reflection, evanescent waves. Metallic reflection (normal incidence) **(10 Lectures)**

Polarization of Electromagnetic Waves: Description of Linear, Circular and Elliptical Polarization. Propagation of E.M. Waves in Anisotropic Media. Symmetric Nature of Dielectric Tensor. Fresnel's

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Formula. Uniaxial and Biaxial Crystals. Light Propagation in Uniaxial Crystal. Double Refraction. Polarization by Double Refraction. Nicol Prism. Ordinary & extraordinary refractive indices. Production & detection of Plane, Circularly and Elliptically Polarized Light. Phase Retardation Plates: Quarter-Wave and Half-Wave Plates. Babinet Compensator and its Uses. Analysis of Polarized Light. **(12 Lectures)**

Rotatory Polarization: Optical Rotation. Biot's Laws for Rotatory Polarization. Fresnel's Theory of optical rotation. Calculation of angle of rotation. Experimental verification of Fresnel's theory. Specific rotation. Laurent's half-shade polarimeter. **(5 Lectures)**

Wave Guides: Planar optical wave guides. Planar dielectric wave guide. Condition of continuity at interface. Phase shift on total reflection. Eigenvalue equations. Phase and group velocity of guided waves. Field energy and Power transmission. **(8 Lectures)**

Optical Fibres:- Numerical Aperture. Step and Graded Indices (Definitions Only). Single and Multiple Mode Fibres (Concept and Definition Only). **(3 Lectures)**

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SYLLABUS DISTRIBUTION

Semester I

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-CC-T-01: MATHEMATICAL PHYSICS-I

Vector Calculus:

Recapitulation of vectors: Properties of vectors under rotations. Scalar product and its invariance under rotations. Vector product, Scalar triple product and their interpretation in terms of area and volume respectively. Scalar and Vector fields. (6 Lectures)

Vector Differentiation: Directional derivatives and normal derivative. Gradient of a scalar field and its geometrical interpretation. Divergence and curl of a vector field. Del and Laplacian operators. Vector identities, Gradient, divergence, curl and Laplacian in spherical and cylindrical coordinates. (7 Lectures)

Vector Integration: Ordinary Integrals of Vectors. Multiple integrals, Jacobian. Notion of infinitesimal line, surface and volume elements. Line, surface and volume integrals of Vector fields. Flux of a vector field. Gauss' divergence theorem, Green's and Stokes Theorems and their applications (no rigorous proof)(10 Lectures)

PHY-H-CC-T-02: MECHANICS

Fundamentals of Dynamics: Reference frames. Inertial frames; Galilean transformations; Galilean invariance. Review of Newton's Laws of Motion. Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse. Momentum of variable-mass system: motion of rocket. (6 Lectures)

Work and Energy: Work and Kinetic Energy Theorem. Conservative and non-conservative forces. Potential Energy. Energy diagram. Stable and unstable equilibrium. Elastic potential energy. Force

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as gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy. (4 Lectures)

Special Theory of Relativity: Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum. Four Vectors (definition and examples only). (10 Lectures)

PHY-H-GE-T-01: MECHANICS

Vectors: Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter. **(4 Lectures)**
Laws of Motion: Frames of reference. Newton's Laws of motion. Dynamics of a system of particles. Centre of Mass. **(10 Lectures)**
Momentum and Energy: Conservation of momentum. Work and energy. Conservation of energy. Motion of rockets. **(6 Lectures)**
Speed Theory of Relativity: Constancy of speed of light. Postulates of Special Theory of Relativity. Length contraction. Time dilation. Relativistic addition of velocities.

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Semester I

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-CC-T-01: MECHANICS

Fundamentals of Dynamics: Reference frames. Inertial frames; Galilean transformations; Galilean invariance. Review of Newton's Laws of Motion. Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse. Momentum of variable-mass system: motion of rocket. **(6 Lectures)**
Work and Energy: Work and Kinetic Energy Theorem. Conservative and non-conservative forces. Potential Energy. Energy diagram. Stable and unstable equilibrium. Elastic potential energy. Force as gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy. **(4 Lectures)**
Special Theory of Relativity: Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy

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Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum. Energy-Momentum Four Vector. **(10 Lectures)**

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Semester II

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-CC-T-03: ELECTRICITY AND MAGNETISM

Electric Field and Electric Potential:

Electric field: Electric field lines. Electric flux. Gauss' Law with applications to charge distributions with spherical, cylindrical and planar symmetry. **(6 Lectures)**

Conservative nature of Electrostatic Field. Electrostatic Potential. Laplace's and Poisson equations. The Uniqueness Theorem. Potential and Electric Field of a dipole. Force and Torque on a dipole.**(6 Lectures)**

Electrostatic energy of system of charges. Electrostatic energy of a charged sphere. Conductors in an electrostatic Field. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Parallel-plate capacitor. Capacitance of an isolated conductor. Method of Images and its application to: (1) Plane Infinite Sheet and (2) Sphere. **(10 Lectures)**

PHY-H-CC-T-04: WAVES AND OPTICS

Superposition of Two Harmonic Waves:

Standing (Stationary) Waves in a String: Fixed and Free Ends. Analytical Treatment. Phase and Group Velocities. Changes with respect to Position and Time. Energy of Vibrating String. Transfer of Energy. Normal Modes of Stretched Strings. Plucked and Struck Strings. Melde's Experiment. Longitudinal Standing Waves and Normal Modes. Open and Closed Pipes. Superposition of N Harmonic Waves. **(7 Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence. **(3 Lectures)**

Interference: Division of amplitude and wavefront. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index. (**9 Lectures)**

Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer. (4 lectures)

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PHY-H-GE-T-02: WAVES AND OPTICS

Fluids: Surface Tension: Synclastic and anticlastic surface - Excess of pressure -Application to spherical and cylindrical drops and bubbles - variation of surface tension with temperature - Jaegar's method. Viscosity - Rate flow of liquid in a capillary tube - Poiseuille's formula - Determination of coefficient of viscosity of a liquid - Variations of viscosity of liquid with temperature- lubrication. **(6 Lectures)**

Sound: Simple harmonic motion - forced vibrations and resonance - Fourier's Theorem - Application to saw tooth wave and square wave - Intensity and loudness of sound - Decibels - Intensity levels - musical notes - musical scale. Acoustics of buildings: Reverberation and time of reverberation - Absorption coefficient - Sabine's formula - measurement of reverberation time - Acoustic aspects of halls and auditoria. **(6 Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. **(3 Lectures)**

Interference: Interference: Division of amplitude and division of wavefront. Young's Double Slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index.
(10 Lectures)

Michelson's Interferometer: (1) Idea of form of fringes (no theory needed), (2) Determination of wavelength, (3) Wavelength difference, (4) Refractive index, and (5) Visibility of fringes. (3 **Lectures)**

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Semester II

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PHY-G-CC-T-02: WAVES AND OPTICS

Superposition of Two Harmonic Waves:
Standing (Stationary) Waves in a String: Fixed and Free Ends. Analytical Treatment. Phase and Group Velocities. Changes with respect to Position and Time. Energy of Vibrating String. Transfer of Energy. Normal Modes of Stretched Strings. Plucked and Struck Strings. Melde's Experiment. Longitudinal Standing Waves and Normal Modes. Open and Closed Pipes. Superposition of N Harmonic Waves. (7 **Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence. **(3 Lectures)**

Interference: Division of amplitude and wavefront. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films:

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parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index. **(9 Lectures)**

Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer. **(4 Lectures)**

UNDER-GRADUATE COURSE IN PHYSICS (HONOURS) THE ACADEMIC SESSION 2018-19

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2nd Year

FACULTY NAME:MASADULHASSAN, DUMKAL COLLEGE

WAVES

Superposition of Collinear Harmonic oscillations: Linearity and Superposition Principle. Superposition of two collinear oscillations having (1) equal frequencies and (2) different frequencies (Beats). Superposition of N collinear Harmonic Oscillations with (1) equal phase differences and (2) equal frequency differences. **(5 Lectures)**

Superposition of two perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses.

(2 Lectures)

Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves. Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave. Water Waves: Ripple and Gravity Waves

(4 **Lectures)**

Velocity of Waves: Velocity of Transverse Vibrations of Stretched Strings. Velocity of Longitudinal Waves in a Fluid in a Pipe. Newton's Formula for Velocity of Sound. Laplace's Correction. **(6 Lectures)**

Superposition of Two Harmonic Waves:

Standing (Stationary) Waves in a String: Fixed and Free Ends. Analytical Treatment.

Phase and Group Velocities. Changes with respect to Position and Time. Energy of Vibrating String. Transfer of Energy. Normal Modes of Stretched Strings. Plucked and Struck Strings. Melde's Experiment. Longitudinal Standing Waves and Normal Modes. Open and Closed Pipes. Superposition of N Harmonic Waves.(7 Lectures)

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3rd Year

FACULTY NAME:MASADULHASSAN, DUMKAL COLLEGE

CLASSICAL MECHANICS

Classical Mechanics of Point Particles: Generalised coordinates and velocities. Hamilton's Principle, Lagrangian and Euler-Lagrange equations. Applications to simple systems such as coupled oscillators. Canonical momenta & Hamiltonian. Hamilton's equations of motion. Applications: Hamiltonian for a harmonic oscillator, particle in a central force field. Poisson brackets. Canonical transformations. **(22 Lectures)**

PHYSICAL OPTICS

Wave Optics: Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence. **(3 Lectures)**
Interference: Division of amplitude and wavefront. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index. (**9 Lectures)**
Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer. **(4 Lectures)**
Diffraction: Kirchhoff s Integral Theorem, Fresnel-Kirchhoff s Integral formula and its application to rectangular slit. **(5 Lectures)**
Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope. Double slit. Multiple slits. Diffraction grating. Resolving power of grating. **(8 Lectures)**
Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire. (7 **Lectures)**

NUCLEAR PHYSICS

General Properties of Nuclei: Constituents of nucleus and their Intrinsic properties, quantitative facts about mass, radii, charge density (matter density), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A plot, angular momentum, parity, magnetic moment, electric moments, nuclear excites states. **(10 Lectures)**
Nuclear Models: Liquid drop model approach, semi empirical mass formula and significance of its various terms, condition of nuclear stability, two nucleon separation energies, Fermi gas model (degenerate fermion gas, nuclear symmetry potential in Fermi gas), evidence for nuclear shell

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structure, nuclear magic numbers, basic assumption of shell model, concept of mean field, residual interaction, concept of nuclear force. (12 **Lectures)**

Radioactivity decay:(a) Alpha decay: basics of α-decay processes, theory of a-emission, Gamow factor, Geiger Nuttall law, α-decay spectroscopy. (b) (β- decay: energy kinematics for (β-decay, positron emission, electron capture, neutrino hypothesis. (c) Gamma decay: Gamma rays emission & kinematics, internal conversion. **(9 Lectures)**

Nuclear Reactions: Types of Reactions, Conservation Laws, kinematics of reactions, Q-value, reaction rate, reaction cross section, Concept of compound and direct Reaction, resonance reaction, Coulomb scattering (Rutherford scattering). **(8 Lectures)**

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Nuclear Astrophysics: Early universe, primordial nucleosynthesis (particle nuclear interactions), stellar nucleosynthesis, concept of gamow window, heavy element production: r- and s- process path. **(5 Lectures)**

Interaction of Nuclear Radiation with matter: Energy loss due to ionization (Bethe-Block formula), energy loss of electrons, Cerenkov radiation. Gamma ray interaction through matter, photoelectric effect, Compton scattering, pair production, neutron interaction with matter. **(6 Lectures)**

Detector for Nuclear Radiations: Gas detectors: estimation of electric field, mobility of particle, for ionization chamber and GM Counter. Basic principle of Scintillation Detectors and construction of photo-multiplier tube (PMT). Semiconductor Detectors (Si and Ge) for charge particle and photon detection (concept of charge carrier and mobility), neutron detector. **(6 Lectures)**

Particle Accelerators: Accelerator facility available in India: Van-de Graaff generator (Tandem accelerator), Linear accelerator, Cyclotron, Synchrotrons. **(5 Lectures)**

Particle physics: Particle interactions; basic features, types of particles and its families. Symmetries and Conservation Laws: energy and momentum, angular momentum, parity, baryon number, Lepton number, Isospin, Strangeness and charm, concept of quark model, color quantum number and gluons. **(14 Lectures)**

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CBCS CURRICULUM FOR SEMESTERIZED UNDER-GRADUATE COURSE IN PHYSICS (HONOURS) THE ACADEMIC SESSION 2022-23

SYLLABUS DISTRIBUTION

Semester I

FACULTY NAME:SIRAJUL SK, DUMKAL COLLEGE

PHY-H-CC-T-01: MATHEMATICAL PHYSICS-I

Recapitulation: Limits, continuity, average and instantaneous quantities, differentiation. Plotting functions. Intuitive ideas of continuous, differentiable, etc. functions and plotting of curves. Approximation: Taylor and binomial series (statements only). First Order Differential Equations and Integrating Factor.
Second Order Differential equations: Homogeneous Equations with constant coefficients. Wronskian and general solution. Statement of existence and Uniqueness Theorem for Initial Value Problems. Particular Integral.
Calculus of functions of more than one variable: Partial derivatives, exact and inexact differentials. Integrating factor, with simple illustration. Constrained Maximization using Lagrange Multipliers.

PHY-H-CC-T-02: MECHANICS

Gravitation and Central Force Motion: Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere. (3**Lectures)**
Motion of a particle under a central force field: Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS). Physiological effectson astronauts. **(6 Lectures)**
Oscillations: SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor. (7 **Lectures)**
Non-Inertial Systems: Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of in rotating coordinate systems. Centrifugal force. Coriolis force and its applications. Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems.

PHY-H-GE-T-01: MECHANICS

Ordinary Differential Equations: 1st order homogeneous differential equations. 2nd order homogeneous differential equations with constant coefficients. **(6 Lectures)**
Gravitation: Newton's Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's Laws (statement only). Satellite in circular orbit and applications. Geosynchronous orbits. Basic idea of global positioning system (GPS). Weightlessness. Physiological effects on astronauts. **(8 Lectures)**
Oscillations: Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages.

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Damped oscillations. (6 **Lectures)**

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Semester I

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-01: MATHEMATICAL PHYSICS-I

Orthogonal Curvilinear Coordinates:
Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems. (4 **Lectures)**
Matrices: Addition and Multiplication of Matrices. Null Matrices. Diagonal, Scalar and Unit Matrices. Transpose of a Matrix. Symmetric and Skew-Symmetric Matrices. Conjugate of a Matrix. Hermitian and Skew- Hermitian Matrices. Singular and Non-Singular matrices. Orthogonal and Unitary Matrices. Trace of a Matrix. Eigen-values and Eigenvectors (Degenerate and non-degenerate). Cayley-Hamiliton Theorem. Diagonalization of Matrices. Solutions of Coupled Linear Ordinary homogeneous Differential Equations. Functions of a Matrix. (6 **Lectures)**
Introduction to probability:
Independent random variables: Sample space and Probability distribution functions. Binomial, Gaussian, and Poisson distribution with examples. Mean and variance. **(5 Lectures)**
Dirac Delta function and its properties: (2)
Definition of Dirac delta function. Representation as limit of a Gaussian function and rectangular function. Properties of Dirac delta function.

PHY-H-CC-T-02: MECHANICS

Collisions: Elastic and inelastic collisions between particles. Centre of Mass and Laboratory frames.
Rotational Dynamics: Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation.
Elasticity: Relation between Elastic constants. Twisting torque on a Cylinder or Wire.
Fluid Motion: Kinematics of Moving Fluids: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube. Euler's Equation. Bernoulli's Theorem.

PHY-H-GE-T-01: MECHANICS

Rotational Motion: Angular velocity and angular momentum. Torque. Conservation of angular momentum. **(5 Lectures)**

Elasticity: Hooke's law - Stress-strain diagram - Elastic moduli-Relation between elastic constants - Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants - Work

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done in stretching and work done in twisting a wire - Twisting couple on a cylinder - Determination of Rigidity modulus by static torsion – Torsional pendulum-Determination of Rigidity modulus and moment of inertia -q, *r j* and o by Searles method. **(8 Lectures)**

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Semester II

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-CC-T-02: ELECTRICITY AND MAGNETISM

Theory:

Electrostatics: Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere. Calculation of electric field from potential. Capacitance of an isolated spherical conductor. Parallel plate, spherical and cylindrical condenser. Energy per unit volume in electrostatic field. Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric. **(22 Lectures)**

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SYLLABUS DISTRIBUTION

Semester II

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-03: ELECTRICITY AND MAGNETISM

Dielectric Properties of Matter:

Electric Field in matter. Polarization, Polarization Charges. Electrical Susceptibility and Dielectric Constant. Capacitor (parallel plate, spherical, cylindrical) filled with dielectric. Displacement vector D. Relations between E, P and D. Gauss' Law in dielectrics. **(8 Lectures)**

Magnetic Field:

Magnetic force between current elements and definition of Magnetic Field B. Biot-Savart's Law and its simple applications: straight wire and circular loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital Law and its application to (1) Solenoid and (2) Toroid. Properties of B: curl and divergence. Vector Potential. Magnetic Force on (1) point charge (2) current carrying wire (3) between current elements. Torque on a current loop in a uniform Magnetic Field. **(9 Lectures)**

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PHY-H-CC-T-04: WAVES AND OPTICS

Superposition of Collinear Harmonic oscillations: Linearity and Superposition Principle. Superposition of two collinear oscillations having equal frequencies and (2) different frequencies (Beats). Superposition of N collinear Harmonic Oscillations with (1) equal phase differences and equal frequency differences. **(5 Lectures)**
Superposition of two perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses. **(2 Lectures)**
Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves. Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave. Water Waves: Ripple and Gravity Waves
(4 **Lectures)**
Velocity of Waves: Velocity of Transverse Vibrations of Stretched Strings. Velocity of Longitudinal Waves in a Fluid in a Pipe. Newton's Formula for Velocity of Sound. Laplace's Correction.**(6 Lectures)**

PHY-H-GE-T-02: WAVES AND OPTICS

Superposition of Two Collinear Harmonic oscillations: Linearity & Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats). **(4 Lectures)**
Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses. **(2 Lectures)**
Waves Motion- General: Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity. Plane waves. Spherical waves, Wave intensity. (7 **Lectures)**

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Semester III

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-CC-T-03: ELEMENTS OF MODERN PHYSICS

Planck's quantum, Planck's constant and light as a collection of photons; Blackbody Radiation: Quantum theory of Light; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson-Germer experiment. Wave description of particles by wave packets. Group and Phase velocities and relation between them. Two-Slit experiment with electrons. Probability. Wave amplitude and wave functions. **(14 Lectures)**
Position measurement- gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle (Uncertainty relations involving Canonical pair of variables): Derivation from Wave Packets impossibility of a particle following a trajectory; Estimating

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minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle- application to virtual particles and range of an interaction.
(5 Lectures)

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Semester III

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-06: THERMAL PHYSICS

Introduction to Thermodynamics

Zeroth and First Law of Thermodynamics: Extensive and intensive Thermodynamic Variables, Thermodynamic Equilibrium, Zeroeth Law of Thermodynamics & Concept of Temperature, Concept of Work & Heat, State Functions, First Law of Thermodynamics and its differential form, Internal Energy, First Law & various processes, Applications of First Law: General Relation between CP and CV, Work Done during Isothermal and Adiabatic Processes, Compressibility and Expansion Co-efficient. (8 **Lectures)**

Second Law of Thermodynamics: Reversible and Irreversible process with examples. Conversion of Work into Heat and Heat into Work. Heat Engines. Carnot's Cycle, Carnot engine & efficiency. Refrigerator & coefficient of performance, 2nd Law of Thermodynamics: Kelvin-Planck and Clausius Statements and their Equivalence. Carnot's Theorem. Applications of Second Law of Thermodynamics: Thermodynamic Scale of Temperature and its Equivalence to Perfect Gas Scale. (10 **Lectures)**

Entropy: Concept of Entropy, Clausius Theorem. Clausius Inequality, Second Law of Thermodynamics in terms of Entropy. Entropy of a perfect gas. Principle of Increase of Entropy. Entropy Changes in Reversible and Irreversible processes with examples. Entropy of the Universe. Entropy Changes in Reversible and Irreversible Processes. Principle of Increase of Entropy. Temperature-Entropy diagrams for Carnot's Cycle. Third Law of Thermodynamics. Unattainability of Absolute Zero. (7 **Lectures)**

Thermodynamic Potentials: Extensive and Intensive Thermodynamic Variables.Thermodynamic Potentials: Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy. Their Definitions, Properties and Applications. Surface Films and Variation of Surface Tension with Temperature. Magnetic Work, Cooling due to adiabatic demagnetization, First and second order Phase Transitions with examples, Clausius Clapeyron Equation and Ehrenfest equations. (7 **Lectures)**

Maxwell's Thermodynamic Relations: Derivations and applications of Maxwell's Relations, Maxwell's Relations:(1) Clausius Clapeyron equation, (2) Values of $C_p - C_v$, (3) Tds Equations, (4) Joule-Kelvin coefficient for Ideal and Van der Waal Gases, (5) Energy equations, (6) Change of Temperature during Adiabatic Process. (7 **Lectures)**

Kinetic Theory of Gases Distribution of Velocities: Maxwell-Boltzmann Law of Distribution of Velocities in an Ideal Gas and its Experimental Verification. Doppler Broadening of Spectral Lines and Stern's Experiment. Mean, RMS and Most Probable Speeds. Degrees of Freedom. Law of Equipartition of Energy (No proof required). Specific heats of Gases. (7 **Lectures)**

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Molecular Collisions: Mean Free Path. Collision Probability. Estimates of Mean Free Path. Transport Phenomenon in Ideal Gases: (1) Viscosity, (2) Thermal Conductivity and (3) Diffusion. Brownian Motion and its Significance. **(4 Lectures)**

Real Gases: Behavior of Real Gases: Deviations from the Ideal Gas Equation. The Virial Equation. Andrew's Experiments on CO2 Gas. Critical Constants. Continuity of Liquid and Gaseous State. Vapour and Gas. Boyle Temperature. Van der Waal's Equation of State for Real Gases. Values of Critical Constants. Law of Corresponding States. Comparison with Experimental Curves. p-V Diagrams. Joule's Experiment. Free Adiabatic Expansion of a Perfect Gas. Joule-Thomson Porous Plug Experiment. Joule- Thomson Effect for Real and Van der Waal Gases. Temperature of Inversion. Joule- Thomson Cooling. **(10 Lectures)**

Skill Enhancement Courses (Credit: 02 each)

PHY—H-SEC-T-01: ELECTRICAL CIRCUITS & NETWORK SKILLS

Solid-State Devices: Resistors, inductors and capacitors. Diode and rectifiers (half wave and full wave rectifier with L, C, L-C filter arrangement, regulation). Components in Series or in shunt. Response of inductors and capacitors with DC or AC sources. **(4 Lectures)**

Electrical Protection: Relays, Fuses and disconnect switches, Working principle of Circuit breakers, Miniature circuit breaker and its types. **(3 Lectures)**

Electrical Wiring: Conduit wiring (basic idea of house hold wiring). Basics of wiring: Star and Delta Connections. Preparation of extension board, Wiring Materials (Basic information about the wiring components). **(2 Lectures)**

PHY-H-GE-T-03: MECHANICS

Rotational Motion: Angular velocity and angular momentum. Torque. Conservation of angular momentum. **(5 Lectures)**

Elasticity: Hooke's law - Stress-strain diagram - Elastic moduli-Relation between elastic constants - Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants - Work done in stretching and work done in twisting a wire - Twisting couple on a cylinder - Determination of Rigidity modulus by static torsion – Torsional pendulum-Determination of Rigidity modulus and moment of inertia -q, *r j* and o by Searles method. **(8 Lectures)**

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Semester IV

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PHY-G-CC-T-04: SOLID STATE PHYSICS

Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis - Central and Non-Central Elements. Unit Cell. Miller Indices. Reciprocal Lattice. Types of Lattices. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Atomic and Geometrical Factor.
(12 Lectures)

Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids. T^3 law **(10 Lectures)**

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Semester IV

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-09: ELEMENTS OF MODERN PHYSICS

Planck's quantum hypothesis, Planck's constant and light as a collection of photons; Blackbody Radiation: Quantum theory of Light; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson- Germer experiment. Wave description of particles by wave packets. Group and Phase velocities and relation between them. Two-Slit experiment with electrons. Probability. Wave amplitude and wave functions. **(14 Lectures)**

Position measurement- gamma ray microscope thought experiment; Waveparticle duality, Heisenberg uncertainty principle (Uncertainty relations involving Canonical pair of variables): Derivation from Wave Packets impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle- application to virtual particles and range of an interaction. **(5 Lectures)**

Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of a wave function, probabilities and normalization; Probability and probability current densities in one dimension.
(10 Lectures)

One dimensional infinitely rigid box- energy eigenvalues and eigenfunctions, normalization; Quantum dot as example; Quantum mechanical scattering and tunnelling in one dimension-across a step potential & rectangular potential barrier. **(10 Lectures)**

Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, Liquid Drop model: semi-empirical mass formula and binding energy, Nuclear Shell Model and magic numbers. **(6 Lectures)**

Radioactivity: stability of the nucleus; Law of radioactive decay; Mean life and half-life; Alpha decay; Beta decay- energy released, spectrum and Pauli's prediction of neutrino; Gamma ray emission, energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus. (8 Lectures)

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Fission and fusion- mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions driving stellar energy (brief qualitative discussions). **(3 Lectures)**
Lasers: Einstein's A and B coefficients. Metastable states. Spontaneous and Stimulated emissions. Optical Pumping and Population Inversion. Three- Level and Four-Level Lasers. Ruby Laser and He-Ne Laser. **(4 Lectures)**

PHY—H-SEC-T-02: RENEWABLE ENERGY AND ENERGY HARVESTING

Hydro Energy: Hydropower resources, Types of hydroelectric project (Run-of-river schemes, Storage schemes, Pumped-Storage schemes, Low head power plant, Medium head power plant, High head power station), environmental impact of hydro power sources. **(4 Lectures)**
Piezoelectric Energy harvesting: Introduction, Physics and characteristics of piezoelectric effect (No mathematical treatment), materials used for piezoelectricity , recent application of piezoelectric generators. **(5 Lectures)**
Electromagnetic Energy Harvesting: Linear generators (principle of linear generator, applications). **(2 Lecture)**

PHY-H-GE-T-04: WAVES AND OPTICS

Superposition of Two Collinear Harmonic oscillations: Linearity & Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats). **(4 Lectures)**
Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses. **(2 Lectures)**
Waves Motion- General: Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity. Plane waves. Spherical waves, Wave intensity. (7 **Lectures)**

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Semester V

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-DSE-T-01: ELECTRICITY AND MAGNETISM

Electrostatics: Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere. Calculation of electric field from potential. Capacitance of an isolated spherical conductor. Parallel plate, spherical and cylindrical condenser. Energy per unit volume in electrostatic field. Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric. **(22 Lectures)**

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Semester V

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-12: STATISTICAL MECHANICS

Classical Statistics: Macrostate & Microstate, Elementary Concept of Ensemble, Phase Space, Entropy and Thermodynamic Probability, Maxwell-Boltzmann Distribution Law, Partition Function, Thermodynamic Functions of an Ideal Gas, Classical Entropy Expression, Gibbs Paradox, Sackur Tetrode equation, Law of Equipartition of Energy (with proof) - Applications to Specific Heat and its Limitations, Thermodynamic Functions of a Two-Energy Levels System, Negative Temperature. **(18 Lectures)**

Classical Theory of Radiation: Properties of Thermal Radiation. Blackbody Radiation. Pure temperature dependence. Kirchhoff s law. Stefan-Boltzmann law: Thermodynamic proof. Radiation Pressure. Wien's Displacement law. Wien's Distribution Law. Saha's Ionization Formula. Rayleigh-Jean's Law. Ultraviolet Catastrophe. **(9 Lectures)**

Quantum Theory of Radiation: Spectral Distribution of Black Body Radiation. Planck's Quantum Postulates. Planck's Law of Blackbody Radiation: Experimental Verification. Deduction of (1) Wien's Distribution Law, (2) Rayleigh-Jeans Law, (3) Stefan-Boltzmann Law, (4) Wien's Displacement law from Planck's law. **(5 Lectures)**

Bose-Einstein Statistics: B-E distribution law, Thermodynamic functions of a strongly Degenerate Bose Gas, Bose Einstein condensation, properties of liquid He (qualitative description), Radiation as a photon gas and Thermodynamic functions of photon gas. Bose derivation of Planck's law. **(13 Lectures)**

Fermi-Dirac Statistics: Fermi-Dirac Distribution Law, Thermodynamic functions of a Completely and strongly Degenerate Fermi Gas, Fermi Energy, Electron gas in a Metal, Specific Heat of Metals, Relativistic Fermi gas, White Dwarf Stars, Chandrasekhar Mass Limit. **(15 Lectures)**

PHY-H-DSE-T-01: CLASSICAL DYNAMICS

Special Theory of Relativity: Geometrical interpretation of Space-time:Minkowski space. The invariant interval, light cone and world lines. Space-time diagrams. Intervals: space-like, time-like & light-like. Four velocity and acceleration. Elementary idea of tensors: Covariant and contravariant tensors, Metric and alternating tensors. Four-momentum and energymomentum relation. Doppler effect from a four-vector perspective. Concept of four-force. Conservation of four-momentum. Relativistic kinematics

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Semester VI

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FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-DSE-T-02: NUCLEAR AND PARTICLE PHYSICS

Detector for Nuclear Radiations: Gas detectors: estimation of electric field, mobility of particle, for ionization chamber and GM Counter. Basic principle of Scintillation Detectors and construction of photo-multiplier tube (PMT). Semiconductor Detectors (Si and Ge) for charge particle and photon detection (concept of charge carrier and mobility), neutron detector. **(6 Lectures)**
Particle Accelerators: Accelerator facility available in India: Van-de Graaff generator (Tandem accelerator), Linear accelerator, Cyclotron, Synchrotrons. **(5 Lectures)**
Particle physics: Particle interactions; basic features, types of particles and its families. Symmetries and Conservation Laws: energy and momentum, angular
momentum, parity, baryon number, Lepton number, Isospin, Strangeness and charm, concept of quark model, color quantum number and gluons. **(14 Lectures)**

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Semester VI

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-14: SOLID STATE PHYSICS

Crystal Structure: Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis - Central and Non-Central Elements. Unit Cell. Miller Indices. Reciprocal Lattice. Types of Lattices. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Atomic and Geometrical Factor. **(12 Lectures)**
Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids, T^3 law. **(10 Lectures)**
Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia- and Paramagnetic Domains. Quantum Mechanical Treatment of Paramagnetism. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss. **(8 Lectures)**
Dielectric Properties of Materials: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability. Normal and Anomalous Dispersion. Cauchy and Sellmeir relations. Langevin-Debye equation. Complex Dielectric Constant. Optical Phenomena. Application: Plasma Oscillations, Plasma Frequency, Plasmons, TO modes. **(8 Lectures)**
Ferroelectric Properties of Materials: Structural phase transition, Classification of crystals, Piezoelectric effect, Pyroelectric effect, Ferroelectric effect, Electrostrictive effect, Curie-Weiss Law, Ferroelectric domains, PE hysteresis loop. **(6 lectures)**
Elementary band theory: Kronig Penny model. Band Gap. Conductor, Semiconductor (P and N type) and insulator. Conductivity of Semiconductor, mobility, Hall Effect. Measurement of conductivity (04 probe method) & Hall coefficient. **(10 Lectures)**

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Superconductivity: Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory (No derivation) **(6 Lectures)**

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Semester I

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-CC-T-01: MECHANICS

Gravitation and Central Force Motion: Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere. (3 **Lectures)** Motion of a particle under a central force field. Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS). Physiological effects on astronauts. **(6 Lectures)**
Oscillations: SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor. (7 **Lectures)**
Non-Inertial Systems: Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of Physics in rotating coordinate systems. Centrifugal force. Coriolis force and its applications. Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems. **(4 Lectures)**

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Semester II

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-CC-T-02: ELECTRICITY AND MAGNETISM

Theory:

Magnetism: Magnetostatics: Biot-Savart's law and its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law. Magnetic properties of materials: Magnetic intensity, magnetic induction,

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permeability, magnetic susceptibility. Brief introduction of dia-, para-and ferromagnetic materials. **(10 Lectures)**

Maxwell's equations and Electromagnetic wave propagation: Equation of continuity of current, Displacement current, Maxwell's equations, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves, polarization. **(10 Lectures)**

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Semester II

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-H-CC-T-03: ELECTRICITY AND MAGNETISM

Magnetic Properties of Matter:
Magnetization vector (M). Magnetic Intensity(H). Magnetic Susceptibility and permeability. Relation between B, H, M. B-H curve and hysteresis. **(3 Lectures)**

Electromagnetic Induction:
Faraday's Law. Lenz's Law. Self Inductance and Mutual Inductance. Reciprocity Theorem. Energy stored in a Magnetic Field. **(5 Lectures)**

Transients: Growth and decay of currents and voltages in L-R, C-R and L-C-R circuits; electrical oscillations in L-C circuits. **(2 Lectures)**

Electrical Circuits: AC Circuits: Kirchhoff s laws for AC circuits. Complex Reactance and Impedance. Series LCR Circuit: (1) Resonance, (2) Power Dissipation and (3) Quality Factor, and (4) Band Width. Parallel LCR Circuit. **(4 Lectures)**

Network theorems: Ideal Constant-voltage and Constant-current Sources. Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem. Applications to dc circuits. **(4 Lectures)**

Ballistic Galvanometer: Torque on a current Loop. Ballistic Galvanometer: Current and Charge Sensitivity. Electromagnetic damping. Logarithmic damping. CDR. **(3 Lectures)**

PHY-H-CC-T-04: WAVES AND OPTICS

Diffraction: Kirchhoff s Integral Theorem, Fresnel-Kirchhoff s Integral formula and its application to rectangular slit. **(5 Lectures)**

Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope. Double slit. Multiple slits. Diffraction grating. Resolving power of grating. **(8 Lectures)**

Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire. (7 **Lectures)**

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Semester III

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-CC-T-03: ELEMENTS OF MODERN PHYSICS

Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of a wave function, probabilities and normalization; Probability and probability current densities in one dimension.
(10 Lectures)

One dimensional infinitely rigid box- energy eigenvalues and eigenfunctions, normalization; Quantum dot as example; Quantum mechanical scattering and tunnelling in one dimension-across a step potential & rectangular potential barrier.
(10 Lectures)

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Semester III

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-H-CC-T-07: ANALOG SYSTEMS AND APPLICATIONS

Semiconductor Diodes: P and N type semiconductors. Energy Level Diagram. Conductivity and Mobility, Concept of Drift velocity. PN Junction Fabrication (Simple Idea). Barrier Formation in PN Junction Diode. Static and Dynamic Resistance. Current Flow Mechanism in Forward and Reverse Biased Diode. Drift Velocity. Derivation for Barrier Potential, Barrier Width and Current for Step Junction. **(10 Lectures)**

Two-terminal Devices and their Applications: (1) Rectifier Diode: Halfwave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency, (2) Zener Diode and Voltage Regulation. Principle and structure of (1) LEDs, (2) Photodiode, (3) Solar Cell. **(6 Lectures)**

Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Current gains α and β, Relations between α and β. Load Line analysis of Transistors. DC Load line and Q-point. Physical Mechanism of Current Flow. Active, Cutoff and Saturation Regions.
(6 Lectures)

Amplifiers: Transistor Biasing and Stabilization Circuits. Fixed Bias and Voltage Divider Bias. Transistor as 2-port Network. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Classification of Class A, B & C Amplifiers. **(10 Lectures)**

Coupled Amplifier: RC-coupled amplifier and its frequency response. **(4 Lectures)**

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Feedback in Amplifiers: Effects of Positive and Negative Feedback on Input Impedance, Output Impedance, Gain, Stability, Distortion and Noise. (**4 Lectures)**
Sinusoidal Oscillators: Barkhausen's Criterion for self-sustained oscillations. RC Phase shift oscillator, determination of Frequency. Hartley & Colpitts oscillators. **(4 Lectures)**
Operational Amplifiers (Black Box approach): Characteristics of an Ideal and Practical Op-Amp. (IC 741) Open-loop and Closed-loop Gain. Frequency Response. CMRR. Slew Rate and concept of Virtual ground. (**4 Lectures)**
Applications of Op-Amps: (1) Inverting and non-inverting amplifiers, (2) Adder, (3)Subtractor, (4) Differentiator, (5) Integrator, (6) Log amplifier, (7) Zero crossing detector (8) Wein bridge oscillator. **(9 Lectures)**
Conversion: Resistive network (Weighted and R-2R Ladder). Accuracy and Resolution. A/D Conversion (successive approximation) **(3 Lectures)**

Skill Enhancement Courses (Credit: 02 each)

PHY—H-SEC-T-01: ELECTRICAL CIRCUITS & NETWORK SKILLS

Understanding Electrical Circuits: Main electric circuit elements and their combination. Rules to analyze DC sourced electrical circuits. Current and voltage drop across the DC circuit elements. Single-phase and three-phase alternating current sources (principle of generation, output wave form, advantage of using three-phase). Rules to analyze AC sourced electrical circuits. Real, imaginary and complex power components of AC source. Power factor. Saving energy and money. **(8Lectures)**

Electric Motors: Single-phase, three-phase & DC motors. Basic design. Speed & power of ac motor. **(3 Lectures**

PHY-H-GE-T-03: MECHANICS

Ordinary Differential Equations: 1st order homogeneous differential equations. 2nd order homogeneous differential equations with constant coefficients. **(6 Lectures)**
Gravitation: Newton's Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's Laws (statement only). Satellite in circular orbit and applications. Geosynchronous orbits. Basic idea of global positioning system (GPS). Weightlessness. Physiological effects on astronauts. **(8 Lectures)**
Oscillations: Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages. Damped oscillations. (6 **Lectures)**

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PHY-G-CC-T-04: SOLID STATE PHYSICS

Ferroelectric Properties of Materials: Structural phase transition, Classification of crystals, Piezoelectric effect, Pyroelectric effect, Ferroelectric effect, Electrostrictive effect, Curie-Weiss Law, Ferroelectric domains, PE hysteresis loop. **(6 lectures)**

Elementary band theory: Kronig Penny model. Band Gap. Conductor, Semiconductor (P and N type) and insulator. Conductivity of Semiconductor, mobility, Hall Effect. Measurement of conductivity (04 probe method) & Hall coefficient. **(10 Lectures)**

Superconductivity: Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory (No derivation) **(6 Lectures)**

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Semester IV

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-H-CC-T-10: DIGITAL SYSTEMS AND APPLICATIONS

Introduction to CRO: Block Diagram of CRO. Electron Gun, Deflection System and Time Base. Deflection Sensitivity. Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference. **(3 Lectures)**

Integrated Circuits (Qualitative treatment only): Active & Passive components. Discrete components. Wafer. Chip. Advantages and drawbacks of ICs. Scale of integration: SSI, MSI, LSI and VLSI (basic idea and definitions only). Classification of ICs. Examples of Linear and Digital ICs. **(3 Lectures)**

Digital Circuits: Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion. BCD, Octal and Hexadecimal numbers. AND, OR and NOT Gates (realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates and application as Parity Checkers. **(6 Lectures)**

Boolean algebra: De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Idea of Minterms and Maxterms. Conversion of a Truth table into Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map. **(6 Lectures)**

Data processing circuits: Basic idea of Multiplexers, De-multiplexers, Decoders, Encoders.**(4 Lectures)**

Arithmetic Circuits: Binary Addition. Binary Subtraction using 2's Complement. Half and Full Adders. Half & Full Subtractors, 4-bit binary Adder/Subtractor. **(5 Lectures)**

Sequential Circuits: SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered) Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop. M/S JK Flip-Flop. **(6 Lectures)**

Timers: IC 555: block diagram and applications: Astable multivibrator and Monostable multivibrator. **(3 Lectures)**

Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits). **(2 Lectures)**

Counters(4 bits): Ring Counter. Asynchronous counters, Decade Counter. Synchronous Counter. (4 Lectures)

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Computer Organization: Input/Output Devices. Data storage (idea of RAM and ROM). Computer memory. Memory organization & addressing. Memory Interfacing. Memory Map. **(6 Lectures)**
Intel 8085 Microprocessor Architecture: Main features of 8085. Block diagram. Components. Pin-out diagram. Buses. Registers. ALU. Memory. Stack memory. Timing & Control circuitry. Timing states. Instruction cycle, Timing diagram of MOV and MVI. **(8 Lectures)**
Introduction to Assembly Language: 1 byte, 2 byte & 3 byte instructions. **(4 Lectures)**

PHY—H-SEC-T-02: RENEWABLE ENERGY AND ENERGY HARVESTING

Hydro Energy: Hydropower resources, Types of hydroelectric project (Run-of-river schemes, Storage schemes, Pumped-Storage schemes, Low head power plant, Medium head power plant, High head power station), environmental impact of hydro power sources. **(4 Lectures)**
Piezoelectric Energy harvesting: Introduction, Physics and characteristics of piezoelectric effect (No mathematical treatment), materials used for piezoelectricity , recent application of piezoelectric generators. **(5 Lectures)**
Electromagnetic Energy Harvesting: Linear generators (principle of linear generator, applications). **(2 Lecture)**

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Semester V

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-DSE-T-01: ELECTRICITY AND MAGNETISM

Magnetism:
Magnetostatics: Biot-Savart's law and its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law. Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief introduction of dia-, para-and ferro magnetic materials. **(10 Lectures)**
Maxwell's equations and Electromagnetic wave propagation: Equation of continuity of current, Displacement current, Maxwell's equations, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves, polarization.
(10 Lectures)

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FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-H-CC-T-11: QUANTUM MECHANICS AND APPLICATIONS

Time dependent Schrodinger equation: Time dependent Schrodinger equation and dynamical evolution of a quantum state; Properties of Wave Function. Linearity and Superposition Principles. Eigenvalues and Eigenfunctions. Position, momentum and Energy operators; commutator of position and momentum operators; Hermitian Operators, Expectation values of position and momentum. Wave Function of a Free Particle. (8 **Lectures)**

Time independent Schrodinger equation-Hamiltonian, stationary states and energy eigenvalues; expansion of an arbitrary wavefunction as a linear combination of energy eigenfunctions; General solution of the time dependent Schrodinger equation in terms of linear combinations of stationary states. (5 **Lectures)**

General discussion of bound states in an arbitrary potential- continuity of wave function, boundary condition and emergence of discrete energy levels; Quantum mechanics of simple harmonic oscillator-energy levels and energy eigenfunctions using Frobenius method; Hermite polynomials; ground state, zero point energy & uncertainty principle. **(10 Lectures)**

Quantum theory of hydrogen-like atoms: time independent Schrodinger equation in spherical polar coordinates; separation of variables for second order partial differential equation; angular momentum operator & quantum numbers; Radial wavefunctions from Frobenius method; shapes of the probability densities for ground & first excited states; Orbital angular momentum quantum numbers l and m; s, p, d,..shells. **(11 Lectures)**

Atoms in Electric & Magnetic Fields: Electron angular momentum. Space quantization. Electron Spin and Spin Angular Momentum. Larmor's Theorem. Spin Magnetic Moment. Stern-Gerlach Experiment. Zeeman Effect: Electron Magnetic Moment and Magnetic Energy, Gyromagnetic Ratio and Bohr Magneton. **(11 Lectures)**

Atoms in External Magnetic Fields:- Normal and Anomalous Zeeman Effect. Paschen Back and Stark Effect (Qualitative Discussion only). **(5 Lectures)**

Many electron atoms: Pauli's Exclusion Principle. Symmetric & Antisymmetric Wave Functions. Periodic table. Fine structure. Spin orbit coupling. Spectral Notations for Atomic States. Total angular momentum. Vector Model. Spin-orbit coupling in atoms- L-S and J-J couplings. Hund's Rule. Term symbols. Spectra of Hydrogen and Alkali Atoms (Na etc.). **(10 Lectures)**

PHY-H-DSE-T-01: CLASSICAL DYNAMICS

Application to two-body decay of an unstable particle. The Electromagnetic field tensor and its transformation under Lorentz transformations: relation to known transformation properties of E and B. Electric and magnetic fields due to a uniformly moving charge. Equation of motion of charged particle & Maxwell's equations in tensor form. Motion of charged particles in external electric and magnetic fields. **(38 Lectures)**

Electromagnetic radiation: Review of retarded potentials. Potentials due to a moving charge: Lienard Wiechert potentials. Electric & Magnetic fields due to a moving charge: Power radiated, Larmor's formula. **(15 Lectures)**

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Semester VI

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-DSE-T-02: NUCLEAR AND PARTICLE PHYSICS

Radioactivity decay:(a) Alpha decay: basics of a-decay processes, theory of a- emission, Gamow factor, Geiger Nuttall law, a-decay spectroscopy. (b) (3-decay: energy kinematics for (3-decay, positron emission, electron capture, neutrino hypothesis. (c) Gamma decay: Gamma rays emission & kinematics, internal conversion. **(9 Lectures)**

Nuclear Reactions: Types of Reactions, Conservation Laws, kinematics of reactions, Q-value, reaction rate, reaction cross section, Concept of compound and direct reaction, resonance reaction, Coulomb scattering(Rutherford scattering). **(8 Lectures)**

Nuclear Astrophysics: Early universe, primordial nucleosynthesis (particle nuclear interactions), stellar nucleosynthesis, concept of gamow window, heavy element production: r- and s- process path. **(5 Lectures)**

Interaction of Nuclear Radiation with matter: Energy loss due to ionization (Bethe- Block formula), energy loss of electrons, Cerenkov radiation. Gamma ray interaction through matter, photoelectric effect, Compton scattering, pair production, neutron interaction with matter. (6 **Lectures)**

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Semester VI

FACULTY NAME: SIRAJUKL SK, DUMKAL COLLEGE

PHY-H-CC-T-13: ELECTROMAGNETIC THEORY

Maxwell Equations: Review of Maxwell's equations. Displacement Current. Vector and Scalar Potentials. Gauge Transformations: Lorentz and Coulomb Gauge. Boundary Conditions at Interface between Different Media. Wave Equations. Plane Waves in Dielectric Media. Poynting Theorem and Poynting Vector. Electromagnetic (EM) Energy Density. Physical Concept of Electromagnetic Field Energy Density, Momentum Density and Angular Momentum Density. **(12 Lectures)**

EM Wave Propagation in Unbounded Media: Plane EM waves through vacuum and isotropic dielectric medium, transverse nature of plane EM waves, refractive index and dielectric constant, wave impedance. Propagation through conducting media, relaxation time, skin depth. Wave propagation through dilute plasma, electrical conductivity of ionized gases, plasma frequency, refractive index, skin depth, application to propagation through ionosphere. **(10 Lectures)**

EM Wave in Bounded Media: Boundary conditions at a plane interface between two media. Reflection & Refraction of plane waves at plane interface between two dielectric media-Laws of Reflection & Refraction. Fresnel's Formulae for perpendicular & parallel polarization cases, Brewster's law. Reflection & Transmission coefficients. Total internal reflection, evanescent waves. Metallic reflection (normal incidence) **(10 Lectures)**

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Polarization of Electromagnetic Waves: Description of Linear, Circular and Elliptical Polarization. Propagation of E.M. Waves in Anisotropic Media. Symmetric Nature of Dielectric Tensor. Fresnel's Formula. Uniaxial and Biaxial Crystals. Light Propagation in Uniaxial Crystal. Double Refraction. Polarization by Double Refraction. Nicol Prism. Ordinary & extraordinary refractive indices. Production & detection of Plane, Circularly and Elliptically Polarized Light. Phase Retardation Plates: Quarter-Wave and Half-Wave Plates. Babinet Compensator and its Uses. Analysis of Polarized Light. **(12 Lectures)**

Rotatory Polarization: Optical Rotation. Biot's Laws for Rotatory Polarization. Fresnel's Theory of optical rotation. Calculation of angle of rotation. Experimental verification of Fresnel's theory. Specific rotation. Laurent's half-shade polarimeter. **(5 Lectures)**

Wave Guides: Planar optical wave guides. Planar dielectric wave guide. Condition of continuity at interface. Phase shift on total reflection. Eigenvalue equations. Phase and group velocity of guided waves. Field energy and Power transmission. **(8 Lectures)**

Optical Fibres:- Numerical Aperture. Step and Graded Indices (Definitions Only). Single and Multiple Mode Fibres (Concept and Definition Only). **(3 Lectures)**

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Semester I

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-CC-T-01: MATHEMATICAL PHYSICS-I

Vector Calculus:

Recapitulation of vectors: Properties of vectors under rotations. Scalar product and its invariance under rotations. Vector product, Scalar triple product and their interpretation in terms of area and volume respectively. Scalar and Vector fields. (6)

Vector Differentiation: Directional derivatives and normal derivative. Gradient of a scalar field and its geometrical interpretation. Divergence and curl of a vector field. Del and Laplacian operators. Vector identities, Gradient, divergence, curl and Laplacian in spherical and cylindrical coordinates. (7)

Vector Integration: Ordinary Integrals of Vectors. Multiple integrals, Jacobian. Notion of infinitesimal line, surface and volume elements. Line, surface and volume integrals of Vector fields. Flux of a vector field. Gauss' divergence theorem, Green's and Stokes Theorems and their applications (no rigorous proof)(10)

PHY-H-CC-T-02: MECHANICS

Fundamentals of Dynamics: Reference frames. Inertial frames; Galilean transformations; Galilean invariance. Review of Newton's Laws of Motion. Dynamics of a system of particles. Centre of Mass.

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Principle of conservation of momentum. Impulse. Momentum of variable-mass system: motion of rocket.

Work and Energy: Work and Kinetic Energy Theorem. Conservative and non-conservative forces. Potential Energy. Energy diagram. Stable and unstable equilibrium. Elastic potential energy. Force as gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy.

Special Theory of Relativity: Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum. Four Vectors (definition and examples only).

PHY-H-GE-T-01: MECHANICS

Vectors: Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter. **(4 Lectures)**

Laws of Motion: Frames of reference. Newton's Laws of motion. Dynamics of a system of particles. Centre of Mass. **(10 Lectures)**

Momentum and Energy: Conservation of momentum. Work and energy. Conservation of energy. Motion of rockets. **(6 Lectures)**

Speed Theory of Relativity: Constancy of speed of light. Postulates of Special Theory of Relativity. Length contraction. Time dilation. Relativistic addition of velocities.

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Semester I

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PHY-G-CC-T-01: MECHANICS

Fundamentals of Dynamics: Reference frames. Inertial frames; Galilean transformations; Galilean invariance. Review of Newton's Laws of Motion. Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse. Momentum of variable-mass system: motion of rocket. **(6 Lectures)**

Work and Energy: Work and Kinetic Energy Theorem. Conservative and non-conservative forces. Potential Energy. Energy diagram. Stable and unstable equilibrium. Elastic potential energy. Force as gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy. **(4 Lectures)**

Special Theory of Relativity: Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number.

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Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum. Energy-Momentum Four Vector. **(10 Lectures)**

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Semester II

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-CC-T-03: ELECTRICITY AND MAGNETISM

Electric Field and Electric Potential:

Electric field: Electric field lines. Electric flux. Gauss' Law with applications to charge distributions with spherical, cylindrical and planar symmetry. **(6 Lectures)**

Conservative nature of Electrostatic Field. Electrostatic Potential. Laplace's and Poisson equations. The Uniqueness Theorem. Potential and Electric Field of a dipole. Force and Torque on a dipole.**(6 Lectures)**

Electrostatic energy of system of charges. Electrostatic energy of a charged sphere. Conductors in an electrostatic Field. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Parallel-plate capacitor. Capacitance of an isolated conductor. Method of Images and its application to: (1) Plane Infinite Sheet and (2) Sphere. **(10 Lectures)**

PHY-H-CC-T-04: WAVES AND OPTICS

Superposition of Two Harmonic Waves:

Standing (Stationary) Waves in a String: Fixed and Free Ends. Analytical Treatment. Phase and Group Velocities. Changes with respect to Position and Time. Energy of Vibrating String. Transfer of Energy. Normal Modes of Stretched Strings. Plucked and Struck Strings. Melde's Experiment. Longitudinal Standing Waves and Normal Modes. Open and Closed Pipes. Superposition of N Harmonic Waves. **(7 Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence. **(3 Lectures)**

Interference: Division of amplitude and wavefront. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index. (**9 Lectures)**

Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer.

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PHY-H-GE-T-02: WAVES AND OPTICS

Fluids: Surface Tension: Synclastic and anticlastic surface - Excess of pressure -Application to spherical and cylindrical drops and bubbles - variation of surface tension with temperature - Jaegar's method. Viscosity - Rate flow of liquid in a capillary tube - Poiseuille's formula - Determination of coefficient of viscosity of a liquid - Variations of viscosity of liquid with temperature- lubrication. **(6 Lectures)**

Sound: Simple harmonic motion - forced vibrations and resonance - Fourier's Theorem - Application to saw tooth wave and square wave - Intensity and loudness of sound - Decibels - Intensity levels - musical notes - musical scale. Acoustics of buildings: Reverberation and time of reverberation - Absorption coefficient - Sabine's formula - measurement of reverberation time - Acoustic aspects of halls and auditoria. **(6 Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. **(3 Lectures)**

Interference: Interference: Division of amplitude and division of wavefront. Young's Double Slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index.
(10 Lectures)

Michelson's Interferometer: (1) Idea of form of fringes (no theory needed), (2) Determination of wavelength, (3) Wavelength difference, (4) Refractive index, and (5) Visibility of fringes. (3 **Lectures)**

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Semester II

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-CC-T-02: ELECTRICITY AND MAGNETISM

Theory: 60 Lectures

Vector Analysis: Scalar and Vector product, gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gauss-divergence theorem and Stoke's theorem of vectors (statement only). **(12 Lectures)**

Electromagnetic Induction: Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils. Energy stored in magnetic field. **(6 Lectures)**

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Semester III

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-CC-T-05: MATHEMATICAL PHYSICS-II

Fourier Series: Periodic functions. Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only). Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients. Complex representation of Fourier series. Expansion of functions with arbitrary period. Expansion of non-periodic functions over an interval. Even and odd functions and their Fourier expansions. Application. Summing of Infinite Series. Term-by-Term differentiation and integration of Fourier Series. Parseval Identity. **(14 Lectures)**

Frobenius Method and Special Functions: Singular Points of Second Order Linear Differential Equations and their importance. Frobenius method and its applications to differential equations. Legendre, Bessel, Hermite and Laguerre Differential Equations. Properties of Legendre Polynomials: Rodrigues Formula, Generating Function, Orthogonality. Simple recurrence relations. Expansion of function in a series of Legendre Polynomials. Bessel Functions of the First Kind: Generating Function, simple recurrence relations. Zeros of Bessel Functions and Orthogonality. **(24 Lectures)**

Some Special Integrals: Beta and Gamma Functions and Relation between them. Expression of Integrals in terms of Gamma Functions. Error Function (Probability Integral). **(4 Lectures)**

Theory of Errors: Systematic and Random Errors. Propagation of Errors. Normal Law of Errors. Standard and Probable Error. (**4 Lectures)**

Partial Differential Equations: Solutions to partial differential equations, using separation of variables: Laplace's Equation in problems of rectangular, cylindrical and spherical symmetry. Wave equation and its solution for vibrational modes of a stretched string, rectangular and circular membranes**. (14 Lectures)**

Skill Enhancement Courses (Credit: 02 each)

PHY—H-SEC-T-01: ELECTRICAL CIRCUITS & NETWORK SKILLS

Basic Electricity Principles: Voltage, Current, Resistance, and Power. Ohm's law, Series, parallel, and series-parallel combinations. AC Electricity and DC Electricity. Familiarization with digital multimeter (name of the circuit elements and their ranges), Analog voltmeter and analog ammeter. **(6 Lectures)**

Generators and Transformers: DC Power sources (basic idea). AC and DC generators (basic principle of action). Inductance, capacitance, and impedance. Operation of transformers (Step-up and step-down). **(4 Lectures)**

PHY-H-GE-T-03: MECHANICS

Vectors: Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter. **(4 Lectures)**

Laws of Motion: Frames of reference. Newton's Laws of motion. Dynamics of a system of particles. Centre of Mass. **(10 Lectures)**

Momentum and Energy: Conservation of momentum. Work and energy. Conservation of energy. Motion of rockets. **(6 Lectures)**

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Speed Theory of Relativity: Constancy of speed of light. Postulates of Special Theory of Relativity. Length contraction. Time dilation. Relativistic addition of velocities. (7 Lectuers)

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Semester III

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-CC-T-03: ELEMENTS OF MODERN PHYSICS

Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, Liquid Drop model: semi-empirical mass formula and binding energy, Nuclear Shell Model and magic numbers.
(6 Lectures)
Radioactivity: stability of the nucleus; Law of radioactive decay; Mean life and half-life; Alpha decay; Beta decay- energy released, spectrum and Pauli's prediction of neutrino; Gamma ray emission, energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus.
(8 Lectures)
Fission and fusion- mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions driving stellar energy (brief qualitative discussions).
(3 Lectures)
Lasers: Einstein's A and B coefficients. Metastable states. Spontaneous and Stimulated emissions. Optical Pumping and Population Inversion. Three-Level and Four-Level Lasers. Ruby Laser and He-Ne Laser. **(4 Lectures)**

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Semester IV

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-CC-T-08: MATHEMATICAL PHYSICS-III

Complex Analysis: Brief Revision of Complex Numbers and their Graphical Representation. Euler's formula, De Moivre's theorem, Roots of Complex Numbers. Functions of Complex Variables.

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Analyticity and Cauchy-Riemann Conditions. Examples of analytic functions. Singular functions: poles and branch points, order of singularity, branch cuts. Integration of a function of a complex variable. Cauchy's Inequality. Cauchy's Integral formula. Simply and multiply connected region. Laurent and Taylor's expansion. Residues and Residue Theorem. Application in solving Definite Integrals. **(30 Lectures)**

Integrals Transforms:

Fourier Transforms: Fourier Integral theorem. Fourier Transform. Examples. Fourier transform of trigonometric, Gaussian, finite wave train & other functions. Representation of Dirac delta function as a Fourier Integral. Fourier transform of derivatives, Inverse Fourier transform, Convolution theorem. Properties of Fourier transforms (translation, change of scale, complex conjugation, etc.). Three dimensional Fourier transforms with examples. Application of Fourier Transforms to differential equations: One dimensional Wave and Diffusion/Heat Flow Equations. **(15 Lectures)**

Laplace Transforms: Laplace Transform (LT) of Elementary functions. Properties of LTs: Change of Scale Theorem, Shifting Theorem. LTs of Derivatives and Integrals of Functions, Derivatives and Integrals of LTs. LT of Unit Step function, Dirac Delta function, Periodic Functions. Convolution Theorem. Inverse LT. Application of Laplace Transforms to Differential Equations: Damped Harmonic Oscillator, Simple Electrical Circuits. **(15 Lectures)**

PHY—H-SEC-T-02: RENEWABLE ENERGY AND ENERGY HARVESTING

Fossil fuels and Alternate Sources of energy: Fossil fuels and nuclear energy, their limitation, need of renewable energy, non-conventional energy sources. **(3 Lectures)**

Solar energy: Solar energy, It's importance, storage of solar energy (Thermal storage and Electrical storage, Mechanical storage), solar pond (Basic idea), Principle of operation of non convective solar pond, applications of solar pond, solar water heating, flat plate collector, solar cooker (basic idea, Design principle and Constructional details of box type solar cooker and its limitation), solar furnace, solar green houses (basic idea, types and advantage), Solar Cell principle (No mathematical treatment), application of solar photovoltaic system, advantage and disadvantage of Photovoltaic solar energy conversion. **(6 Lectures)**

PHY-H-GE-T-04: WAVES AND OPTICS

Fluids: Surface Tension: Synclastic and anticlastic surface - Excess of pressure -Application to spherical and cylindrical drops and bubbles - variation of surface tension with temperature - Jaegar's method. Viscosity - Rate flow of liquid in a capillary tube - Poiseuille's formula - Determination of coefficient of viscosity of a liquid - Variations of viscosity of liquid with temperature- lubrication. **(6 Lectures)**

Sound: Simple harmonic motion - forced vibrations and resonance - Fourier's Theorem - Application to saw tooth wave and square wave - Intensity and loudness of sound - Decibels - Intensity levels - musical notes - musical scale. Acoustics of buildings: Reverberation and time of reverberation - Absorption coefficient - Sabine's formula - measurement of reverberation time - Acoustic aspects of halls and auditoria. **(6 Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. **(3 Lectures)**

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Interference: Interference: Division of amplitude and division of wavefront. Young's Double Slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index.
(10 Lectures)
Michelson's Interferometer: (1) Idea of form of fringes (no theory needed), (2) Determination of wavelength, (3) Wavelength difference, (4) Refractive index, and (5) Visibility of fringes. (3 **Lectures)**

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Semester IV

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-CC-T-04: SOLID STATE PHYSICS

Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia- and Paramagnetic Domains. Quantum Mechanical Treatment of Paramagnetism. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss. **(8 Lectures)**
Dielectric Properties of Materials: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability. Normal and Anomalous Dispersion. Cauchy and Sellmeir relations. Langevin-Debye equation. Complex Dielectric Constant. Optical Phenomena. Application: Plasma Oscillations, Plasma Frequency, Plasmons, TO modes. **(8 Lectures)**

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Semester V

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-DSE-T-02: NUCLEAR AND PARTICLE PHYSICS

General Properties of Nuclei: Constituents of nucleus and their Intrinsic properties, quantitative facts about mass, radii, charge density (matter density), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A

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plot, angular momentum, parity, magnetic moment, electric moments, nuclear excites states. **(10 Lectures)**

Nuclear Models: Liquid drop model approach, semi empirical mass formula and significance of its various terms, condition of nuclear stability, two nucleon separation energies, Fermi gas model (degenerate fermion gas, nuclear symmetry potential in Fermi gas), evidence for nuclear shell structure, nuclear magic numbers, basic assumption of shell model, concept of mean field, residual interaction, concept of nuclear force. (12 **Lectures)**

Radioactivity decay:(a) Alpha decay: basics of α-decay processes, theory of a-emission, Gamow factor, Geiger Nuttall law, α-decay spectroscopy. (b) (β- decay: energy kinematics for (β-decay, positron emission, electron capture, neutrino hypothesis. (c) Gamma decay: Gamma rays emission & kinematics, internal conversion. **(9 Lectures)**

Nuclear Reactions: Types of Reactions, Conservation Laws, kinematics of reactions, Q-value, reaction rate, reaction cross section, Concept of compound and direct Reaction, resonance reaction, Coulomb scattering (Rutherford scattering). **(8 Lectures)**

Nuclear Astrophysics: Early universe, primordial nucleosynthesis (particle nuclear interactions), stellar nucleosynthesis, concept of gamow window, heavy element production: r- and s- process path. **(5 Lectures)**

Interaction of Nuclear Radiation with matter: Energy loss due to ionization (Bethe-Block formula), energy loss of electrons, Cerenkov radiation. Gamma ray interaction through matter, photoelectric effect, Compton scattering, pair production, neutron interaction with matter. **(6 Lectures)**

Detector for Nuclear Radiations: Gas detectors: estimation of electric field, mobility of particle, for ionization chamber and GM Counter. Basic principle of Scintillation Detectors and construction of photo-multiplier tube (PMT). Semiconductor Detectors (Si and Ge) for charge particle and photon detection (concept of charge carrier and mobility), neutron detector. **(6 Lectures)**

Particle Accelerators: Accelerator facility available in India: Van-de Graaff generator (Tandem accelerator), Linear accelerator, Cyclotron, Synchrotrons. **(5 Lectures)**

Particle physics: Particle interactions; basic features, types of particles and its families. Symmetries and Conservation Laws: energy and momentum, angular momentum, parity, baryon number, Lepton number, Isospin, Strangeness and charm, concept of quark model, color quantum number and gluons. **(14 Lectures)**

PHY-H-DSE-T-01: CLASSICAL DYNAMICS

Classical Mechanics of Point Particles: Generalised coordinates and velocities. Hamilton's Principle, Lagrangian and Euler-Lagrange equations. Applications to simple systems such as coupled oscillators. Canonical momenta & Hamiltonian. Hamilton's equations of motion. Applications: Hamiltonian for a harmonic oscillator, particle in a central force field. Poisson brackets. Canonical transformations.

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FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-DSE-T-01: ELECTRICITY AND MAGNETISM

Vector Analysis: Scalar and Vector product, gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gauss-divergence theorem and Stoke's theorem of vectors (statement only). **(12 Lectures)**

Electromagnetic Induction: Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils. Energy stored in magnetic field. **(6 Lectures)**

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Semester VI

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-DSE-T-03: NANO MATERIALS AND APPLICATIONS

NANOSCALE SYSTEMS: Length scales in physics, Nanostructures: 1D, 2D and 3D nanostructures (nanodots, thin films, nanowires, nanorods), Band structure and density of states of materials at nanoscale, Size Effects in nano systems, Quantum confinement: Applications of Schrodinger equation- Infinite potential well, potential step, potential box, quantum confinement of carriers in 3D, 2D, 1D nanostructures and its consequences. **(12 Lectures)**

SYNTHESIS OF NANOSTRUCTURE MATERIALS: Top down and Bottom up approach, Photolithography. Ball milling. Gas phase condensation. Vacuum deposition. Physical vapor deposition (PVD): Thermal evaporation, Ebeam evaporation, Pulsed Laser deposition. Chemical vapor deposition (CVD). Sol-Gel. Electro deposition. Spraypyrolysis. Hydrothermal synthesis. Preparation through colloidal methods. MBE growth of quantum dots. **(10 Lectures)**

CHARACTERIZATION: X-Ray Diffraction. Optical Microscopy. Scanning Electron Microscopy. Transmission Electron Microscopy. Atomic Force Microscopy. Scanning Tunneling Microscopy. **(10 Lectures)**

OPTICAL PROPERTIES: Coulomb interaction in nanostructures. Concept of dielectric constant for nanostructures and charging of nanostructure. Quasi-particles and excitons. Excitons in direct and indirect band gap semiconductor nanocrystals. Quantitative treatment of quasi-particles and excitons, charging effects. Radiative processes: General formalizationabsorption, emission and luminescence. Optical properties of heterostrctures and nanostructures. **(16 Lectures)**

ELECTRON TRANSPORT: Carrier transport in nanostrcutures. Coulomb blockade effect, thermionic emission, tunneling and hoping conductivity. Defects and impurities: Deep level and surface defects. **(9 Lectures)**

APPLICATIONS: Applications of nanoparticles, quantum dots, nano wires and thin films for photonic devices (LED, solar cells). Single electron devices (no derivation). CNT based transistors. Nanomaterial Devices: Quantum dots heterostructure lasers, optical switching and optical data storage. Magnetic quantum well; magnetic dots - magnetic data storage. Micro Electromechanical Systems (MEMS), Nano Electromechanical Systems (NEMS). **(18 Lectures)**

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Semester VI

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-DSE-T-02: NUCLEAR AND PARTICLE PHYSICS

General Properties of Nuclei: Constituents of nucleus and their Intrinsic properties, quantitative facts about mass, radii, charge density (matter density), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A plot, angular momentum, parity, magnetic moment, electric moments, nuclear excites states. **(10 Lectures)**

Nuclear Models: Liquid drop model approach, semi empirical mass formula and significance of its various terms, condition of nuclear stability, two nucleon separation energies, Fermi gas model (degenerate fermion gas, nuclear symmetry potential in Fermi gas), evidence for nuclear shell structure, nuclear magic numbers, basic assumption of shell model, concept of mean field, residual interaction, concept of nuclear force. (12 **Lectures)**

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Semester I

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-CC-T-01: MECHANICS

Gravitation and Central Force Motion: Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere. (3 **Lectures)** Motion of a particle under a central force field. Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS). Physiological effects on astronauts. **(6 Lectures)**
Oscillations: SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor. (7 **Lectures)**
Non-Inertial Systems: Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of Physics in rotating coordinate systems. Centrifugal force. Coriolis force and its applications. Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems. **(4 Lectures)**

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Semester I

FACULTY NAME:SIRAJUL SK, DUMKAL COLLEGE

PHY-H-CC-T-01: MATHEMATICAL PHYSICS-I

Recapitulation: Limits, continuity, average and instantaneous quantities, differentiation. Plotting functions. Intuitive ideas of continuous, differentiable, etc. functions and plotting of curves. Approximation: Taylor and binomial series (statements only). First Order Differential Equations and Integrating Factor.
Second Order Differential equations: Homogeneous Equations with constant coefficients. Wronskian and general solution. Statement of existence and Uniqueness Theorem for Initial Value Problems. Particular Integral.
Calculus of functions of more than one variable: Partial derivatives, exact and inexact differentials. Integrating factor, with simple illustration. Constrained Maximization using Lagrange Multipliers.

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PHY-H-CC-T-02: MECHANICS

Gravitation and Central Force Motion: Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere. (3**Lectures)**
Motion of a particle under a central force field: Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS). Physiological effectson astronauts. (**6 Lectures)**
Oscillations: SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor. (7 **Lectures)**
Non-Inertial Systems: Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of in rotating coordinate systems. Centrifugal force. Coriolis force and its applications. Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems.

PHY-H-GE-T-01: MECHANICS

Ordinary Differential Equations: 1st order homogeneous differential equations. 2nd order homogeneous differential equations with constant coefficients. **(6 Lectures)**
Gravitation: Newton's Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's Laws (statement only). Satellite in circular orbit and applications. Geosynchronous orbits. Basic idea of global positioning system (GPS). Weightlessness. Physiological effects on astronauts. **(8 Lectures)**
Oscillations: Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages. Damped oscillations. (6 **Lectures)**

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Semester II

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-CC-T-02: WAVES AND OPTICS

Diffraction: Kirchhoff s Integral Theorem, Fresnel-Kirchhoff s Integral formula and its application to rectangular slit. **(5 Lectures)**
Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope. Double slit. Multiple slits. Diffraction grating. Resolving power of grating. **(8 Lectures)**
Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire. (7 **Lectures**

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Semester II

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-H-CC-T-03: ELECTRICITY AND MAGNETISM

Magnetic Properties of Matter:
Magnetization vector (M). Magnetic Intensity(H). Magnetic Susceptibility and permeability. Relation between B, H, M. B-H curve and hysteresis. **(3 Lectures)**
Electromagnetic Induction:
Faraday's Law. Lenz's Law. Self Inductance and Mutual Inductance. Reciprocity Theorem. Energy stored in a Magnetic Field. **(5 Lectures)**
Transients: Growth and decay of currents and voltages in L-R, C-R and L-C-R circuits; electrical oscillations in L-C circuits. **(2 Lectures)**
Electrical Circuits: AC Circuits: Kirchhoff s laws for AC circuits. Complex Reactance and Impedance. Series LCR Circuit: (1) Resonance, (2) Power Dissipation and (3) Quality Factor, and (4) Band Width. Parallel LCR Circuit. **(4 Lectures)**
Network theorems: Ideal Constant-voltage and Constant-current Sources. Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem. Applications to dc circuits. **(4 Lectures)**
Ballistic Galvanometer: Torque on a current Loop. Ballistic Galvanometer: Current and Charge Sensitivity. Electromagnetic damping. Logarithmic damping. CDR. **(3 Lectures)**

PHY-H-CC-T-04: WAVES AND OPTICS

Diffraction: Kirchhoff s Integral Theorem, Fresnel-Kirchhoff s Integral formula and its application to rectangular slit. **(5 Lectures)**
Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope. Double slit. Multiple slits. Diffraction grating. Resolving power of grating. **(8 Lectures)**
Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire. (7 **Lectures)**

PHY-H-GE-T-02: WAVES AND OPTICS

Diffraction: Fraunhofer diffraction- Single slit; Double Slit. Multiple slits and Diffraction grating. Fresnel Diffraction: Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis.
(14 Lectures)
Polarization: Transverse nature of light waves. Plane polarized light - production and analysis. Circular and elliptical polarization. **(5 Lectures)**

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Semester III

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-CC-T-03: ELEMENTS OF MODERN PHYSICS

Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of a wave function, probabilities and normalization; Probability and probability current densities in one dimension.
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One dimensional infinitely rigid box- energy eigenvalues and eigenfunctions, normalization; Quantum dot as example; Quantum mechanical scattering and tunnelling in one dimension-across a step potential & rectangular potential barrier.
(10 Lectures)

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Semester III

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-H-CC-T-07: DIGITAL SYSTEMS AND APPLICATIONS

Introduction to CRO: Block Diagram of CRO. Electron Gun, Deflection System and Time Base. Deflection Sensitivity. Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference. **(3 Lectures)**

Integrated Circuits (Qualitative treatment only): Active & Passive components. Discrete components. Wafer. Chip. Advantages and drawbacks of ICs. Scale of integration: SSI, MSI, LSI and VLSI (basic idea and definitions only). Classification of ICs. Examples of Linear and Digital ICs. **(3 Lectures)**

Digital Circuits: Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion. BCD, Octal and Hexadecimal numbers. AND, OR and NOT Gates (realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates and application as Parity Checkers. **(6 Lectures)**

Boolean algebra: De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Idea of Minterms and Maxterms. Conversion of a Truth

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table into Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map. **(6 Lectures)**
Data processing circuits: Basic idea of Multiplexers, De-multiplexers, Decoders, Encoders.**(4 Lectures)**
Arithmetic Circuits: Binary Addition. Binary Subtraction using 2's Complement. Half and Full Adders. Half & Full Subtractors, 4-bit binary Adder/Subtractor. **(5 Lectures)**
Sequential Circuits: SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered) Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop. M/S JK Flip-Flop. **(6 Lectures)**
Timers: IC 555: block diagram and applications: Astable multivibrator and Monostable multivibrator. **(3 Lectures)**
Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits). **(2 Lectures)**
Counters(4 bits): Ring Counter. Asynchronous counters, Decade Counter. Synchronous Counter. (4 Lectures)
Computer Organization: Input/Output Devices. Data storage (idea of RAM and ROM). Computer memory. Memory organization & addressing. Memory Interfacing. Memory Map. **(6 Lectures)**
Intel 8085 Microprocessor Architecture: Main features of 8085. Block diagram. Components. Pin-out diagram. Buses. Registers. ALU. Memory. Stack memory. Timing & Control circuitry. Timing states. Instruction cycle, Timing diagram of MOV and MVI. **(8 Lectures)**
Introduction to Assembly Language: 1 byte, 2 byte & 3 byte instructions. **(4 Lectures)**

Skill Enhancement Courses (Credit: 02 each)

PHY—H-SEC-T-01: ELECTRICAL CIRCUITS & NETWORK SKILLS

Understanding Electrical Circuits: Main electric circuit elements and their combination. Rules to analyze DC sourced electrical circuits. Current and voltage drop across the DC circuit elements. Single-phase and three-phase alternating current sources (principle of generation, output wave form, advantage of using three-phase). Rules to analyze AC sourced electrical circuits. Real, imaginary and complex power components of AC source. Power factor. Saving energy and money. **(8Lectures)**

Electric Motors: Single-phase, three-phase & DC motors. Basic design. Speed & power of ac motor. **(3 Lectures**

PHY-H-GE-T-03: MECHANICS

Ordinary Differential Equations: 1st order homogeneous differential equations. 2nd order homogeneous differential equations with constant coefficients. **(6 Lectures)**
Gravitation: Newton's Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's Laws (statement only). Satellite in circular orbit and applications. Geosynchronous orbits. Basic idea of global positioning system (GPS). Weightlessness. Physiological effects on astronauts. **(8 Lectures)**

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Oscillations: Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages. Damped oscillations. (6 **Lectures)**

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SYLLABUS DISTRIBUTION

Semester IV

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-CC-T-04: SOLID STATE PHYSICS

Ferroelectric Properties of Materials: Structural phase transition, Classification of crystals, Piezoelectric effect, Pyroelectric effect, Ferroelectric effect, Electrostrictive effect, Curie-Weiss Law, Ferroelectric domains, PE hysteresis loop. **(6 lectures)**

Elementary band theory: Kronig Penny model. Band Gap. Conductor, Semiconductor (P and N type) and insulator. Conductivity of Semiconductor, mobility, Hall Effect. Measurement of conductivity (04 probe method) & Hall coefficient. **(10 Lectures)**

Superconductivity: Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory (No derivation) **(6 Lectures)**

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Semester IV

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-H-CC-T-10: ANALOG SYSTEMS AND APPLICATIONS

Semiconductor Diodes: P and N type semiconductors. Energy Level Diagram. Conductivity and Mobility, Concept of Drift velocity. PN Junction Fabrication (Simple Idea). Barrier Formation in PN Junction Diode. Static and Dynamic Resistance. Current Flow Mechanism in Forward and Reverse Biased Diode. Drift Velocity. Derivation for Barrier Potential, Barrier Width and Current for Step Junction. **(10 Lectures)**

Two-terminal Devices and their Applications: (1) Rectifier Diode: Halfwave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency, (2) Zener Diode and Voltage Regulation. Principle and structure of (1) LEDs, (2) Photodiode, (3) Solar Cell. **(6 Lectures)**

Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Current gains α and β, Relations between α and β. Load Line analysis of Transistors.

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DC Load line and Q-point. Physical Mechanism of Current Flow. Active, Cutoff and Saturation Regions.
(6 Lectures)
Amplifiers: Transistor Biasing and Stabilization Circuits. Fixed Bias and Voltage Divider Bias. Transistor as 2-port Network. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Classification of Class A, B & C Amplifiers. **(10 Lectures)**
Coupled Amplifier: RC-coupled amplifier and its frequency response. **(4 Lectures)**
Feedback in Amplifiers: Effects of Positive and Negative Feedback on Input Impedance, Output Impedance, Gain, Stability, Distortion and Noise. (**4 Lectures)**
Sinusoidal Oscillators: Barkhausen's Criterion for self-sustained oscillations. RC Phase shift oscillator, determination of Frequency. Hartley & Colpitts oscillators. **(4 Lectures)**
Operational Amplifiers (Black Box approach): Characteristics of an Ideal and Practical Op-Amp. (IC 741) Open-loop and Closed-loop Gain. Frequency Response. CMRR. Slew Rate and concept of Virtual ground. (**4 Lectures)**
Applications of Op-Amps: (1) Inverting and non-inverting amplifiers, (2) Adder, (3)Subtractor, (4) Differentiator, (5) Integrator, (6) Log amplifier, (7) Zero crossing detector (8) Wein bridge oscillator. **(9 Lectures)**
Conversion: Resistive network (Weighted and R-2R Ladder). Accuracy and Resolution. A/D Conversion (successive approximation) **(3 Lectures)**

PHY—H-SEC-T-02: RENEWABLE ENERGY AND ENERGY HARVESTING

Hydro Energy: Hydropower resources, Types of hydroelectric project (Run-of-river schemes, Storage schemes, Pumped-Storage schemes, Low head power plant, Medium head power plant, High head power station), environmental impact of hydro power sources. **(4 Lectures)**
Piezoelectric Energy harvesting: Introduction, Physics and characteristics of piezoelectric effect (No mathematical treatment), materials used for piezoelectricity , recent application of piezoelectric generators. **(5 Lectures)**
Electromagnetic Energy Harvesting: Linear generators (principle of linear generator, applications). **(2 Lecture)**

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Semester V

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-DSE-T-01: ELECTRICITY AND MAGNETISM

Magnetism:

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Magnetostatics: Biot-Savart's law and its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law. Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief introduction of dia-, para-and ferro magnetic materials. **(10 Lectures)**
Maxwell's equations and Electromagnetic wave propagation: Equation of continuity of current, Displacement current, Maxwell's equations, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves, polarization.
(10 Lectures)

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Semester V

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-H-CC-T-11: QUANTUM MECHANICS AND APPLICATIONS

Time dependent Schrodinger equation: Time dependent Schrodinger equation and dynamical evolution of a quantum state; Properties of Wave Function. Linearity and Superposition Principles. Eigenvalues and Eigenfunctions. Position, momentum and Energy operators; commutator of position and momentum operators; Hermitian Operators, Expectation values of position and momentum. Wave Function of a Free Particle. (8 **Lectures)**
Time independent Schrodinger equation-Hamiltonian, stationary states and energy eigenvalues; expansion of an arbitrary wavefunction as a linear combination of energy eigenfunctions; General solution of the time dependent Schrodinger equation in terms of linear combinations of stationary states. (5 **Lectures)**
General discussion of bound states in an arbitrary potential- continuity of wave function, boundary condition and emergence of discrete energy levels; Quantum mechanics of simple harmonic oscillator-energy levels and energy eigenfunctions using Frobenius method; Hermite polynomials; ground state, zero point energy & uncertainty principle. **(10 Lectures)**
Quantum theory of hydrogen-like atoms: time independent Schrodinger equation in spherical polar coordinates; separation of variables for second order partial differential equation; angular momentum operator & quantum numbers; Radial wavefunctions from Frobenius method; shapes of the probability densities for ground & first excited states; Orbital angular momentum quantum numbers l and m; s, p, d,..shells. **(11 Lectures)**
Atoms in Electric & Magnetic Fields: Electron angular momentum. Space quantization. Electron Spin and Spin Angular Momentum. Larmor's Theorem. Spin Magnetic Moment. Stern-Gerlach Experiment. Zeeman Effect: Electron Magnetic Moment and Magnetic Energy, Gyromagnetic Ratio and Bohr Magneton. **(11 Lectures)**
Atoms in External Magnetic Fields:- Normal and Anomalous Zeeman Effect. Paschen Back and Stark Effect (Qualitative Discussion only). **(5 Lectures)**
Many electron atoms: Pauli's Exclusion Principle. Symmetric & Antisymmetric Wave Functions. Periodic table. Fine structure. Spin orbit coupling. Spectral Notations for Atomic States. Total

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angular momentum. Vector Model. Spin-orbit coupling in atoms- L-S and J-J couplings. Hund's Rule. Term symbols. Spectra of Hydrogen and Alkali Atoms (Na etc.). **(10 Lectures)**

PHY-H-DSE-T-01: CLASSICAL DYNAMICS

Application to two-body decay of an unstable particle. The Electromagnetic field tensor and its transformation under Lorentz transformations: relation to known transformation properties of E and B. Electric and magnetic fields due to a uniformly moving charge. Equation of motion of charged particle & Maxwell's equations in tensor form. Motion of charged particles in external electric and magnetic fields. **(38 Lectures)**

Electromagnetic radiation: Review of retarded potentials. Potentials due to a moving charge: Lienard Wiechert potentials. Electric & Magnetic fields due to a moving charge: Power radiated, Larmor's formula. **(15 Lectures)**

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Semester VI

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-DSE-T-02: NUCLEAR AND PARTICLE PHYSICS

Radioactivity decay:(a) Alpha decay: basics of a-decay processes, theory of a- emission, Gamow factor, Geiger Nuttall law, a-decay spectroscopy. (b) (3-decay: energy kinematics for (3-decay, positron emission, electron capture, neutrino hypothesis. (c) Gamma decay: Gamma rays emission & kinematics, internal conversion. **(9 Lectures)**

Nuclear Reactions: Types of Reactions, Conservation Laws, kinematics of reactions, Q-value, reaction rate, reaction cross section, Concept of compound and direct reaction, resonance reaction, Coulomb scattering(Rutherford scattering). **(8 Lectures)**

Nuclear Astrophysics: Early universe, primordial nucleosynthesis (particle nuclear interactions), stellar nucleosynthesis, concept of gamow window, heavy element production: r- and s- process path. **(5 Lectures)**

Interaction of Nuclear Radiation with matter: Energy loss due to ionization (Bethe- Block formula), energy loss of electrons, Cerenkov radiation. Gamma ray interaction through matter, photoelectric effect, Compton scattering, pair production, neutron interaction with matter. (6 **Lectures)**

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Semester VI

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PHY-H-CC-T-13: ELECTROMAGNETIC THEORY

Maxwell Equations: Review of Maxwell's equations. Displacement Current. Vector and Scalar Potentials. Gauge Transformations: Lorentz and Coulomb Gauge. Boundary Conditions at Interface between Different Media. Wave Equations. Plane Waves in Dielectric Media. Poynting Theorem and Poynting Vector. Electromagnetic (EM) Energy Density. Physical Concept of Electromagnetic Field Energy Density, Momentum Density and Angular Momentum Density. **(12 Lectures)**

EM Wave Propagation in Unbounded Media: Plane EM waves through vacuum and isotropic dielectric medium, transverse nature of plane EM waves, refractive index and dielectric constant, wave impedance. Propagation through conducting media, relaxation time, skin depth. Wave propagation through dilute plasma, electrical conductivity of ionized gases, plasma frequency, refractive index, skin depth, application to propagation through ionosphere. **(10 Lectures)**

EM Wave in Bounded Media: Boundary conditions at a plane interface between two media. Reflection & Refraction of plane waves at plane interface between two dielectric media-Laws of Reflection & Refraction. Fresnel's Formulae for perpendicular & parallel polarization cases, Brewster's law. Reflection & Transmission coefficients. Total internal reflection, evanescent waves. Metallic reflection (normal incidence) **(10 Lectures)**

Polarization of Electromagnetic Waves: Description of Linear, Circular and Elliptical Polarization. Propagation of E.M. Waves in Anisotropic Media. Symmetric Nature of Dielectric Tensor. Fresnel's Formula. Uniaxial and Biaxial Crystals. Light Propagation in Uniaxial Crystal. Double Refraction. Polarization by Double Refraction. Nicol Prism. Ordinary & extraordinary refractive indices. Production & detection of Plane, Circularly and Elliptically Polarized Light. Phase Retardation Plates: Quarter-Wave and Half-Wave Plates. Babinet Compensator and its Uses. Analysis of Polarized Light. **(12 Lectures)**

Rotatory Polarization: Optical Rotation. Biot's Laws for Rotatory Polarization. Fresnel's Theory of optical rotation. Calculation of angle of rotation. Experimental verification of Fresnel's theory. Specific rotation. Laurent's half-shade polarimeter. **(5 Lectures)**

Wave Guides: Planar optical wave guides. Planar dielectric wave guide. Condition of continuity at interface. Phase shift on total reflection. Eigenvalue equations. Phase and group velocity of guided waves. Field energy and Power transmission. **(8 Lectures)**

Optical Fibres:- Numerical Aperture. Step and Graded Indices (Definitions Only). Single and Multiple Mode Fibres (Concept and Definition Only). **(3 Lectures)**

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Semester I

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-01: MATHEMATICAL PHYSICS-I

Orthogonal Curvilinear Coordinates:

Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems. (4 **Lectures)**

Matrices: Addition and Multiplication of Matrices. Null Matrices. Diagonal, Scalar and Unit Matrices. Transpose of a Matrix. Symmetric and Skew-Symmetric Matrices. Conjugate of a Matrix.

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Hermitian and Skew- Hermitian Matrices. Singular and Non-Singular matrices. Orthogonal and Unitary Matrices. Trace of a Matrix. Eigen-values and Eigenvectors (Degenerate and non-degenerate). Cayley-Hamiliton Theorem. Diagonalization of Matrices. Solutions of Coupled Linear Ordinary homogeneous Differential Equations. Functions of a Matrix. (6 **Lectures)**

Introduction to probability:

Independent random variables: Sample space and Probability distribution functions. Binomial, Gaussian, and Poisson distribution with examples. Mean and variance. **(5 Lectures)**

Dirac Delta function and its properties: (2)

Definition of Dirac delta function. Representation as limit of a Gaussian function and rectangular function. Properties of Dirac delta function.

PHY-H-CC-T-02: MECHANICS

Collisions: Elastic and inelastic collisions between particles. Centre of Mass and Laboratory frames.

Rotational Dynamics: Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation.

Elasticity: Relation between Elastic constants. Twisting torque on a Cylinder or Wire.

Fluid Motion: Kinematics of Moving Fluids: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube. Euler's Equation. Bernoulli's Theorem.

PHY-H-GE-T-01: MECHANICS

Rotational Motion: Angular velocity and angular momentum. Torque. Conservation of angular momentum. **(5 Lectures)**

Elasticity: Hooke's law - Stress-strain diagram - Elastic moduli-Relation between elastic constants - Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants - Work done in stretching and work done in twisting a wire - Twisting couple on a cylinder - Determination of Rigidity modulus by static torsion – Torsional pendulum-Determination of Rigidity modulus and moment of inertia -q, *r j* and o by Searles method. **(8 Lectures)**

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Semester II

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-03: ELECTRICITY AND MAGNETISM

Dielectric Properties of Matter:

Electric Field in matter. Polarization, Polarization Charges. Electrical Susceptibility and Dielectric Constant. Capacitor (parallel plate, spherical, cylindrical) filled with dielectric. Displacement vector D. Relations between E, P and D. Gauss' Law in dielectrics. **(8 Lectures)**

Magnetic Field:

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Magnetic force between current elements and definition of Magnetic Field B. Biot-Savart's Law and its simple applications: straight wire and circular loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital Law and its application to (1) Solenoid and (2) Toroid. Properties of B: curl and divergence. Vector Potential. Magnetic Force on (1) point charge (2) current carrying wire (3) between current elements. Torque on a current loop in a uniform Magnetic Field. **(9 Lectures)**

PHY-H-CC-T-04: WAVES AND OPTICS

Superposition of Collinear Harmonic oscillations: Linearity and Superposition Principle. Superposition of two collinear oscillations having equal frequencies and (2) different frequencies (Beats). Superposition of N collinear Harmonic Oscillations with (1) equal phase differences and equal frequency differences. **(5 Lectures)**
Superposition of two perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses. **(2 Lectures)**
Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves. Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave. Water Waves: Ripple and Gravity Waves
(4 **Lectures)**
Velocity of Waves: Velocity of Transverse Vibrations of Stretched Strings. Velocity of Longitudinal Waves in a Fluid in a Pipe. Newton's Formula for Velocity of Sound. Laplace's Correction.**(6 Lectures)**

PHY-H-GE-T-02: WAVES AND OPTICS

Superposition of Two Collinear Harmonic oscillations: Linearity & Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats). **(4 Lectures)**
Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses. **(2 Lectures)**
Waves Motion- General: Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity. Plane waves. Spherical waves, Wave intensity. (7 **Lectures)**

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Semester III

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-06: THERMAL PHYSICS

Introduction to Thermodynamics

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Zeroth and First Law of Thermodynamics: Extensive and intensive Thermodynamic Variables, Thermodynamic Equilibrium, Zeroeth Law of Thermodynamics & Concept of Temperature, Concept of Work & Heat, State Functions, First Law of Thermodynamics and its differential form, Internal Energy, First Law & various processes, Applications of First Law: General Relation between CP and CV, Work Done during Isothermal and Adiabatic Processes, Compressibility and Expansion Co-efficient. (8 **Lectures)**

Second Law of Thermodynamics: Reversible and Irreversible process with examples. Conversion of Work into Heat and Heat into Work. Heat Engines. Carnot's Cycle, Carnot engine & efficiency. Refrigerator & coefficient of performance, 2nd Law of Thermodynamics: Kelvin-Planck and Clausius Statements and their Equivalence. Carnot's Theorem. Applications of Second Law of Thermodynamics: Thermodynamic Scale of Temperature and its Equivalence to Perfect Gas Scale. (10 **Lectures)**

Entropy: Concept of Entropy, Clausius Theorem. Clausius Inequality, Second Law of Thermodynamics in terms of Entropy. Entropy of a perfect gas. Principle of Increase of Entropy. Entropy Changes in Reversible and Irreversible processes with examples. Entropy of the Universe. Entropy Changes in Reversible and Irreversible Processes. Principle of Increase of Entropy. Temperature-Entropy diagrams for Carnot's Cycle. Third Law of Thermodynamics. Unattainability of Absolute Zero. (7 **Lectures)**

Thermodynamic Potentials: Extensive and Intensive Thermodynamic Variables.Thermodynamic Potentials: Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy. Their Definitions, Properties and Applications. Surface Films and Variation of Surface Tension with Temperature. Magnetic Work, Cooling due to adiabatic demagnetization, First and second order Phase Transitions with examples, Clausius Clapeyron Equation and Ehrenfest equations. (7 **Lectures)**

Maxwell's Thermodynamic Relations: Derivations and applications of Maxwell's Relations, Maxwell's Relations:(1) Clausius Clapeyron equation, (2) Values of $C_p - C_v$, (3) Tds Equations, (4) Joule-Kelvin coefficient for Ideal and Van der Waal Gases, (5) Energy equations, (6) Change of Temperature during Adiabatic Process. (7 **Lectures)**

Kinetic Theory of Gases Distribution of Velocities: Maxwell-Boltzmann Law of Distribution of Velocities in an Ideal Gas and its Experimental Verification. Doppler Broadening of Spectral Lines and Stern's Experiment. Mean, RMS and Most Probable Speeds. Degrees of Freedom. Law of Equipartition of Energy (No proof required). Specific heats of Gases. (7 **Lectures)**

Molecular Collisions: Mean Free Path. Collision Probability. Estimates of Mean Free Path. Transport Phenomenon in Ideal Gases: (1) Viscosity, (2) Thermal Conductivity and (3) Diffusion. Brownian Motion and its Significance. **(4 Lectures)**

Real Gases: Behavior of Real Gases: Deviations from the Ideal Gas Equation. The Virial Equation. Andrew's Experiments on CO2 Gas. Critical Constants. Continuity of Liquid and Gaseous State. Vapour and Gas. Boyle Temperature. Van der Waal's Equation of State for Real Gases. Values of Critical Constants. Law of Corresponding States. Comparison with Experimental Curves. p-V Diagrams. Joule's Experiment. Free Adiabatic Expansion of a Perfect Gas. Joule-Thomson Porous Plug Experiment. Joule- Thomson Effect for Real and Van der Waal Gases. Temperature of Inversion. Joule- Thomson Cooling. **(10 Lectures)**

Skill Enhancement Courses (Credit: 02 each)

PHY—H-SEC-T-01: ELECTRICAL CIRCUITS & NETWORK SKILLS

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Solid-State Devices: Resistors, inductors and capacitors. Diode and rectifiers (half wave and full wave rectifier with L, C, L-C filter arrangement, regulation). Components in Series or in shunt. Response of inductors and capacitors with DC or AC sources. **(4 Lectures)**
Electrical Protection: Relays, Fuses and disconnect switches, Working principle of Circuit breakers, Miniature circuit breaker and its types. **(3 Lectures)**
Electrical Wiring: Conduit wiring (basic idea of house hold wiring). Basics of wiring: Star and Delta Connections. Preparation of extension board, Wiring Materials (Basic information about the wiring components). **(2 Lectures)**

PHY-H-GE-T-03: MECHANICS

Rotational Motion: Angular velocity and angular momentum. Torque. Conservation of angular momentum. **(5 Lectures)**

Elasticity: Hooke's law - Stress-strain diagram - Elastic moduli-Relation between elastic constants - Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants - Work done in stretching and work done in twisting a wire - Twisting couple on a cylinder - Determination of Rigidity modulus by static torsion – Torsional pendulum-Determination of Rigidity modulus and moment of inertia -q, *r j* and o by Searles method. **(8 Lectures)**

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Semester IV

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-09: ELEMENTS OF MODERN PHYSICS

Planck's quantum hypothesis, Planck's constant and light as a collection of photons; Blackbody Radiation: Quantum theory of Light; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson- Germer experiment. Wave description of particles by wave packets. Group and Phase velocities and relation between them. Two-Slit experiment with electrons. Probability. Wave amplitude and wave functions. **(14 Lectures)**
Position measurement- gamma ray microscope thought experiment; Waveparticle duality, Heisenberg uncertainty principle (Uncertainty relations involving Canonical pair of variables): Derivation from Wave Packets impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle- application to virtual particles and range of an interaction. **(5 Lectures)**
Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic

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particles; Momentum and Energy operators; stationary states; physical interpretation of a wave function, probabilities and normalization; Probability and probability current densities in one dimension.
(10 Lectures)
One dimensional infinitely rigid box- energy eigenvalues and eigenfunctions, normalization; Quantum dot as example; Quantum mechanical scattering and tunnelling in one dimension-across a step potential & rectangular potential barrier. **(10 Lectures)**
Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, Liquid Drop model: semi-empirical mass formula and binding energy, Nuclear Shell Model and magic numbers. **(6 Lectures)**
Radioactivity: stability of the nucleus; Law of radioactive decay; Mean life and half-life; Alpha decay; Beta decay- energy released, spectrum and Pauli's prediction of neutrino; Gamma ray emission, energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus. (8 Lectures)
Fission and fusion- mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions driving stellar energy (brief qualitative discussions). **(3 Lectures)**
Lasers: Einstein's A and B coefficients. Metastable states. Spontaneous and Stimulated emissions. Optical Pumping and Population Inversion. Three- Level and Four-Level Lasers. Ruby Laser and He-Ne Laser. **(4 Lectures)**

PHY—H-SEC-T-02: RENEWABLE ENERGY AND ENERGY HARVESTING

Hydro Energy: Hydropower resources, Types of hydroelectric project (Run-of-river schemes, Storage schemes, Pumped-Storage schemes, Low head power plant, Medium head power plant, High head power station), environmental impact of hydro power sources. **(4 Lectures)**
Piezoelectric Energy harvesting: Introduction, Physics and characteristics of piezoelectric effect (No mathematical treatment), materials used for piezoelectricity , recent application of piezoelectric generators. **(5 Lectures)**
Electromagnetic Energy Harvesting: Linear generators (principle of linear generator, applications). **(2 Lecture)**

PHY-H-GE-T-04: WAVES AND OPTICS

Superposition of Two Collinear Harmonic oscillations: Linearity & Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats). **(4 Lectures)**
Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses. **(2 Lectures)**
Waves Motion- General: Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity. Plane waves. Spherical waves, Wave intensity. (7 **Lectures)**

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Semester V

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-12: SOLID STATE PHYSICS

Crystal Structure: Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis - Central and Non-Central Elements. Unit Cell. Miller Indices. Reciprocal Lattice. Types of Lattices. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Atomic and Geometrical Factor. **(12 Lectures)**

Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids, T^3 law. **(10 Lectures)**

Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia- and Paramagnetic Domains. Quantum Mechanical Treatment of Paramagnetism. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss. **(8 Lectures)**

Dielectric Properties of Materials: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability. Normal and Anomalous Dispersion. Cauchy and Sellmeir relations. Langevin-Debye equation. Complex Dielectric Constant. Optical Phenomena. Application: Plasma Oscillations, Plasma Frequency, Plasmons, TO modes. **(8 Lectures)**

Ferroelectric Properties of Materials: Structural phase transition, Classification of crystals, Piezoelectric effect, Pyroelectric effect, Ferroelectric effect, Electrostrictive effect, Curie-Weiss Law, Ferroelectric domains, PE hysteresis loop. **(6 lectures)**

Elementary band theory: Kronig Penny model. Band Gap. Conductor, Semiconductor (P and N type) and insulator. Conductivity of Semiconductor, mobility, Hall Effect. Measurement of conductivity (04 probe method) & Hall coefficient. **(10 Lectures)**

Superconductivity: Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory (No derivation) **(6 Lectures)**

PHY-H-DSE-T-01: CLASSICAL DYNAMICS

Special Theory of Relativity: Geometrical interpretation of Space-time:Minkowski space. The invariant interval, light cone and world lines. Space-time diagrams. Intervals: space-like, time-like & light-like. Four velocity and acceleration. Elementary idea of tensors: Covariant and contravariant tensors, Metric and alternating tensors. Four-momentum and energymomentum relation. Doppler effect from a four-vector perspective. Concept of four-force. Conservation of four-momentum. Relativistic kinematics

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Semester VI

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-14: STATISTICAL MECHANICS

Classical Statistics: Macrostate & Microstate, Elementary Concept of Ensemble, Phase Space, Entropy and Thermodynamic Probability, Maxwell-Boltzmann Distribution Law, Partition Function, Thermodynamic Functions of an Ideal Gas, Classical Entropy Expression, Gibbs Paradox, Sackur Tetrode equation, Law of Equipartition of Energy (with proof) - Applications to Specific Heat and its Limitations, Thermodynamic Functions of a Two-Energy Levels System, Negative Temperature. **(18 Lectures)**

Classical Theory of Radiation: Properties of Thermal Radiation. Blackbody Radiation. Pure temperature dependence. Kirchhoff s law. Stefan-Boltzmann law: Thermodynamic proof. Radiation Pressure. Wien's Displacement law. Wien's Distribution Law. Saha's Ionization Formula. Rayleigh-Jean's Law. Ultraviolet Catastrophe. **(9 Lectures)**

Quantum Theory of Radiation: Spectral Distribution of Black Body Radiation. Planck's Quantum Postulates. Planck's Law of Blackbody Radiation: Experimental Verification. Deduction of (1) Wien's Distribution Law, (2) Rayleigh-Jeans Law, (3) Stefan-Boltzmann Law, (4) Wien's Displacement law from Planck's law. **(5 Lectures)**

Bose-Einstein Statistics: B-E distribution law, Thermodynamic functions of a strongly Degenerate Bose Gas, Bose Einstein condensation, properties of liquid He (qualitative description), Radiation as a photon gas and Thermodynamic functions of photon gas. Bose derivation of Planck's law. **(13 Lectures)**

Fermi-Dirac Statistics: Fermi-Dirac Distribution Law, Thermodynamic functions of a Completely and strongly Degenerate Fermi Gas, Fermi Energy, Electron gas in a Metal, Specific Heat of Metals, Relativistic Fermi gas, White Dwarf Stars, Chandrasekhar Mass Limit. **(15 Lectures)**

CBCS CURRICULUM FOR SEMESTERIZED UNDER-GRADUATE COURSE IN PHYSICS (GENERAL) THE ACADEMIC SESSION 2020-21

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Semester I

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-CC-T-01: MECHANICS

Collisions: Elastic and inelastic collisions between particles. Centre of Mass and Laboratory frames. **(3 Lectures)**

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Rotational Dynamics: Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation. (12 **Lectures)**
Elasticity: Relation between Elastic constants. Twisting torque on a Cylinder or Wire. **(3 Lectures)**
Fluid Motion: Kinematics of Moving Fluids: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube. (2 **Lectures)**

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Semester II

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-CC-T-02: WAVES AND OPTICS

Superposition of Collinear Harmonic oscillations: Linearity and Superposition Principle. Superposition of two collinear oscillations having (1) equal frequencies and (2) different frequencies (Beats). Superposition of N collinear Harmonic Oscillations with (1) equal phase differences and (2) equal frequency differences.
(5 Lectures)
Superposition of two perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses.
(2 Lectures)
Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves. Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave. Water Waves: Ripple and Gravity Waves.
(4 **Lectures)**
Velocity of Waves: Velocity of Transverse Vibrations of Stretched Strings.
Velocity of Longitudinal Waves in a Fluid in a Pipe. Newton's Formula for
Velocity of Sound. Laplace's Correction. **(6 Lectures)**

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Semester III

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-CC-T-03: ELEMENTS OF MODERN PHYSICS

Planck's quantum, Planck's constant and light as a collection of photons; Blackbody Radiation: Quantum theory of Light; Photo-electric effect and Compton scattering. De Broglie wavelength and

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matter waves; Davisson-Germer experiment. Wave description of particles by wave packets. Group and Phase velocities and relation between them. Two-Slit experiment with electrons. Probability. Wave amplitude and wave functions. **(14 Lectures)**

Position measurement- gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle (Uncertainty relations involving Canonical pair of variables): Derivation from Wave Packets impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle- application to virtual particles and range of an interaction.
(5 Lectures)

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Semester IV

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-CC-T-04: SOLID STATE PHYSICS

Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis - Central and Non-Central Elements. Unit Cell. Miller Indices. Reciprocal Lattice. Types of Lattices. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Atomic and Geometrical Factor.
(12 Lectures)

Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids. T^3 law **(10 Lectures)**

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Semester V

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-DSE-T-01: ELECTRICITY AND MAGNETISM

Electrostatics: Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere. Calculation of electric field from potential. Capacitance of an isolated spherical conductor. Parallel plate, spherical and cylindrical condenser. Energy per unit volume in electrostatic field. Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric. **(22 Lectures)**

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Semester VI

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-DSE-T-02: NUCLEAR AND PARTICLE PHYSICS

Detector for Nuclear Radiations: Gas detectors: estimation of electric field, mobility of particle, for ionization chamber and GM Counter. Basic principle of Scintillation Detectors and construction of photo-multiplier tube (PMT). Semiconductor Detectors (Si and Ge) for charge particle and photon detection (concept of charge carrier and mobility), neutron detector. **(6 Lectures)**
Particle Accelerators: Accelerator facility available in India: Van-de Graaff generator (Tandem accelerator), Linear accelerator, Cyclotron, Synchrotrons. **(5 Lectures)**
Particle physics: Particle interactions; basic features, types of particles and its families. Symmetries and Conservation Laws: energy and momentum, angular
momentum, parity, baryon number, Lepton number, Isospin, Strangeness and charm, concept of quark model, color quantum number and gluons. **(14 Lectures)**

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Semester I

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-CC-T-01: MATHEMATICAL PHYSICS-I

Vector Calculus:
Recapitulation of vectors: Properties of vectors under rotations. Scalar product and its invariance under rotations. Vector product, Scalar triple product and their interpretation in terms of area and volume respectively. Scalar and Vector fields.
Vector Differentiation: Directional derivatives and normal derivative. Gradient of a scalar field and its geometrical interpretation. Divergence and curl of a vector field. Del and Laplacian operators. Vector identities, Gradient, divergence, curl and Laplacian in spherical and cylindrical coordinates.
Vector Integration: Ordinary Integrals of Vectors. Multiple integrals, Jacobian. Notion of infinitesimal line, surface and volume elements. Line, surface and volume integrals of Vector fields. Flux of a vector field. Gauss' divergence theorem, Green's and Stokes Theorems and their applications (no rigorous proof)

PHY-H-CC-T-02: MECHANICS

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Fundamentals of Dynamics: Reference frames. Inertial frames; Galilean transformations; Galilean invariance. Review of Newton's Laws of Motion. Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse. Momentum of variable-mass system: motion of rocket.

Work and Energy: Work and Kinetic Energy Theorem. Conservative and non-conservative forces. Potential Energy. Energy diagram. Stable and unstable equilibrium. Elastic potential energy. Force as gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy.

Special Theory of Relativity: Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum. Four Vectors (definition and examples only).

PHY-H-GE-T-01: MECHANICS

Vectors: Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter. **(4 Lectures)**

Laws of Motion: Frames of reference. Newton's Laws of motion. Dynamics of a system of particles. Centre of Mass. **(10 Lectures)**

Momentum and Energy: Conservation of momentum. Work and energy. Conservation of energy. Motion of rockets. **(6 Lectures)**

Speed Theory of Relativity: Constancy of speed of light. Postulates of Special Theory of Relativity. Length contraction. Time dilation. Relativistic addition of velocities.

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Semester I

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-CC-T-01: MECHANICS

Fundamentals of Dynamics: Reference frames. Inertial frames; Galilean transformations; Galilean invariance. Review of Newton's Laws of Motion. Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse. Momentum of variable-mass system: motion of rocket. **(6 Lectures)**

Work and Energy: Work and Kinetic Energy Theorem. Conservative and non-conservative forces. Potential Energy. Energy diagram. Stable and unstable equilibrium. Elastic potential energy. Force as gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy. **(4 Lectures)**

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Special Theory of Relativity: Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum. Energy-Momentum Four Vector. **(10 Lectures**

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Semester II

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-CC-T-03: ELECTRICITY AND MAGNETISM

Electric Field and Electric Potential:

Electric field: Electric field lines. Electric flux. Gauss' Law with applications to charge distributions with spherical, cylindrical and planar symmetry. **(6 Lectures)**

Conservative nature of Electrostatic Field. Electrostatic Potential. Laplace's and Poisson equations. The Uniqueness Theorem. Potential and Electric Field of a dipole. Force and Torque on a dipole.**(6 Lectures)**

Electrostatic energy of system of charges. Electrostatic energy of a charged sphere. Conductors in an electrostatic Field. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Parallel-plate capacitor. Capacitance of an isolated conductor. Method of Images and its application to: (1) Plane Infinite Sheet and (2) Sphere. **(10 Lectures)**

PHY-H-CC-T-04: WAVES AND OPTICS

Superposition of Two Harmonic Waves:

Standing (Stationary) Waves in a String: Fixed and Free Ends. Analytical Treatment. Phase and Group Velocities. Changes with respect to Position and Time. Energy of Vibrating String. Transfer of Energy. Normal Modes of Stretched Strings. Plucked and Struck Strings. Melde's Experiment. Longitudinal Standing Waves and Normal Modes. Open and Closed Pipes. Superposition of N Harmonic Waves. **(7 Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence. **(3 Lectures)**

Interference: Division of amplitude and wavefront. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index. (**9 Lectures)**

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Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer.

PHY-H-GE-T-02: WAVES AND OPTICS

Fluids: Surface Tension: Synclastic and anticlastic surface - Excess of pressure -Application to spherical and cylindrical drops and bubbles - variation of surface tension with temperature - Jaegar's method. Viscosity - Rate flow of liquid in a capillary tube - Poiseuille's formula - Determination of coefficient of viscosity of a liquid - Variations of viscosity of liquid with temperature- lubrication. **(6 Lectures)**

Sound: Simple harmonic motion - forced vibrations and resonance - Fourier's Theorem - Application to saw tooth wave and square wave - Intensity and loudness of sound - Decibels - Intensity levels - musical notes - musical scale. Acoustics of buildings: Reverberation and time of reverberation - Absorption coefficient - Sabine's formula - measurement of reverberation time - Acoustic aspects of halls and auditoria. **(6 Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. **(3 Lectures)**

Interference: Interference: Division of amplitude and division of wavefront. Young's Double Slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index.
(10 Lectures)

Michelson's Interferometer: (1) Idea of form of fringes (no theory needed), (2) Determination of wavelength, (3) Wavelength difference, (4) Refractive index, and (5) Visibility of fringes. (3 **Lectures)**

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Semester II

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-CC-T-02: WAVES AND OPTICS

Superposition of Two Harmonic Waves:
Standing (Stationary) Waves in a String: Fixed and Free Ends. Analytical Treatment. Phase and Group Velocities. Changes with respect to Position and Time. Energy of Vibrating String. Transfer of Energy. Normal Modes of Stretched Strings. Plucked and Struck Strings. Melde's Experiment. Longitudinal Standing Waves and Normal Modes. Open and Closed Pipes. Superposition of N Harmonic Waves. (7 **Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence. **(3 Lectures)**

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Interference: Division of amplitude and wavefront. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index. **(9 Lectures)**
Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer. **(4 Lectures)**

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Semester III

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-CC-T-05: MATHEMATICAL PHYSICS-II

Fourier Series: Periodic functions. Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only). Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients. Complex representation of Fourier series. Expansion of functions with arbitrary period. Expansion of non-periodic functions over an interval. Even and odd functions and their Fourier expansions. Application. Summing of Infinite Series. Term-by-Term differentiation and integration of Fourier Series. Parseval Identity. **(14 Lectures)**
Frobenius Method and Special Functions: Singular Points of Second Order Linear Differential Equations and their importance. Frobenius method and its applications to differential equations. Legendre, Bessel, Hermite and Laguerre Differential Equations. Properties of Legendre Polynomials: Rodrigues Formula, Generating Function, Orthogonality. Simple recurrence relations. Expansion of function in a series of Legendre Polynomials. Bessel Functions of the First Kind: Generating Function, simple recurrence relations. Zeros of Bessel Functions and Orthogonality. **(24 Lectures)**
Some Special Integrals: Beta and Gamma Functions and Relation between them. Expression of Integrals in terms of Gamma Functions. Error Function (Probability Integral). **(4 Lectures)**
Theory of Errors: Systematic and Random Errors. Propagation of Errors. Normal Law of Errors. Standard and Probable Error. (**4 Lectures)**
Partial Differential Equations: Solutions to partial differential equations, using separation of variables: Laplace's Equation in problems of rectangular, cylindrical and spherical symmetry. Wave equation and its solution for vibrational modes of a stretched string, rectangular and circular membranes**. (14 Lectures)**

Skill Enhancement Courses (Credit: 02 each)

PHY—H-SEC-T-01: ELECTRICAL CIRCUITS & NETWORK SKILLS

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Basic Electricity Principles: Voltage, Current, Resistance, and Power. Ohm's law, Series, parallel, and series-parallel combinations. AC Electricity and DC Electricity. Familiarization with digital multimeter (name of the circuit elements and their ranges), Analog voltmeter and analog ammeter. **(6 Lectures)**

Generators and Transformers: DC Power sources (basic idea). AC and DC generators (basic principle of action). Inductance, capacitance, and impedance. Operation of transformers (Step-up and step-down). **(4 Lectures)**

PHY-H-GE-T-03: MECHANICS

Vectors: Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter. **(4 Lectures)**
Laws of Motion: Frames of reference. Newton's Laws of motion. Dynamics of a system of particles. Centre of Mass. **(10 Lectures)**
Momentum and Energy: Conservation of momentum. Work and energy. Conservation of energy. Motion of rockets. **(6 Lectures)**
Speed Theory of Relativity: Constancy of speed of light. Postulates of Special Theory of Relativity. Length contraction. Time dilation. Relativistic addition of velocities

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Semester III

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-CC-T-03: ELEMENTS OF MODERN PHYSICS

Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, Liquid Drop model: semi-empirical mass formula and binding energy, Nuclear Shell Model and magic numbers.
(6 Lectures)
Radioactivity: stability of the nucleus; Law of radioactive decay; Mean life and half-life; Alpha decay; Beta decay- energy released, spectrum and Pauli's prediction of neutrino; Gamma ray emission, energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus.
(8 Lectures)
Fission and fusion- mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions driving stellar energy (brief qualitative discussions).
(3 Lectures)

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Lasers: Einstein's A and B coefficients. Metastable states. Spontaneous and Stimulated emissions. Optical Pumping and Population Inversion. Three-Level and Four-Level Lasers. Ruby Laser and He-Ne Laser. **(4 Lectures)**

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Semester IV

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-CC-T-08: MATHEMATICAL PHYSICS-III

Complex Analysis: Brief Revision of Complex Numbers and their Graphical Representation. Euler's formula, De Moivre's theorem, Roots of Complex Numbers. Functions of Complex Variables. Analyticity and Cauchy-Riemann Conditions. Examples of analytic functions. Singular functions: poles and branch points, order of singularity, branch cuts. Integration of a function of a complex variable. Cauchy's Inequality. Cauchy's Integral formula. Simply and multiply connected region. Laurent and Taylor's expansion. Residues and Residue Theorem. Application in solving Definite Integrals. **(30 Lectures)**

Integrals Transforms:

Fourier Transforms: Fourier Integral theorem. Fourier Transform. Examples. Fourier transform of trigonometric, Gaussian, finite wave train & other functions. Representation of Dirac delta function as a Fourier Integral. Fourier transform of derivatives, Inverse Fourier transform, Convolution theorem. Properties of Fourier transforms (translation, change of scale, complex conjugation, etc.). Three dimensional Fourier transforms with examples. Application of Fourier Transforms to differential equations: One dimensional Wave and Diffusion/Heat Flow Equations. **(15 Lectures)**

Laplace Transforms: Laplace Transform (LT) of Elementary functions. Properties of LTs: Change of Scale Theorem, Shifting Theorem. LTs of Derivatives and Integrals of Functions, Derivatives and Integrals of LTs. LT of Unit Step function, Dirac Delta function, Periodic Functions. Convolution Theorem. Inverse LT. Application of Laplace Transforms to Differential Equations: Damped Harmonic Oscillator, Simple Electrical Circuits. **(15 Lectures)**

PHY—H-SEC-T-02: RENEWABLE ENERGY AND ENERGY HARVESTING

Fossil fuels and Alternate Sources of energy: Fossil fuels and nuclear energy, their limitation, need of renewable energy, non-conventional energy sources. **(3 Lectures)**

Solar energy: Solar energy, It's importance, storage of solar energy (Thermal storage and Electrical storage, Mechanical storage), solar pond (Basic idea), Principle of operation of non convective solar pond, applications of solar pond, solar water heating, flat plate collector, solar cooker (basic idea, Design principle and Constructional details of box type solar cooker and its limitation), solar

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furnace, solar green houses (basic idea, types and advantage), Solar Cell principle (No mathematical treatment), application of solar photovoltaic system, advantage and disadvantage of Photovoltaic solar energy conversion. **(6 Lectures)**

PHY-H-GE-T-04: WAVES AND OPTICS

Fluids: Surface Tension: Synclastic and anticlastic surface - Excess of pressure -Application to spherical and cylindrical drops and bubbles - variation of surface tension with temperature - Jaegar's method. Viscosity - Rate flow of liquid in a capillary tube - Poiseuille's formula - Determination of coefficient of viscosity of a liquid - Variations of viscosity of liquid with temperature- lubrication. **(6 Lectures)**

Sound: Simple harmonic motion - forced vibrations and resonance - Fourier's Theorem - Application to saw tooth wave and square wave - Intensity and loudness of sound - Decibels - Intensity levels - musical notes - musical scale. Acoustics of buildings: Reverberation and time of reverberation - Absorption coefficient - Sabine's formula - measurement of reverberation time - Acoustic aspects of halls and auditoria. **(6 Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. **(3 Lectures)**

Interference: Interference: Division of amplitude and division of wavefront. Young's Double Slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index.
(10 Lectures)

Michelson's Interferometer: (1) Idea of form of fringes (no theory needed), (2) Determination of wavelength, (3) Wavelength difference, (4) Refractive index, and (5) Visibility of fringes. (3 **Lectures)**

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Semester IV

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-CC-T-04: SOLID STATE PHYSICS

Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia- and Paramagnetic Domains. Quantum Mechanical Treatment of Paramagnetism. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss. **(8 Lectures)**

Dielectric Properties of Materials: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability. Normal and Anomalous Dispersion. Cauchy and Sellmeir relations. Langevin-Debye

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equation. Complex Dielectric Constant. Optical Phenomena. Application: Plasma Oscillations, Plasma Frequency, Plasmons, TO modes. **(8 Lectures)**

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Semester V

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-DSE-T-02: NUCLEAR AND PARTICLE PHYSICS

General Properties of Nuclei: Constituents of nucleus and their Intrinsic properties, quantitative facts about mass, radii, charge density (matter density), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A plot, angular momentum, parity, magnetic moment, electric moments, nuclear excites states. **(10 Lectures)**

Nuclear Models: Liquid drop model approach, semi empirical mass formula and significance of its various terms, condition of nuclear stability, two nucleon separation energies, Fermi gas model (degenerate fermion gas, nuclear symmetry potential in Fermi gas), evidence for nuclear shell structure, nuclear magic numbers, basic assumption of shell model, concept of mean field, residual interaction, concept of nuclear force. (12 **Lectures)**

Radioactivity decay:(a) Alpha decay: basics of α-decay processes, theory of a-emission, Gamow factor, Geiger Nuttall law, α-decay spectroscopy. (b) (β- decay: energy kinematics for (β-decay, positron emission, electron capture, neutrino hypothesis. (c) Gamma decay: Gamma rays emission & kinematics, internal conversion. **(9 Lectures)**

Nuclear Reactions: Types of Reactions, Conservation Laws, kinematics of reactions, Q-value, reaction rate, reaction cross section, Concept of compound and direct Reaction, resonance reaction, Coulomb scattering (Rutherford scattering). **(8 Lectures)**

Nuclear Astrophysics: Early universe, primordial nucleosynthesis (particle nuclear interactions), stellar nucleosynthesis, concept of gamow window, heavy element production: r- and s- process path. **(5 Lectures)**

Interaction of Nuclear Radiation with matter: Energy loss due to ionization (Bethe-Block formula), energy loss of electrons, Cerenkov radiation. Gamma ray interaction through matter, photoelectric effect, Compton scattering, pair production, neutron interaction with matter. **(6 Lectures)**

Detector for Nuclear Radiations: Gas detectors: estimation of electric field, mobility of particle, for ionization chamber and GM Counter. Basic principle of Scintillation Detectors and construction of photo-multiplier tube (PMT). Semiconductor Detectors (Si and Ge) for charge particle and photon detection (concept of charge carrier and mobility), neutron detector. **(6 Lectures)**

Particle Accelerators: Accelerator facility available in India: Van-de Graaff generator (Tandem accelerator), Linear accelerator, Cyclotron, Synchrotrons. **(5 Lectures)**

Particle physics: Particle interactions; basic features, types of particles and its families. Symmetries and Conservation Laws: energy and momentum, angular momentum, parity, baryon number, Lepton number, Isospin, Strangeness and charm, concept of quark model, color quantum number and gluons. **(14 Lectures)**

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PHY-H-DSE-T-01: CLASSICAL DYNAMICS

Classical Mechanics of Point Particles: Generalised coordinates and velocities. Hamilton's Principle, Lagrangian and Euler-Lagrange equations. Applications to simple systems such as coupled oscillators. Canonical momenta & Hamiltonian. Hamilton's equations of motion. Applications: Hamiltonian for a harmonic oscillator, particle in a central force field. Poisson brackets. Canonical transformations.

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Semester V

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-DSE-T-01: ELECTRICITY AND MAGNETISM

Vector Analysis: Scalar and Vector product, gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gauss-divergence theorem and Stoke's theorem of vectors (statement only). **(12 Lectures)**

Electromagnetic Induction: Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils. Energy stored in magnetic field. **(6 Lectures)**

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Semester VI

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-DSE-T-03: NANO MATERIALS AND APPLICATIONS

NANOSCALE SYSTEMS: Length scales in physics, Nanostructures: 1D, 2D and 3D nanostructures (nanodots, thin films, nanowires, nanorods), Band structure and density of states of materials at nanoscale, Size Effects in nano systems, Quantum confinement: Applications of Schrodinger equation- Infinite potential well, potential step, potential box, quantum confinement of carriers in 3D, 2D, 1D nanostructures and its consequences. **(12 Lectures)**

SYNTHESIS OF NANOSTRUCTURE MATERIALS: Top down and Bottom up approach, Photolithography. Ball milling. Gas phase condensation. Vacuum deposition. Physical vapor deposition (PVD): Thermal evaporation, Ebeam evaporation, Pulsed Laser deposition. Chemical

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vapor deposition (CVD). Sol-Gel. Electro deposition. Spraypyrolysis. Hydrothermal synthesis. Preparation through colloidal methods. MBE growth of quantum dots. **(10 Lectures)**
CHARACTERIZATION: X-Ray Diffraction. Optical Microscopy. Scanning Electron Microscopy. Transmission Electron Microscopy. Atomic Force Microscopy. Scanning Tunneling Microscopy. **(10 Lectures)**
OPTICAL PROPERTIES: Coulomb interaction in nanostructures. Concept of dielectric constant for nanostructures and charging of nanostructure. Quasi-particles and excitons. Excitons in direct and indirect band gap semiconductor nanocrystals. Quantitative treatment of quasi-particles and excitons, charging effects. Radiative processes: General formalizationabsorption, emission and luminescence. Optical properties of heterostrctures and nanostructures. **(16 Lectures)**
ELECTRON TRANSPORT: Carrier transport in nanostrcutures. Coulomb blockade effect, thermionic emission, tunneling and hoping conductivity. Defects and impurities: Deep level and surface defects. **(9 Lectures)**
APPLICATIONS: Applications of nanoparticles, quantum dots, nano wires and thin films for photonic devices (LED, solar cells). Single electron devices (no derivation). CNT based transistors. Nanomaterial Devices: Quantum dots heterostructure lasers, optical switching and optical data storage. Magnetic quantum well; magnetic dots - magnetic data storage. Micro Electromechanical Systems (MEMS), Nano Electromechanical Systems (NEMS). **(18 Lectures)**

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Semester VI

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-DSE-T-02: NUCLEAR AND PARTICLE PHYSICS

General Properties of Nuclei: Constituents of nucleus and their Intrinsic properties, quantitative facts about mass, radii, charge density (matter density), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A plot, angular momentum, parity, magnetic moment, electric moments, nuclear excites states. **(10 Lectures)**
Nuclear Models: Liquid drop model approach, semi empirical mass formula and significance of its various terms, condition of nuclear stability, two nucleon separation energies, Fermi gas model (degenerate fermion gas, nuclear symmetry potential in Fermi gas), evidence for nuclear shell structure, nuclear magic numbers, basic assumption of shell model, concept of mean field, residual interaction, concept of nuclear force. (12 **Lectures)**

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Semester I

FACULTY NAME:SIRAJUL SK, DUMKAL COLLEGE

PHY-H-CC-T-01: MATHEMATICAL PHYSICS-I

Recapitulation: Limits, continuity, average and instantaneous quantities, differentiation. Plotting functions. Intuitive ideas of continuous, differentiable, etc. functions and plotting of curves. Approximation: Taylor and binomial series (statements only). First Order Differential Equations and Integrating Factor.
Second Order Differential equations: Homogeneous Equations with constant coefficients. Wronskian and general solution. Statement of existence and Uniqueness Theorem for Initial Value Problems. Particular Integral.
Calculus of functions of more than one variable: Partial derivatives, exact and inexact differentials. Integrating factor, with simple illustration. Constrained Maximization using Lagrange Multipliers.

PHY-H-CC-T-02: MECHANICS

Gravitation and Central Force Motion: Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere. (3**Lectures)**
Motion of a particle under a central force field: Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS). Physiological effectson astronauts. **(6 Lectures)**
Oscillations: SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor. (7 **Lectures)**
Non-Inertial Systems: Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of in rotating coordinate systems. Centrifugal force. Coriolis force and its applications. Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems.

PHY-H-GE-T-01: MECHANICS

Ordinary Differential Equations: 1st order homogeneous differential equations. 2nd order homogeneous differential equations with constant coefficients. **(6 Lectures)**
Gravitation: Newton's Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's Laws (statement only). Satellite in circular orbit and applications. Geosynchronous orbits. Basic idea of global positioning system (GPS). Weightlessness. Physiological effects on astronauts. **(8 Lectures)**
Oscillations: Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages.

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Damped oscillations. (6 **Lectures)**

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Semester I

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-CC-T-01: MECHANICS

Gravitation and Central Force Motion: Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere. (3 **Lectures)** Motion of a particle under a central force field. Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS). Physiological effects on astronauts. **(6 Lectures)**
Oscillations: SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor. (7 **Lectures)**
Non-Inertial Systems: Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of Physics in rotating coordinate systems. Centrifugal force. Coriolis force and its applications. Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems. **(4 Lectures)**

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Semester II

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-CC-T-02: WAVES AND OPTICS

Diffraction: Kirchhoff s Integral Theorem, Fresnel-Kirchhoff s Integral formula and its application to rectangular slit. **(5 Lectures)**
Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope. Double slit. Multiple slits. Diffraction grating. Resolving power of grating. **(8 Lectures)**
Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire. (7 **Lectures**

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PHY-G-CC-T-02: WAVES AND OPTICS

Diffraction: Kirchhoff s Integral Theorem, Fresnel-Kirchhoff s Integral formula and its application to rectangular slit. **(5 Lectures)**

Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope. Double slit. Multiple slits. Diffraction grating. Resolving power of grating. **(8 Lectures)**

Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire. (7 **Lectures**

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Semester III

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-CC-T-03: ELEMENTS OF MODERN PHYSICS

Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of a wave function, probabilities and normalization; Probability and probability current densities in one dimension.

(10 Lectures)

One dimensional infinitely rigid box- energy eigenvalues and eigenfunctions, normalization; Quantum dot as example; Quantum mechanical scattering and tunnelling in one dimension-across a step potential & rectangular potential barrier.

(10 Lectures)

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Semester III

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PHY-H-CC-T-07: DIGITAL SYSTEMS AND APPLICATIONS

Introduction to CRO: Block Diagram of CRO. Electron Gun, Deflection System and Time Base. Deflection Sensitivity. Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference. **(3 Lectures)**

Integrated Circuits (Qualitative treatment only): Active & Passive components. Discrete components. Wafer. Chip. Advantages and drawbacks of ICs. Scale of integration: SSI, MSI, LSI and VLSI (basic idea and definitions only). Classification of ICs. Examples of Linear and Digital ICs. **(3 Lectures)**

Digital Circuits: Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion. BCD, Octal and Hexadecimal numbers. AND, OR and NOT Gates (realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates and application as Parity Checkers. **(6 Lectures)**

Boolean algebra: De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Idea of Minterms and Maxterms. Conversion of a Truth table into Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map. **(6 Lectures)**

Data processing circuits: Basic idea of Multiplexers, De-multiplexers, Decoders, Encoders.**(4 Lectures)**

Arithmetic Circuits: Binary Addition. Binary Subtraction using 2's Complement. Half and Full Adders. Half & Full Subtractors, 4-bit binary Adder/Subtractor. **(5 Lectures)**

Sequential Circuits: SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered) Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop. M/S JK Flip-Flop. **(6 Lectures)**

Timers: IC 555: block diagram and applications: Astable multivibrator and Monostable multivibrator. **(3 Lectures)**

Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits). **(2 Lectures)**

Counters(4 bits): Ring Counter. Asynchronous counters, Decade Counter. Synchronous Counter. (4 Lectures)

Computer Organization: Input/Output Devices. Data storage (idea of RAM and ROM). Computer memory. Memory organization & addressing. Memory Interfacing. Memory Map. **(6 Lectures)**

Intel 8085 Microprocessor Architecture: Main features of 8085. Block diagram. Components. Pin-out diagram. Buses. Registers. ALU. Memory. Stack memory. Timing & Control circuitry. Timing states. Instruction cycle, Timing diagram of MOV and MVI. **(8 Lectures)**

Introduction to Assembly Language: 1 byte, 2 byte & 3 byte instructions. **(4 Lectures)**

Skill Enhancement Courses (Credit: 02 each)

PHY—H-SEC-T-01: ELECTRICAL CIRCUITS & NETWORK SKILLS

Understanding Electrical Circuits: Main electric circuit elements and their combination. Rules to analyze DC sourced electrical circuits. Current and voltage drop across the DC circuit elements. Single-phase and three-phase alternating current sources (principle of generation, output wave form, advantage of using three-phase). Rules to analyze AC sourced electrical circuits. Real, imaginary and complex power components of AC source. Power factor. Saving energy and money. **(8Lectures)**

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Electric Motors: Single-phase, three-phase & DC motors. Basic design. Speed & power of ac motor. **(3 Lectures**

PHY-H-GE-T-03: MECHANICS

Ordinary Differential Equations: 1st order homogeneous differential equations. 2nd order homogeneous differential equations with constant coefficients. **(6 Lectures)**
Gravitation: Newton's Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's Laws (statement only). Satellite in circular orbit and applications. Geosynchronous orbits. Basic idea of global positioning system (GPS). Weightlessness. Physiological effects on astronauts. **(8 Lectures)**
Oscillations: Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages. Damped oscillations. (6 **Lectures)**

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Semester IV

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-CC-T-04: SOLID STATE PHYSICS

Ferroelectric Properties of Materials: Structural phase transition, Classification of crystals, Piezoelectric effect, Pyroelectric effect, Ferroelectric effect, Electrostrictive effect, Curie-Weiss Law, Ferroelectric domains, PE hysteresis loop. **(6 lectures)**
Elementary band theory: Kronig Penny model. Band Gap. Conductor, Semiconductor (P and N type) and insulator. Conductivity of Semiconductor, mobility, Hall Effect. Measurement of conductivity (04 probe method) & Hall coefficient. **(10 Lectures)**
Superconductivity: Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory (No derivation) **(6 Lectures)**

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Semester IV

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PHY-H-CC-T-10: ANALOG SYSTEMS AND APPLICATIONS

Semiconductor Diodes: P and N type semiconductors. Energy Level Diagram. Conductivity and Mobility, Concept of Drift velocity. PN Junction Fabrication (Simple Idea). Barrier Formation in PN Junction Diode. Static and Dynamic Resistance. Current Flow Mechanism in Forward and Reverse Biased Diode. Drift Velocity. Derivation for Barrier Potential, Barrier Width and Current for Step Junction. **(10 Lectures)**

Two-terminal Devices and their Applications: (1) Rectifier Diode: Halfwave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency, (2) Zener Diode and Voltage Regulation. Principle and structure of (1) LEDs, (2) Photodiode, (3) Solar Cell. **(6 Lectures)**

Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Current gains α and β, Relations between α and β. Load Line analysis of Transistors. DC Load line and Q-point. Physical Mechanism of Current Flow. Active, Cutoff and Saturation Regions.
(6 Lectures)

Amplifiers: Transistor Biasing and Stabilization Circuits. Fixed Bias and Voltage Divider Bias. Transistor as 2-port Network. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Classification of Class A, B & C Amplifiers. **(10 Lectures)**

Coupled Amplifier: RC-coupled amplifier and its frequency response. **(4 Lectures)**

Feedback in Amplifiers: Effects of Positive and Negative Feedback on Input Impedance, Output Impedance, Gain, Stability, Distortion and Noise. (**4 Lectures)**

Sinusoidal Oscillators: Barkhausen's Criterion for self-sustained oscillations. RC Phase shift oscillator, determination of Frequency. Hartley & Colpitts oscillators. **(4 Lectures)**

Operational Amplifiers (Black Box approach): Characteristics of an Ideal and Practical Op-Amp. (IC 741) Open-loop and Closed-loop Gain. Frequency Response. CMRR. Slew Rate and concept of Virtual ground. (**4 Lectures)**

Applications of Op-Amps: (1) Inverting and non-inverting amplifiers, (2) Adder, (3)Subtractor, (4) Differentiator, (5) Integrator, (6) Log amplifier, (7) Zero crossing detector (8) Wein bridge oscillator. **(9 Lectures)**

Conversion: Resistive network (Weighted and R-2R Ladder). Accuracy and Resolution. A/D Conversion (successive approximation) **(3 Lectures)**

PHY—H-SEC-T-02: RENEWABLE ENERGY AND ENERGY HARVESTING

Hydro Energy: Hydropower resources, Types of hydroelectric project (Run-of-river schemes, Storage schemes, Pumped-Storage schemes, Low head power plant, Medium head power plant, High head power station), environmental impact of hydro power sources. **(4 Lectures)**

Piezoelectric Energy harvesting: Introduction, Physics and characteristics of piezoelectric effect (No mathematical treatment), materials used for piezoelectricity , recent application of piezoelectric generators. **(5 Lectures)**

Electromagnetic Energy Harvesting: Linear generators (principle of linear generator, applications). **(2 Lecture)**

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Semester V

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-DSE-T-01: ELECTRICITY AND MAGNETISM

Magnetism:
Magnetostatics: Biot-Savart's law and its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law. Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief introduction of dia-, para-and ferro magnetic materials. **(10 Lectures)**
Maxwell's equations and Electromagnetic wave propagation: Equation of continuity of current, Displacement current, Maxwell's equations, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves, polarization.
(10 Lectures)

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Semester V

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-H-CC-T-11: QUANTUM MECHANICS AND APPLICATIONS

Time dependent Schrodinger equation: Time dependent Schrodinger equation and dynamical evolution of a quantum state; Properties of Wave Function. Linearity and Superposition Principles. Eigenvalues and Eigenfunctions. Position, momentum and Energy operators; commutator of position and momentum operators; Hermitian Operators, Expectation values of position and momentum. Wave Function of a Free Particle. (8 **Lectures)**
Time independent Schrodinger equation-Hamiltonian, stationary states and energy eigenvalues; expansion of an arbitrary wavefunction as a linear combination of energy eigenfunctions; General solution of the time dependent Schrodinger equation in terms of linear combinations of stationary states. (5 **Lectures)**
General discussion of bound states in an arbitrary potential- continuity of wave function, boundary condition and emergence of discrete energy levels; Quantum mechanics of simple harmonic oscillator-energy levels and energy eigenfunctions using Frobenius method; Hermite polynomials; ground state, zero point energy & uncertainty principle. **(10 Lectures)**
Quantum theory of hydrogen-like atoms: time independent Schrodinger equation in spherical polar coordinates; separation of variables for second order partial differential equation; angular

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momentum operator & quantum numbers; Radial wavefunctions from Frobenius method; shapes of the probability densities for ground & first excited states; Orbital angular momentum quantum numbers l and m; s, p, d,..shells. **(11 Lectures)**

Atoms in Electric & Magnetic Fields: Electron angular momentum. Space quantization. Electron Spin and Spin Angular Momentum. Larmor's Theorem. Spin Magnetic Moment. Stern-Gerlach Experiment. Zeeman Effect: Electron Magnetic Moment and Magnetic Energy, Gyromagnetic Ratio and Bohr Magneton. **(11 Lectures)**

Atoms in External Magnetic Fields:- Normal and Anomalous Zeeman Effect. Paschen Back and Stark Effect (Qualitative Discussion only). **(5 Lectures)**

Many electron atoms: Pauli's Exclusion Principle. Symmetric & Antisymmetric Wave Functions. Periodic table. Fine structure. Spin orbit coupling. Spectral Notations for Atomic States. Total angular momentum. Vector Model. Spin-orbit coupling in atoms- L-S and J-J couplings. Hund's Rule. Term symbols. Spectra of Hydrogen and Alkali Atoms (Na etc.). **(10 Lectures)**

PHY-H-DSE-T-01: CLASSICAL DYNAMICS

Application to two-body decay of an unstable particle. The Electromagnetic field tensor and its transformation under Lorentz transformations: relation to known transformation properties of E and B. Electric and magnetic fields due to a uniformly moving charge. Equation of motion of charged particle & Maxwell's equations in tensor form. Motion of charged particles in external electric and magnetic fields. **(38 Lectures)**

Electromagnetic radiation: Review of retarded potentials. Potentials due to a moving charge: Lienard Wiechert potentials. Electric & Magnetic fields due to a moving charge: Power radiated, Larmor's formula. **(15 Lectures)**

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Semester VI

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-DSE-T-02: NUCLEAR AND PARTICLE PHYSICS

Radioactivity decay:(a) Alpha decay: basics of a-decay processes, theory of a- emission, Gamow factor, Geiger Nuttall law, a-decay spectroscopy. (b) (3-decay: energy kinematics for (3-decay, positron emission, electron capture, neutrino hypothesis. (c) Gamma decay: Gamma rays emission & kinematics, internal conversion. **(9 Lectures)**

Nuclear Reactions: Types of Reactions, Conservation Laws, kinematics of reactions, Q-value, reaction rate, reaction cross section, Concept of compound and direct reaction, resonance reaction, Coulomb scattering(Rutherford scattering). **(8 Lectures)**

Nuclear Astrophysics: Early universe, primordial nucleosynthesis (particle nuclear interactions), stellar nucleosynthesis, concept of gamow window, heavy element production: r- and s- process path. **(5 Lectures)**

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Interaction of Nuclear Radiation with matter: Energy loss due to ionization (Bethe- Block formula), energy loss of electrons, Cerenkov radiation. Gamma ray interaction through matter, photoelectric effect, Compton scattering, pair production, neutron interaction with matter.
(6 **Lectures)**

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Semester VI

FACULTY NAME: SIRAJUKL SK, DUMKAL COLLEGE

PHY-H-CC-T-13: ELECTROMAGNETIC THEORY

Maxwell Equations: Review of Maxwell's equations. Displacement Current. Vector and Scalar Potentials. Gauge Transformations: Lorentz and Coulomb Gauge. Boundary Conditions at Interface between Different Media. Wave Equations. Plane Waves in Dielectric Media. Poynting Theorem and Poynting Vector. Electromagnetic (EM) Energy Density. Physical Concept of Electromagnetic Field Energy Density, Momentum Density and Angular Momentum Density. **(12 Lectures)**
EM Wave Propagation in Unbounded Media: Plane EM waves through vacuum and isotropic dielectric medium, transverse nature of plane EM waves, refractive index and dielectric constant, wave impedance. Propagation through conducting media, relaxation time, skin depth. Wave propagation through dilute plasma, electrical conductivity of ionized gases, plasma frequency, refractive index, skin depth, application to propagation through ionosphere. **(10 Lectures)**
EM Wave in Bounded Media: Boundary conditions at a plane interface between two media. Reflection & Refraction of plane waves at plane interface between two dielectric media-Laws of Reflection & Refraction. Fresnel's Formulae for perpendicular & parallel polarization cases, Brewster's law. Reflection & Transmission coefficients. Total internal reflection, evanescent waves. Metallic reflection (normal incidence) **(10 Lectures)**
Polarization of Electromagnetic Waves: Description of Linear, Circular and Elliptical Polarization. Propagation of E.M. Waves in Anisotropic Media. Symmetric Nature of Dielectric Tensor. Fresnel's Formula. Uniaxial and Biaxial Crystals. Light Propagation in Uniaxial Crystal. Double Refraction. Polarization by Double Refraction. Nicol Prism. Ordinary & extraordinary refractive indices. Production & detection of Plane, Circularly and Elliptically Polarized Light. Phase Retardation Plates: Quarter-Wave and Half-Wave Plates. Babinet Compensator and its Uses. Analysis of Polarized Light. **(12 Lectures)**
Rotatory Polarization: Optical Rotation. Biot's Laws for Rotatory Polarization. Fresnel's Theory of optical rotation. Calculation of angle of rotation. Experimental verification of Fresnel's theory. Specific rotation. Laurent's half-shade polarimeter. **(5 Lectures)**
Wave Guides: Planar optical wave guides. Planar dielectric wave guide. Condition of continuity at interface. Phase shift on total reflection. Eigenvalue equations. Phase and group velocity of guided waves. Field energy and Power transmission. **(8 Lectures)**
Optical Fibres:- Numerical Aperture. Step and Graded Indices (Definitions Only). Single and Multiple Mode Fibres (Concept and Definition Only). **(3 Lectures)**

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SYLLABUS DISTRIBUTION

Semester I

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-01: MATHEMATICAL PHYSICS-I

Orthogonal Curvilinear Coordinates:
Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems. (4 **Lectures)**
Matrices: Addition and Multiplication of Matrices. Null Matrices. Diagonal, Scalar and Unit Matrices. Transpose of a Matrix. Symmetric and Skew-Symmetric Matrices. Conjugate of a Matrix. Hermitian and Skew- Hermitian Matrices. Singular and Non-Singular matrices. Orthogonal and Unitary Matrices. Trace of a Matrix. Eigen-values and Eigenvectors (Degenerate and non-degenerate). Cayley-Hamiliton Theorem. Diagonalization of Matrices. Solutions of Coupled Linear Ordinary homogeneous Differential Equations. Functions of a Matrix. (6 **Lectures)**
Introduction to probability:
Independent random variables: Sample space and Probability distribution functions. Binomial, Gaussian, and Poisson distribution with examples. Mean and variance. **(5 Lectures)**
Dirac Delta function and its properties: (2)
Definition of Dirac delta function. Representation as limit of a Gaussian function and rectangular function. Properties of Dirac delta function.

PHY-H-CC-T-02: MECHANICS

Collisions: Elastic and inelastic collisions between particles. Centre of Mass and Laboratory frames.
Rotational Dynamics: Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation.
Elasticity: Relation between Elastic constants. Twisting torque on a Cylinder or Wire.
Fluid Motion: Kinematics of Moving Fluids: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube. Euler's Equation. Bernoulli's Theorem.

PHY-H-GE-T-01: MECHANICS

Rotational Motion: Angular velocity and angular momentum. Torque. Conservation of angular momentum. **(5 Lectures)**

Elasticity: Hooke's law - Stress-strain diagram - Elastic moduli-Relation between elastic constants - Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants - Work done in stretching and work done in twisting a wire - Twisting couple on a cylinder - Determination of Rigidity modulus by static torsion – Torsional pendulum-Determination of Rigidity modulus and moment of inertia -q, *r j* and o by Searles method. **(8 Lectures)**

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Semester I

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-CC-T-01: MECHANICS

Collisions: Elastic and inelastic collisions between particles. Centre of Mass and Laboratory frames. **(3 Lectures)**

Rotational Dynamics: Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation. (12 **Lectures)**

Elasticity: Relation between Elastic constants. Twisting torque on a Cylinder or Wire. **(3 Lectures)**

Fluid Motion: Kinematics of Moving Fluids: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube. (2 **Lectures)**

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Semester II

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-CC-T-02: WAVES AND OPTICS

Superposition of Collinear Harmonic oscillations: Linearity and Superposition Principle. Superposition of two collinear oscillations having (1) equal frequencies and (2) different frequencies (Beats). Superposition of N collinear Harmonic Oscillations with (1) equal phase differences and (2) equal frequency differences.
(5 Lectures)

Superposition of two perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses.
(2 Lectures)

Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves. Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave. Water Waves: Ripple and Gravity Waves.
(4 **Lectures)**

Velocity of Waves: Velocity of Transverse Vibrations of Stretched Strings. Velocity of Longitudinal Waves in a Fluid in a Pipe. Newton's Formula for Velocity of Sound. Laplace's Correction. **(6 Lectures)**

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Semester II

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-03: ELECTRICITY AND MAGNETISM

Dielectric Properties of Matter:
Electric Field in matter. Polarization, Polarization Charges. Electrical Susceptibility and Dielectric Constant. Capacitor (parallel plate, spherical, cylindrical) filled with dielectric. Displacement vector D. Relations between E, P and D. Gauss' Law in dielectrics. **(8 Lectures)**
Magnetic Field:
Magnetic force between current elements and definition of Magnetic Field B. Biot-Savart's Law and its simple applications: straight wire and circular loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital Law and its application to (1) Solenoid and (2) Toroid. Properties of B: curl and divergence. Vector Potential. Magnetic Force on (1) point charge (2) current carrying wire (3) between current elements. Torque on a current loop in a uniform Magnetic Field. **(9 Lectures)**

PHY-H-CC-T-04: WAVES AND OPTICS

Superposition of Collinear Harmonic oscillations: Linearity and Superposition Principle. Superposition of two collinear oscillations having equal frequencies and (2) different frequencies (Beats). Superposition of N collinear Harmonic Oscillations with (1) equal phase differences and equal frequency differences. **(5 Lectures)**
Superposition of two perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses. **(2 Lectures)**
Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves. Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave. Water Waves: Ripple and Gravity Waves
(4 **Lectures)**
Velocity of Waves: Velocity of Transverse Vibrations of Stretched Strings. Velocity of Longitudinal Waves in a Fluid in a Pipe. Newton's Formula for Velocity of Sound. Laplace's Correction.**(6 Lectures)**

PHY-H-GE-T-02: WAVES AND OPTICS

Superposition of Two Collinear Harmonic oscillations: Linearity & Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats). **(4 Lectures)**
Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses. **(2 Lectures)**

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Waves Motion- General: Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity. Plane waves. Spherical waves, Wave intensity. (7 **Lectures)**

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Semester III

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-CC-T-03: ELEMENTS OF MODERN PHYSICS

Planck's quantum, Planck's constant and light as a collection of photons; Blackbody Radiation: Quantum theory of Light; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson-Germer experiment. Wave description of particles by wave packets. Group and Phase velocities and relation between them. Two-Slit experiment with electrons. Probability. Wave amplitude and wave functions. **(14 Lectures)**

Position measurement- gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle (Uncertainty relations involving Canonical pair of variables): Derivation from Wave Packets impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle- application to virtual particles and range of an interaction.
(5 Lectures)

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Semester III

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-06: THERMAL PHYSICS

Introduction to Thermodynamics

Zeroth and First Law of Thermodynamics: Extensive and intensive Thermodynamic Variables, Thermodynamic Equilibrium, Zeroeth Law of Thermodynamics & Concept of Temperature, Concept of Work & Heat, State Functions, First Law of Thermodynamics and its differential form, Internal Energy, First Law & various processes, Applications of First Law: General Relation between CP and CV, Work Done during Isothermal and Adiabatic Processes, Compressibility and Expansion Co-efficient. (8 **Lectures)**

Second Law of Thermodynamics: Reversible and Irreversible process with examples. Conversion of Work into Heat and Heat into Work. Heat Engines. Carnot's Cycle, Carnot engine & efficiency. Refrigerator & coefficient of performance, 2nd Law of Thermodynamics: Kelvin-Planck and Clausius Statements and their Equivalence. Carnot's Theorem. Applications of Second Law of

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Thermodynamics: Thermodynamic Scale of Temperature and its Equivalence to Perfect Gas Scale. (10 **Lectures)**

Entropy: Concept of Entropy, Clausius Theorem. Clausius Inequality, Second Law of Thermodynamics in terms of Entropy. Entropy of a perfect gas. Principle of Increase of Entropy. Entropy Changes in Reversible and Irreversible processes with examples. Entropy of the Universe. Entropy Changes in Reversible and Irreversible Processes. Principle of Increase of Entropy. Temperature-Entropy diagrams for Carnot's Cycle. Third Law of Thermodynamics. Unattainability of Absolute Zero. (7 **Lectures)**

Thermodynamic Potentials: Extensive and Intensive Thermodynamic Variables.Thermodynamic Potentials: Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy. Their Definitions, Properties and Applications. Surface Films and Variation of Surface Tension with Temperature. Magnetic Work, Cooling due to adiabatic demagnetization, First and second order Phase Transitions with examples, Clausius Clapeyron Equation and Ehrenfest equations. (7 **Lectures)**

Maxwell's Thermodynamic Relations: Derivations and applications of Maxwell's Relations, Maxwell's Relations:(1) Clausius Clapeyron equation, (2) Values of C_p- C_v, (3) Tds Equations, (4) Joule-Kelvin coefficient for Ideal and Van der Waal Gases, (5) Energy equations, (6) Change of Temperature during Adiabatic Process. (7 **Lectures)**

Kinetic Theory of Gases Distribution of Velocities: Maxwell-Boltzmann Law of Distribution of Velocities in an Ideal Gas and its Experimental Verification. Doppler Broadening of Spectral Lines and Stern's Experiment. Mean, RMS and Most Probable Speeds. Degrees of Freedom. Law of Equipartition of Energy (No proof required). Specific heats of Gases. (7 **Lectures)**

Molecular Collisions: Mean Free Path. Collision Probability. Estimates of Mean Free Path. Transport Phenomenon in Ideal Gases: (1) Viscosity, (2) Thermal Conductivity and (3) Diffusion. Brownian Motion and its Significance. **(4 Lectures)**

Real Gases: Behavior of Real Gases: Deviations from the Ideal Gas Equation. The Virial Equation. Andrew's Experiments on CO_2 Gas. Critical Constants. Continuity of Liquid and Gaseous State. Vapour and Gas. Boyle Temperature. Van der Waal's Equation of State for Real Gases. Values of Critical Constants. Law of Corresponding States. Comparison with Experimental Curves. p-V Diagrams. Joule's Experiment. Free Adiabatic Expansion of a Perfect Gas. Joule-Thomson Porous Plug Experiment. Joule- Thomson Effect for Real and Van der Waal Gases. Temperature of Inversion. Joule- Thomson Cooling. **(10 Lectures)**

Skill Enhancement Courses (Credit: 02 each)

PHY—H-SEC-T-01: ELECTRICAL CIRCUITS & NETWORK SKILLS

Solid-State Devices: Resistors, inductors and capacitors. Diode and rectifiers (half wave and full wave rectifier with L, C, L-C filter arrangement, regulation). Components in Series or in shunt. Response of inductors and capacitors with DC or AC sources. **(4 Lectures)**

Electrical Protection: Relays, Fuses and disconnect switches, Working principle of Circuit breakers, Miniature circuit breaker and its types. **(3 Lectures)**

Electrical Wiring: Conduit wiring (basic idea of house hold wiring). Basics of wiring: Star and Delta Connections. Preparation of extension board, Wiring Materials (Basic information about the wiring components). **(2 Lectures)**

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PHY-H-GE-T-03: MECHANICS

Rotational Motion: Angular velocity and angular momentum. Torque. Conservation of angular momentum. **(5 Lectures)**

Elasticity: Hooke's law - Stress-strain diagram - Elastic moduli-Relation between elastic constants - Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants - Work done in stretching and work done in twisting a wire - Twisting couple on a cylinder - Determination of Rigidity modulus by static torsion – Torsional pendulum-Determination of Rigidity modulus and moment of inertia -q, *r j* and o by Searles method. **(8 Lectures)**

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Semester IV

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-CC-T-04: SOLID STATE PHYSICS

Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis - Central and Non-Central Elements. Unit Cell. Miller Indices. Reciprocal Lattice. Types of Lattices. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Atomic and Geometrical Factor.
(12 Lectures)
Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids. T_3 law **(10 Lectures)**

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Semester IV

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-09: ELEMENTS OF MODERN PHYSICS

Planck's quantum hypothesis, Planck's constant and light as a collection of photons; Blackbody Radiation: Quantum theory of Light; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson- Germer experiment. Wave description of particles by wave packets. Group and Phase velocities and relation between them. Two-Slit experiment with electrons. Probability. Wave amplitude and wave functions. **(14 Lectures)**

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Position measurement- gamma ray microscope thought experiment; Waveparticle duality, Heisenberg uncertainty principle (Uncertainty relations involving Canonical pair of variables): Derivation from Wave Packets impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle- application to virtual particles and range of an interaction. **(5 Lectures)**
Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of a wave function, probabilities and normalization; Probability and probability current densities in one dimension.
(10 Lectures)
One dimensional infinitely rigid box- energy eigenvalues and eigenfunctions, normalization; Quantum dot as example; Quantum mechanical scattering and tunnelling in one dimension-across a step potential & rectangular potential barrier. **(10 Lectures)**
Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, Liquid Drop model: semi-empirical mass formula and binding energy, Nuclear Shell Model and magic numbers. **(6 Lectures)**
Radioactivity: stability of the nucleus; Law of radioactive decay; Mean life and half-life; Alpha decay; Beta decay- energy released, spectrum and Pauli's prediction of neutrino; Gamma ray emission, energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus. (8 Lectures)
Fission and fusion- mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions driving stellar energy (brief qualitative discussions). **(3 Lectures)**
Lasers: Einstein's A and B coefficients. Metastable states. Spontaneous and Stimulated emissions. Optical Pumping and Population Inversion. Three- Level and Four-Level Lasers. Ruby Laser and He-Ne Laser. **(4 Lectures)**

PHY—H-SEC-T-02: RENEWABLE ENERGY AND ENERGY HARVESTING

Hydro Energy: Hydropower resources, Types of hydroelectric project (Run-of-river schemes, Storage schemes, Pumped-Storage schemes, Low head power plant, Medium head power plant, High head power station), environmental impact of hydro power sources. **(4 Lectures)**
Piezoelectric Energy harvesting: Introduction, Physics and characteristics of piezoelectric effect (No mathematical treatment), materials used for piezoelectricity , recent application of piezoelectric generators. **(5 Lectures)**
Electromagnetic Energy Harvesting: Linear generators (principle of linear generator, applications). **(2 Lecture)**

PHY-H-GE-T-04: WAVES AND OPTICS

Superposition of Two Collinear Harmonic oscillations: Linearity & Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats). **(4 Lectures)**
Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical

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Methods. Lissajous Figures (1:1 and 1:2) and their uses. **(2 Lectures)**
Waves Motion- General: Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity. Plane waves. Spherical waves, Wave intensity. (7 **Lectures)**

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Semester V

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-DSE-T-01: ELECTRICITY AND MAGNETISM

Electrostatics: Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere. Calculation of electric field from potential. Capacitance of an isolated spherical conductor. Parallel plate, spherical and cylindrical condenser. Energy per unit volume in electrostatic field. Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric. **(22 Lectures)**

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Semester V

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-12: SOLID STATE PHYSICS

Crystal Structure: Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis - Central and Non-Central Elements. Unit Cell. Miller Indices. Reciprocal Lattice. Types of Lattices. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Atomic and Geometrical Factor. **(12 Lectures)**
Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids, T^3 law. **(10 Lectures)**
Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia- and Paramagnetic Domains. Quantum Mechanical Treatment of Paramagnetism. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss. **(8 Lectures)**

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Dielectric Properties of Materials: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability. Normal and Anomalous Dispersion. Cauchy and Sellmeir relations. Langevin-Debye equation. Complex Dielectric Constant. Optical Phenomena. Application: Plasma Oscillations, Plasma Frequency, Plasmons, TO modes. **(8 Lectures)**
Ferroelectric Properties of Materials: Structural phase transition, Classification of crystals, Piezoelectric effect, Pyroelectric effect, Ferroelectric effect, Electrostrictive effect, Curie-Weiss Law, Ferroelectric domains, PE hysteresis loop. **(6 lectures)**
Elementary band theory: Kronig Penny model. Band Gap. Conductor, Semiconductor (P and N type) and insulator. Conductivity of Semiconductor, mobility, Hall Effect. Measurement of conductivity (04 probe method) & Hall coefficient. **(10 Lectures)**
Superconductivity: Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory (No derivation) **(6 Lectures)**

PHY-H-DSE-T-01: CLASSICAL DYNAMICS

Special Theory of Relativity: Geometrical interpretation of Space-time:Minkowski space. The invariant interval, light cone and world lines. Space-time diagrams. Intervals: space-like, time-like & light-like. Four velocity and acceleration. Elementary idea of tensors: Covariant and contravariant tensors, Metric and alternating tensors. Four-momentum and energymomentum relation. Doppler effect from a four-vector perspective. Concept of four-force. Conservation of four-momentum. Relativistic kinematics

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Semester VI

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-DSE-T-02: NUCLEAR AND PARTICLE PHYSICS

Detector for Nuclear Radiations: Gas detectors: estimation of electric field, mobility of particle, for ionization chamber and GM Counter. Basic principle of Scintillation Detectors and construction of photo-multiplier tube (PMT). Semiconductor Detectors (Si and Ge) for charge particle and photon detection (concept of charge carrier and mobility), neutron detector. **(6 Lectures)**
Particle Accelerators: Accelerator facility available in India: Van-de Graaff generator (Tandem accelerator), Linear accelerator, Cyclotron, Synchrotrons. **(5 Lectures)**
Particle physics: Particle interactions; basic features, types of particles and its families. Symmetries and Conservation Laws: energy and momentum, angular
momentum, parity, baryon number, Lepton number, Isospin, Strangeness and charm, concept of quark model, color quantum number and gluons. **(14 Lectures)**

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Semester VI

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-14: STATISTICAL MECHANICS

Classical Statistics: Macrostate & Microstate, Elementary Concept of Ensemble, Phase Space, Entropy and Thermodynamic Probability, Maxwell-Boltzmann Distribution Law, Partition Function, Thermodynamic Functions of an Ideal Gas, Classical Entropy Expression, Gibbs Paradox, Sackur Tetrode equation, Law of Equipartition of Energy (with proof) - Applications to Specific Heat and its Limitations, Thermodynamic Functions of a Two-Energy Levels System, Negative Temperature. **(18 Lectures)**

Classical Theory of Radiation: Properties of Thermal Radiation. Blackbody Radiation. Pure temperature dependence. Kirchhoff s law. Stefan-Boltzmann law: Thermodynamic proof. Radiation Pressure. Wien's Displacement law. Wien's Distribution Law. Saha's Ionization Formula. Rayleigh-Jean's Law. Ultraviolet Catastrophe. **(9 Lectures)**

Quantum Theory of Radiation: Spectral Distribution of Black Body Radiation. Planck's Quantum Postulates. Planck's Law of Blackbody Radiation: Experimental Verification. Deduction of (1) Wien's Distribution Law, (2) Rayleigh-Jeans Law, (3) Stefan-Boltzmann Law, (4) Wien's Displacement law from Planck's law. **(5 Lectures)**

Bose-Einstein Statistics: B-E distribution law, Thermodynamic functions of a strongly Degenerate Bose Gas, Bose Einstein condensation, properties of liquid He (qualitative description), Radiation as a photon gas and Thermodynamic functions of photon gas. Bose derivation of Planck's law. **(13 Lectures)**

Fermi-Dirac Statistics: Fermi-Dirac Distribution Law, Thermodynamic functions of a Completely and strongly Degenerate Fermi Gas, Fermi Energy, Electron gas in a Metal, Specific Heat of Metals, Relativistic Fermi gas, White Dwarf Stars, Chandrasekhar Mass Limit. **(15 Lectures)**

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Semester I

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-CC-T-01: MATHEMATICAL PHYSICS-I

Vector Calculus:

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Recapitulation of vectors: Properties of vectors under rotations. Scalar product and its invariance under rotations. Vector product, Scalar triple product and their interpretation in terms of area and volume respectively. Scalar and Vector fields.
Vector Differentiation: Directional derivatives and normal derivative. Gradient of a scalar field and its geometrical interpretation. Divergence and curl of a vector field. Del and Laplacian operators. Vector identities, Gradient, divergence, curl and Laplacian in spherical and cylindrical coordinates.
Vector Integration: Ordinary Integrals of Vectors. Multiple integrals, Jacobian. Notion of infinitesimal line, surface and volume elements. Line, surface and volume integrals of Vector fields. Flux of a vector field. Gauss' divergence theorem, Green's and Stokes Theorems and their applications (no rigorous proof)

PHY-H-CC-T-02: MECHANICS

Fundamentals of Dynamics: Reference frames. Inertial frames; Galilean transformations; Galilean invariance. Review of Newton's Laws of Motion. Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse. Momentum of variable-mass system: motion of rocket.
Work and Energy: Work and Kinetic Energy Theorem. Conservative and non-conservative forces. Potential Energy. Energy diagram. Stable and unstable equilibrium. Elastic potential energy. Force as gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy.

Special Theory of Relativity: Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum. Four Vectors (definition and examples only).

PHY-H-GE-T-01: MECHANICS

Vectors: Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter. **(4 Lectures)**
Laws of Motion: Frames of reference. Newton's Laws of motion. Dynamics of a system of particles. Centre of Mass. **(10 Lectures)**
Momentum and Energy: Conservation of momentum. Work and energy. Conservation of energy. Motion of rockets. **(6 Lectures)**
Speed Theory of Relativity: Constancy of speed of light. Postulates of Special Theory of Relativity. Length contraction. Time dilation. Relativistic addition of velocities.

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Semester I

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-CC-T-01: MECHANICS

Fundamentals of Dynamics: Reference frames. Inertial frames; Galilean transformations; Galilean invariance. Review of Newton's Laws of Motion. Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse. Momentum of variable-mass system: motion of rocket. **(6 Lectures)**

Work and Energy: Work and Kinetic Energy Theorem. Conservative and non-conservative forces. Potential Energy. Energy diagram. Stable and unstable equilibrium. Elastic potential energy. Force as gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy. **(4 Lectures)**

Special Theory of Relativity: Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum. Energy-Momentum Four Vector. **(10 Lectures)**

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Semester II

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-CC-T-03: ELECTRICITY AND MAGNETISM

Electric Field and Electric Potential:

Electric field: Electric field lines. Electric flux. Gauss' Law with applications to charge distributions with spherical, cylindrical and planar symmetry. **(6 Lectures)**

Conservative nature of Electrostatic Field. Electrostatic Potential. Laplace's and Poisson equations. The Uniqueness Theorem. Potential and Electric Field of a dipole. Force and Torque on a dipole.**(6 Lectures)**

Electrostatic energy of system of charges. Electrostatic energy of a charged sphere. Conductors in an electrostatic Field. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Parallel-plate capacitor. Capacitance of an isolated conductor. Method of Images and its application to: (1) Plane Infinite Sheet and (2) Sphere. **(10 Lectures)**

PHY-H-CC-T-04: WAVES AND OPTICS

Superposition of Two Harmonic Waves:

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Standing (Stationary) Waves in a String: Fixed and Free Ends. Analytical Treatment. Phase and Group Velocities. Changes with respect to Position and Time. Energy of Vibrating String. Transfer of Energy. Normal Modes of Stretched Strings. Plucked and Struck Strings. Melde's Experiment. Longitudinal Standing Waves and Normal Modes. Open and Closed Pipes. Superposition of N Harmonic Waves. **(7 Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence. **(3 Lectures)**

Interference: Division of amplitude and wavefront. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index. (**9 Lectures)**

Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer.

PHY-H-GE-T-02: WAVES AND OPTICS

Fluids: Surface Tension: Synclastic and anticlastic surface - Excess of pressure -Application to spherical and cylindrical drops and bubbles - variation of surface tension with temperature - Jaegar's method. Viscosity - Rate flow of liquid in a capillary tube - Poiseuille's formula - Determination of coefficient of viscosity of a liquid - Variations of viscosity of liquid with temperature- lubrication. **(6 Lectures)**

Sound: Simple harmonic motion - forced vibrations and resonance - Fourier's Theorem - Application to saw tooth wave and square wave - Intensity and loudness of sound - Decibels - Intensity levels - musical notes - musical scale. Acoustics of buildings: Reverberation and time of reverberation - Absorption coefficient - Sabine's formula - measurement of reverberation time - Acoustic aspects of halls and auditoria. **(6 Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. **(3 Lectures)**

Interference: Interference: Division of amplitude and division of wavefront. Young's Double Slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index.
(10 Lectures)

Michelson's Interferometer: (1) Idea of form of fringes (no theory needed), (2) Determination of wavelength, (3) Wavelength difference, (4) Refractive index, and (5) Visibility of fringes. (3 **Lectures)**

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FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-CC-T-02: WAVES AND OPTICS

Superposition of Two Harmonic Waves:
Standing (Stationary) Waves in a String: Fixed and Free Ends. Analytical Treatment. Phase and Group Velocities. Changes with respect to Position and Time. Energy of Vibrating String. Transfer of Energy. Normal Modes of Stretched Strings. Plucked and Struck Strings. Melde's Experiment. Longitudinal Standing Waves and Normal Modes. Open and Closed Pipes. Superposition of N Harmonic Waves. (7 **Lectures)**
Wave Optics: Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence. **(3 Lectures)**
Interference: Division of amplitude and wavefront. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index. **(9 Lectures)**
Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer. **(4 Lectures)**

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Semester III

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-CC-T-05: MATHEMATICAL PHYSICS-II

Fourier Series: Periodic functions. Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only). Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients. Complex representation of Fourier series. Expansion of functions with arbitrary period. Expansion of non-periodic functions over an interval. Even and odd functions and their Fourier expansions. Application. Summing of Infinite Series. Term-by-Term differentiation and integration of Fourier Series. Parseval Identity. **(14 Lectures)**
Frobenius Method and Special Functions: Singular Points of Second Order Linear Differential Equations and their importance. Frobenius method and its applications to differential equations. Legendre, Bessel, Hermite and Laguerre Differential Equations. Properties of Legendre Polynomials: Rodrigues Formula, Generating Function, Orthogonality. Simple recurrence relations. Expansion of function in a series of Legendre Polynomials. Bessel Functions of the First Kind: Generating Function, simple recurrence relations. Zeros of Bessel Functions and Orthogonality. **(24 Lectures)**
Some Special Integrals: Beta and Gamma Functions and Relation between them. Expression of Integrals in terms of Gamma Functions. Error Function (Probability Integral). **(4 Lectures)**
Theory of Errors: Systematic and Random Errors. Propagation of Errors. Normal Law of Errors. Standard and Probable Error. (**4 Lectures)**

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Partial Differential Equations: Solutions to partial differential equations, using separation of variables: Laplace's Equation in problems of rectangular, cylindrical and spherical symmetry. Wave equation and its solution for vibrational modes of a stretched string, rectangular and circular membranes**. (14 Lectures)**

Skill Enhancement Courses (Credit: 02 each)
PHY—H-SEC-T-01: ELECTRICAL CIRCUITS & NETWORK SKILLS

Basic Electricity Principles: Voltage, Current, Resistance, and Power. Ohm's law, Series, parallel, and series-parallel combinations. AC Electricity and DC Electricity. Familiarization with digital multimeter (name of the circuit elements and their ranges), Analog voltmeter and analog ammeter. **(6 Lectures)**

Generators and Transformers: DC Power sources (basic idea). AC and DC generators (basic principle of action). Inductance, capacitance, and impedance. Operation of transformers (Step-up and step-down). **(4 Lectures)**

PHY-H-GE-T-03: MECHANICS

Vectors: Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter. **(4 Lectures)**
Laws of Motion: Frames of reference. Newton's Laws of motion. Dynamics of a system of particles. Centre of Mass. **(10 Lectures)**
Momentum and Energy: Conservation of momentum. Work and energy. Conservation of energy. Motion of rockets. **(6 Lectures)**
Speed Theory of Relativity: Constancy of speed of light. Postulates of Special Theory of Relativity. Length contraction. Time dilation. Relativistic addition of velocities

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Semester III

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-CC-T-03: ELEMENTS OF MODERN PHYSICS

Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, Liquid Drop model: semi-empirical mass formula and binding energy, Nuclear Shell Model and magic numbers.
(6 Lectures)
Radioactivity: stability of the nucleus; Law of radioactive decay; Mean life and half-life; Alpha decay; Beta decay- energy released, spectrum and Pauli's prediction of neutrino; Gamma ray

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emission, energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus.
(8 Lectures)
Fission and fusion- mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions driving stellar energy (brief qualitative discussions).
(3 Lectures)
Lasers: Einstein's A and B coefficients. Metastable states. Spontaneous and Stimulated emissions. Optical Pumping and Population Inversion. Three-Level and Four-Level Lasers. Ruby Laser and He-Ne Laser. **(4 Lectures)**

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Semester IV

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-CC-T-08: MATHEMATICAL PHYSICS-III

Complex Analysis: Brief Revision of Complex Numbers and their Graphical Representation. Euler's formula, De Moivre's theorem, Roots of Complex Numbers. Functions of Complex Variables. Analyticity and Cauchy-Riemann Conditions. Examples of analytic functions. Singular functions: poles and branch points, order of singularity, branch cuts. Integration of a function of a complex variable. Cauchy's Inequality. Cauchy's Integral formula. Simply and multiply connected region. Laurent and Taylor's expansion. Residues and Residue Theorem. Application in solving Definite Integrals. **(30 Lectures)**
Integrals Transforms:
Fourier Transforms: Fourier Integral theorem. Fourier Transform. Examples. Fourier transform of trigonometric, Gaussian, finite wave train & other functions. Representation of Dirac delta function as a Fourier Integral. Fourier transform of derivatives, Inverse Fourier transform, Convolution theorem. Properties of Fourier transforms (translation, change of scale, complex conjugation, etc.). Three dimensional Fourier transforms with examples. Application of Fourier Transforms to differential equations: One dimensional Wave and Diffusion/Heat Flow Equations. **(15 Lectures)**
Laplace Transforms: Laplace Transform (LT) of Elementary functions. Properties of LTs: Change of Scale Theorem, Shifting Theorem. LTs of Derivatives and Integrals of Functions, Derivatives and Integrals of LTs. LT of Unit Step function, Dirac Delta function, Periodic Functions. Convolution Theorem. Inverse LT. Application of Laplace Transforms to Differential Equations: Damped Harmonic Oscillator, Simple Electrical Circuits. **(15 Lectures)**

PHY—H-SEC-T-02: RENEWABLE ENERGY AND ENERGY HARVESTING

Fossil fuels and Alternate Sources of energy: Fossil fuels and nuclear energy, their limitation, need of renewable energy, non-conventional energy sources. **(3 Lectures)**

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Solar energy: Solar energy, It's importance, storage of solar energy (Thermal storage and Electrical storage, Mechanical storage), solar pond (Basic idea), Principle of operation of non convective solar pond, applications of solar pond, solar water heating, flat plate collector, solar cooker (basic idea, Design principle and Constructional details of box type solar cooker and its limitation), solar furnace, solar green houses (basic idea, types and advantage), Solar Cell principle (No mathematical treatment), application of solar photovoltaic system, advantage and disadvantage of Photovoltaic solar energy conversion. **(6 Lectures)**

PHY-H-GE-T-04: WAVES AND OPTICS

Fluids: Surface Tension: Synclastic and anticlastic surface - Excess of pressure -Application to spherical and cylindrical drops and bubbles - variation of surface tension with temperature - Jaegar's method. Viscosity - Rate flow of liquid in a capillary tube - Poiseuille's formula - Determination of coefficient of viscosity of a liquid - Variations of viscosity of liquid with temperature- lubrication. **(6 Lectures)**

Sound: Simple harmonic motion - forced vibrations and resonance - Fourier's Theorem - Application to saw tooth wave and square wave - Intensity and loudness of sound - Decibels - Intensity levels - musical notes - musical scale. Acoustics of buildings: Reverberation and time of reverberation - Absorption coefficient - Sabine's formula - measurement of reverberation time - Acoustic aspects of halls and auditoria. **(6 Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. **(3 Lectures)**

Interference: Interference: Division of amplitude and division of wavefront. Young's Double Slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index.
(10 Lectures)

Michelson's Interferometer: (1) Idea of form of fringes (no theory needed), (2) Determination of wavelength, (3) Wavelength difference, (4) Refractive index, and (5) Visibility of fringes. (3 **Lectures)**

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Semester IV

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-CC-T-04: SOLID STATE PHYSICS

Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia- and Paramagnetic Domains. Quantum Mechanical Treatment of

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Paramagnetism. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss. **(8 Lectures)**

Dielectric Properties of Materials: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability. Normal and Anomalous Dispersion. Cauchy and Sellmeir relations. Langevin-Debye equation. Complex Dielectric Constant. Optical Phenomena. Application: Plasma Oscillations, Plasma Frequency, Plasmons, TO modes. **(8 Lectures)**

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Semester V

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-DSE-T-02: NUCLEAR AND PARTICLE PHYSICS

General Properties of Nuclei: Constituents of nucleus and their Intrinsic properties, quantitative facts about mass, radii, charge density (matter density), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A plot, angular momentum, parity, magnetic moment, electric moments, nuclear excites states. **(10 Lectures)**

Nuclear Models: Liquid drop model approach, semi empirical mass formula and significance of its various terms, condition of nuclear stability, two nucleon separation energies, Fermi gas model (degenerate fermion gas, nuclear symmetry potential in Fermi gas), evidence for nuclear shell structure, nuclear magic numbers, basic assumption of shell model, concept of mean field, residual interaction, concept of nuclear force. (12 **Lectures)**

Radioactivity decay:(a) Alpha decay: basics of α-decay processes, theory of a-emission, Gamow factor, Geiger Nuttall law, α-decay spectroscopy. (b) (β- decay: energy kinematics for (β-decay, positron emission, electron capture, neutrino hypothesis. (c) Gamma decay: Gamma rays emission & kinematics, internal conversion. **(9 Lectures)**

Nuclear Reactions: Types of Reactions, Conservation Laws, kinematics of reactions, Q-value, reaction rate, reaction cross section, Concept of compound and direct Reaction, resonance reaction, Coulomb scattering (Rutherford scattering). **(8 Lectures)**

Nuclear Astrophysics: Early universe, primordial nucleosynthesis (particle nuclear interactions), stellar nucleosynthesis, concept of gamow window, heavy element production: r- and s- process path. **(5 Lectures)**

Interaction of Nuclear Radiation with matter: Energy loss due to ionization (Bethe-Block formula), energy loss of electrons, Cerenkov radiation. Gamma ray interaction through matter, photoelectric effect, Compton scattering, pair production, neutron interaction with matter. **(6 Lectures)**

Detector for Nuclear Radiations: Gas detectors: estimation of electric field, mobility of particle, for ionization chamber and GM Counter. Basic principle of Scintillation Detectors and construction of photo-multiplier tube (PMT). Semiconductor Detectors (Si and Ge) for charge particle and photon detection (concept of charge carrier and mobility), neutron detector. **(6 Lectures)**

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Particle Accelerators: Accelerator facility available in India: Van-de Graaff generator (Tandem accelerator), Linear accelerator, Cyclotron, Synchrotrons. **(5 Lectures)**
Particle physics: Particle interactions; basic features, types of particles and its families. Symmetries and Conservation Laws: energy and momentum, angular momentum, parity, baryon number, Lepton number, Isospin, Strangeness and charm, concept of quark model, color quantum number and gluons. **(14 Lectures)**

PHY-H-DSE-T-01: CLASSICAL DYNAMICS

Classical Mechanics of Point Particles: Generalised coordinates and velocities. Hamilton's Principle, Lagrangian and Euler-Lagrange equations. Applications to simple systems such as coupled oscillators. Canonical momenta & Hamiltonian. Hamilton's equations of motion. Applications: Hamiltonian for a harmonic oscillator, particle in a central force field. Poisson brackets. Canonical transformations.

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Semester V

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-DSE-T-01: ELECTRICITY AND MAGNETISM

Vector Analysis: Scalar and Vector product, gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gauss-divergence theorem and Stoke's theorem of vectors (statement only). **(12 Lectures)**
Electromagnetic Induction: Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils. Energy stored in magnetic field. **(6 Lectures)**

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Semester VI

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-DSE-T-03: NANO MATERIALS AND APPLICATIONS

NANOSCALE SYSTEMS: Length scales in physics, Nanostructures: 1D, 2D and 3D nanostructures (nanodots, thin films, nanowires, nanorods), Band structure and density of states of materials at nanoscale, Size Effects in nano systems, Quantum confinement: Applications of

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Schrodinger equation- Infinite potential well, potential step, potential box, quantum confinement of carriers in 3D, 2D, 1D nanostructures and its consequences. **(12 Lectures)**

SYNTHESIS OF NANOSTRUCTURE MATERIALS: Top down and Bottom up approach, Photolithography. Ball milling. Gas phase condensation. Vacuum deposition. Physical vapor deposition (PVD): Thermal evaporation, Ebeam evaporation, Pulsed Laser deposition. Chemical vapor deposition (CVD). Sol-Gel. Electro deposition. Spraypyrolysis. Hydrothermal synthesis. Preparation through colloidal methods. MBE growth of quantum dots. **(10 Lectures)**

CHARACTERIZATION: X-Ray Diffraction. Optical Microscopy. Scanning Electron Microscopy. Transmission Electron Microscopy. Atomic Force Microscopy. Scanning Tunneling Microscopy. **(10 Lectures)**

OPTICAL PROPERTIES: Coulomb interaction in nanostructures. Concept of dielectric constant for nanostructures and charging of nanostructure. Quasi-particles and excitons. Excitons in direct and indirect band gap semiconductor nanocrystals. Quantitative treatment of quasi-particles and excitons, charging effects. Radiative processes: General formalizationabsorption, emission and luminescence. Optical properties of heterostrctures and nanostructures. **(16 Lectures)**

ELECTRON TRANSPORT: Carrier transport in nanostrcutures. Coulomb blockade effect, thermionic emission, tunneling and hoping conductivity. Defects and impurities: Deep level and surface defects. **(9 Lectures)**

APPLICATIONS: Applications of nanoparticles, quantum dots, nano wires and thin films for photonic devices (LED, solar cells). Single electron devices (no derivation). CNT based transistors. Nanomaterial Devices: Quantum dots heterostructure lasers, optical switching and optical data storage. Magnetic quantum well; magnetic dots - magnetic data storage. Micro Electromechanical Systems (MEMS), Nano Electromechanical Systems (NEMS). **(18 Lectures)**

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Semester VI

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-DSE-T-02: NUCLEAR AND PARTICLE PHYSICS

General Properties of Nuclei: Constituents of nucleus and their Intrinsic properties, quantitative facts about mass, radii, charge density (matter density), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A plot, angular momentum, parity, magnetic moment, electric moments, nuclear excites states. **(10 Lectures)**

Nuclear Models: Liquid drop model approach, semi empirical mass formula and significance of its various terms, condition of nuclear stability, two nucleon separation energies, Fermi gas model (degenerate fermion gas, nuclear symmetry potential in Fermi gas), evidence for nuclear shell structure, nuclear magic numbers, basic assumption of shell model, concept of mean field, residual interaction, concept of nuclear force. (12 **Lectures)**

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Semester I

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-CC-T-01: MECHANICS

Gravitation and Central Force Motion: Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere. (3 **Lectures)** Motion of a particle under a central force field. Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS). Physiological effects on astronauts. **(6 Lectures)**
Oscillations: SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor. (7 **Lectures)**
Non-Inertial Systems: Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of Physics in rotating coordinate systems. Centrifugal force. Coriolis force and its applications. Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems. **(4 Lectures)**

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Semester I

FACULTY NAME:SIRAJUL SK, DUMKAL COLLEGE

PHY-H-CC-T-01: MATHEMATICAL PHYSICS-I

Recapitulation: Limits, continuity, average and instantaneous quantities, differentiation. Plotting functions. Intuitive ideas of continuous, differentiable, etc. functions and plotting of curves. Approximation: Taylor and binomial series (statements only). First Order Differential Equations and Integrating Factor.
Second Order Differential equations: Homogeneous Equations with constant coefficients. Wronskian and general solution. Statement of existence and Uniqueness Theorem for Initial Value Problems. Particular Integral.
Calculus of functions of more than one variable: Partial derivatives, exact and inexact differentials. Integrating factor, with simple illustration. Constrained Maximization using Lagrange Multipliers.

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PHY-H-CC-T-02: MECHANICS

Gravitation and Central Force Motion: Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere. (3**Lectures)**
Motion of a particle under a central force field: Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS). Physiological effectson astronauts. (**6 Lectures)**
Oscillations: SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor. (7 **Lectures)**
Non-Inertial Systems: Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of in rotating coordinate systems. Centrifugal force. Coriolis force and its applications. Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems.

PHY-H-GE-T-01: MECHANICS

Ordinary Differential Equations: 1st order homogeneous differential equations. 2nd order homogeneous differential equations with constant coefficients. **(6 Lectures)**
Gravitation: Newton's Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's Laws (statement only). Satellite in circular orbit and applications. Geosynchronous orbits. Basic idea of global positioning system (GPS). Weightlessness. Physiological effects on astronauts. **(8 Lectures)**
Oscillations: Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages. Damped oscillations. (6 **Lectures)**

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Semester II

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-H-CC-T-03: ELECTRICITY AND MAGNETISM

Magnetic Properties of Matter:
Magnetization vector (M). Magnetic Intensity(H). Magnetic Susceptibility and permeability. Relation between B, H, M. B-H curve and hysteresis. **(3 Lectures)**
Electromagnetic Induction:
Faraday's Law. Lenz's Law. Self Inductance and Mutual Inductance. Reciprocity Theorem. Energy stored in a Magnetic Field. **(5 Lectures)**
Transients: Growth and decay of currents and voltages in L-R, C-R and L-C-R circuits; electrical oscillations in L-C circuits. **(2 Lectures)**

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Electrical Circuits: AC Circuits: Kirchhoff s laws for AC circuits. Complex Reactance and Impedance. Series LCR Circuit: (1) Resonance, (2) Power Dissipation and (3) Quality Factor, and (4) Band Width. Parallel LCR Circuit. **(4 Lectures)**
Network theorems: Ideal Constant-voltage and Constant-current Sources. Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem. Applications to dc circuits. **(4 Lectures)**
Ballistic Galvanometer: Torque on a current Loop. Ballistic Galvanometer: Current and Charge Sensitivity. Electromagnetic damping. Logarithmic damping. CDR. **(3 Lectures)**

PHY-H-CC-T-04: WAVES AND OPTICS

Diffraction: Kirchhoff s Integral Theorem, Fresnel-Kirchhoff s Integral formula and its application to rectangular slit. **(5 Lectures)**
Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope. Double slit. Multiple slits. Diffraction grating. Resolving power of grating. **(8 Lectures)**
Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire. (7 **Lectures)**

PHY-H-GE-T-02: WAVES AND OPTICS

Diffraction: Fraunhofer diffraction- Single slit; Double Slit. Multiple slits and Diffraction grating. Fresnel Diffraction: Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis.
(14 Lectures)
Polarization: Transverse nature of light waves. Plane polarized light - production and analysis. Circular and elliptical polarization. **(5 Lectures)**

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Semester III

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-CC-T-03: ELEMENTS OF MODERN PHYSICS

Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of a wave function, probabilities and normalization; Probability and probability current densities in one dimension.

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(10 Lectures)
One dimensional infinitely rigid box- energy eigenvalues and eigenfunctions, normalization; Quantum dot as example; Quantum mechanical scattering and tunnelling in one dimension-across a step potential & rectangular potential barrier.
(10 Lectures)

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Semester III

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-H-CC-T-07: DIGITAL SYSTEMS AND APPLICATIONS

Introduction to CRO: Block Diagram of CRO. Electron Gun, Deflection System and Time Base. Deflection Sensitivity. Applications of CRO: (1) Study of Waveform, (2) Measurement of Voltage, Current, Frequency, and Phase Difference. **(3 Lectures)**
Integrated Circuits (Qualitative treatment only): Active & Passive components. Discrete components. Wafer. Chip. Advantages and drawbacks of ICs. Scale of integration: SSI, MSI, LSI and VLSI (basic idea and definitions only). Classification of ICs. Examples of Linear and Digital ICs. **(3 Lectures)**
Digital Circuits: Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion. BCD, Octal and Hexadecimal numbers. AND, OR and NOT Gates (realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates and application as Parity Checkers. **(6 Lectures)**
Boolean algebra: De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Idea of Minterms and Maxterms. Conversion of a Truth table into Equivalent Logic Circuit by (1) Sum of Products Method and (2) Karnaugh Map. **(6 Lectures)**
Data processing circuits: Basic idea of Multiplexers, De-multiplexers, Decoders, Encoders.**(4 Lectures)**
Arithmetic Circuits: Binary Addition. Binary Subtraction using 2's Complement. Half and Full Adders. Half & Full Subtractors, 4-bit binary Adder/Subtractor. **(5 Lectures)**
Sequential Circuits: SR, D, and JK Flip-Flops. Clocked (Level and Edge Triggered) Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop. M/S JK Flip-Flop. **(6 Lectures)**
Timers: IC 555: block diagram and applications: Astable multivibrator and Monostable multivibrator. **(3 Lectures)**
Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits). **(2 Lectures)**
Counters(4 bits): Ring Counter. Asynchronous counters, Decade Counter. Synchronous Counter. (4 Lectures)
Computer Organization: Input/Output Devices. Data storage (idea of RAM and ROM). Computer memory. Memory organization & addressing. Memory Interfacing. Memory Map. **(6 Lectures)**
Intel 8085 Microprocessor Architecture: Main features of 8085. Block diagram. Components. Pin-out diagram. Buses. Registers. ALU. Memory. Stack memory. Timing & Control circuitry. Timing states. Instruction cycle, Timing diagram of MOV and MVI. **(8 Lectures)**

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Introduction to Assembly Language: 1 byte, 2 byte & 3 byte instructions. **(4 Lectures)**

Skill Enhancement Courses (Credit: 02 each)

PHY—H-SEC-T-01: ELECTRICAL CIRCUITS & NETWORK SKILLS

Understanding Electrical Circuits: Main electric circuit elements and their combination. Rules to analyze DC sourced electrical circuits. Current and voltage drop across the DC circuit elements. Single-phase and three-phase alternating current sources (principle of generation, output wave form, advantage of using three-phase). Rules to analyze AC sourced electrical circuits. Real, imaginary and complex power components of AC source. Power factor. Saving energy and money. **(8Lectures)**

Electric Motors: Single-phase, three-phase & DC motors. Basic design. Speed & power of ac motor. **(3 Lectures**

PHY-H-GE-T-03: MECHANICS

Ordinary Differential Equations: 1st order homogeneous differential equations. 2nd order homogeneous differential equations with constant coefficients. **(6 Lectures)**
Gravitation: Newton's Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's Laws (statement only). Satellite in circular orbit and applications. Geosynchronous orbits. Basic idea of global positioning system (GPS). Weightlessness. Physiological effects on astronauts. **(8 Lectures)**
Oscillations: Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages. Damped oscillations. (6 **Lectures)**

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Semester IV

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-G-CC-T-04: SOLID STATE PHYSICS

Ferroelectric Properties of Materials: Structural phase transition, Classification of crystals, Piezoelectric effect, Pyroelectric effect, Ferroelectric effect, Electrostrictive effect, Curie-Weiss Law, Ferroelectric domains, PE hysteresis loop. **(6 lectures)**

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Elementary band theory: Kronig Penny model. Band Gap. Conductor, Semiconductor (P and N type) and insulator. Conductivity of Semiconductor, mobility, Hall Effect. Measurement of conductivity (04 probe method) & Hall coefficient. **(10 Lectures)**
Superconductivity: Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory (No derivation) **(6 Lectures)**

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Semester IV

FACULTY NAME: SIRAJUL SK, DUMKAL COLLEGE

PHY-H-CC-T-10: ANALOG SYSTEMS AND APPLICATIONS

Semiconductor Diodes: P and N type semiconductors. Energy Level Diagram. Conductivity and Mobility, Concept of Drift velocity. PN Junction Fabrication (Simple Idea). Barrier Formation in PN Junction Diode. Static and Dynamic Resistance. Current Flow Mechanism in Forward and Reverse Biased Diode. Drift Velocity. Derivation for Barrier Potential, Barrier Width and Current for Step Junction. **(10 Lectures)**
Two-terminal Devices and their Applications: (1) Rectifier Diode: Halfwave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency, (2) Zener Diode and Voltage Regulation. Principle and structure of (1) LEDs, (2) Photodiode, (3) Solar Cell. **(6 Lectures)**
Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC Configurations. Current gains α and β, Relations between α and β. Load Line analysis of Transistors. DC Load line and Q-point. Physical Mechanism of Current Flow. Active, Cutoff and Saturation Regions.
(6 Lectures)
Amplifiers: Transistor Biasing and Stabilization Circuits. Fixed Bias and Voltage Divider Bias. Transistor as 2-port Network. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Classification of Class A, B & C Amplifiers. **(10 Lectures)**
Coupled Amplifier: RC-coupled amplifier and its frequency response. **(4 Lectures)**
Feedback in Amplifiers: Effects of Positive and Negative Feedback on Input Impedance, Output Impedance, Gain, Stability, Distortion and Noise. (**4 Lectures)**
Sinusoidal Oscillators: Barkhausen's Criterion for self-sustained oscillations. RC Phase shift oscillator, determination of Frequency. Hartley & Colpitts oscillators. **(4 Lectures)**
Operational Amplifiers (Black Box approach): Characteristics of an Ideal and Practical Op-Amp. (IC 741) Open-loop and Closed-loop Gain. Frequency Response. CMRR. Slew Rate and concept of Virtual ground. (**4 Lectures)**
Applications of Op-Amps: (1) Inverting and non-inverting amplifiers, (2) Adder, (3)Subtractor, (4) Differentiator, (5) Integrator, (6) Log amplifier, (7) Zero crossing detector (8) Wein bridge oscillator.
(9 Lectures)

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Conversion: Resistive network (Weighted and R-2R Ladder). Accuracy and Resolution. A/D Conversion (successive approximation) **(3 Lectures)**

PHY—H-SEC-T-02: RENEWABLE ENERGY AND ENERGY HARVESTING

Hydro Energy: Hydropower resources, Types of hydroelectric project (Run-of-river schemes, Storage schemes, Pumped-Storage schemes, Low head power plant, Medium head power plant, High head power station), environmental impact of hydro power sources. **(4 Lectures)**
Piezoelectric Energy harvesting: Introduction, Physics and characteristics of piezoelectric effect (No mathematical treatment), materials used for piezoelectricity , recent application of piezoelectric generators. **(5 Lectures)**
Electromagnetic Energy Harvesting: Linear generators (principle of linear generator, applications). **(2 Lecture)**

UNDER-GRADUATE COURSE IN PHYSICS (HONOURS) THE ACADEMIC SESSION 2019-20

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3rd Year

FACULTY NAME:SIRAJUL SK, DUMKAL COLLEGE

QUANTUM MECHANICS AND APPLICATIONS

Time dependent Schrodinger equation: Time dependent Schrodinger equation and dynamical evolution of a quantum state; Properties of Wave Function. Linearity and Superposition Principles. Eigenvalues and Eigenfunctions. Position, momentum and Energy operators; commutator of position and momentum operators; Hermitian Operators, Expectation values of position and momentum. Wave Function of a Free Particle. (8 **Lectures)**
Time independent Schrodinger equation-Hamiltonian, stationary states and energy eigenvalues; expansion of an arbitrary wavefunction as a linear combination of energy eigenfunctions; General solution of the time dependent Schrodinger equation in terms of linear combinations of stationary states. (5 **Lectures)**
General discussion of bound states in an arbitrary potential- continuity of wave function, boundary condition and emergence of discrete energy levels; Quantum mechanics of simple harmonic oscillator-energy levels and energy eigenfunctions using Frobenius method; Hermite polynomials; ground state, zero point energy & uncertainty principle. **(10 Lectures)**
Quantum theory of hydrogen-like atoms: time independent Schrodinger equation in spherical polar coordinates; separation of variables for second order partial differential equation; angular momentum operator & quantum numbers; Radial wavefunctions from Frobenius method; shapes of the probability densities for ground & first excited states; Orbital angular momentum quantum numbers l and m; s, p, d,..shells. **(11 Lectures)**

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Atoms in Electric & Magnetic Fields: Electron angular momentum. Space quantization. Electron Spin and Spin Angular Momentum. Larmor's Theorem. Spin Magnetic Moment. Stern-Gerlach Experiment. Zeeman Effect: Electron Magnetic Moment and Magnetic Energy, Gyromagnetic Ratio and Bohr Magneton. **(11 Lectures)**
Atoms in External Magnetic Fields:- Normal and Anomalous Zeeman Effect. Paschen Back and Stark Effect (Qualitative Discussion only). **(5 Lectures)**
Many electron atoms: Pauli's Exclusion Principle. Symmetric & Antisymmetric Wave Functions. Periodic table. Fine structure. Spin orbit coupling. Spectral Notations for Atomic States. Total angular momentum. Vector Model. Spin-orbit coupling in atoms- L-S and J-J couplings. Hund's Rule. Term symbols. Spectra of Hydrogen and Alkali Atoms (Na etc.). **(10 Lectures**

ELECTROMAGNETIC THEORY

Maxwell Equations: Review of Maxwell's equations. Displacement Current. Vector and Scalar Potentials. Gauge Transformations: Lorentz and Coulomb Gauge. Boundary Conditions at Interface between Different Media. Wave Equations. Plane Waves in Dielectric Media. Poynting Theorem and Poynting Vector. Electromagnetic (EM) Energy Density. Physical Concept of Electromagnetic Field Energy Density, Momentum Density and Angular Momentum Density. **(12 Lectures)**
EM Wave Propagation in Unbounded Media: Plane EM waves through vacuum and isotropic dielectric medium, transverse nature of plane EM waves, refractive index and dielectric constant, wave impedance. Propagation through conducting media, relaxation time, skin depth. Wave propagation through dilute plasma, electrical conductivity of ionized gases, plasma frequency, refractive index, skin depth, application to propagation through ionosphere. **(10 Lectures)**
EM Wave in Bounded Media: Boundary conditions at a plane interface between two media. Reflection & Refraction of plane waves at plane interface between two dielectric media-Laws of Reflection & Refraction. Fresnel's Formulae for perpendicular & parallel polarization cases, Brewster's law. Reflection & Transmission coefficients. Total internal reflection, evanescent waves. Metallic reflection (normal incidence) **(10 Lectures)**
Polarization of Electromagnetic Waves: Description of Linear, Circular and Elliptical Polarization. Propagation of E.M. Waves in Anisotropic Media. Symmetric Nature of Dielectric Tensor. Fresnel's Formula. Uniaxial and Biaxial Crystals. Light Propagation in Uniaxial Crystal. Double Refraction. Polarization by Double Refraction. Nicol Prism. Ordinary & extraordinary refractive indices. Production & detection of Plane, Circularly and Elliptically Polarized Light. Phase Retardation Plates: Quarter-Wave and Half-Wave Plates. Babinet Compensator and its Uses. Analysis of Polarized Light. **(12 Lectures)**
Rotatory Polarization: Optical Rotation. Biot's Laws for Rotatory Polarization. Fresnel's Theory of optical rotation. Calculation of angle of rotation. Experimental verification of Fresnel's theory. Specific rotation. Laurent's half-shade polarimeter. **(5 Lectures)**
Wave Guides: Planar optical wave guides. Planar dielectric wave guide. Condition of continuity at interface. Phase shift on total reflection. Eigenvalue equations. Phase and group velocity of guided waves. Field energy and Power transmission. **(8 Lectures)**
Optical Fibres:- Numerical Aperture. Step and Graded Indices (Definitions Only). Single and Multiple Mode Fibres (Concept and Definition Only). **(3 Lectures)**

ANALOG SYSTEMS AND APPLICATIONS

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Semiconductor Diodes: P and N type semiconductors. Energy Level Diagram. Conductivity and Mobility, Concept of Drift velocity. PN Junction Fabrication (Simple Idea). Barrier Formation in PN Junction Diode. Static and Dynamic Resistance. Current Flow Mechanism in Forward and Reverse Biased Diode. Drift Velocity. Derivation for Barrier Potential, Barrier Width and Current for Step Junction. **(10 Lectures)**

Two-terminal Devices and their Applications: (1) Rectifier Diode: Halfwave Rectifiers. Centre-tapped and Bridge Full-wave Rectifiers, Calculation of Ripple Factor and Rectification Efficiency, (2) Zener Diode and Voltage Regulation. Principle and structure of (1) LEDs, (2) Photodiode, (3) Solar Cell. **(6 Lectures)**

Bipolar Junction transistors: n-p-n and p-n-p Transistors. Characteristics of CB, CE and CC 21

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Semester I

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-01: MATHEMATICAL PHYSICS-I

Orthogonal Curvilinear Coordinates:

Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems. (4 **Lectures)**

Matrices: Addition and Multiplication of Matrices. Null Matrices. Diagonal, Scalar and Unit Matrices. Transpose of a Matrix. Symmetric and Skew-Symmetric Matrices. Conjugate of a Matrix. Hermitian and Skew- Hermitian Matrices. Singular and Non-Singular matrices. Orthogonal and Unitary Matrices. Trace of a Matrix. Eigen-values and Eigenvectors (Degenerate and non-degenerate). Cayley-Hamiliton Theorem. Diagonalization of Matrices. Solutions of Coupled Linear Ordinary homogeneous Differential Equations. Functions of a Matrix. (6 **Lectures)**

Introduction to probability:

Independent random variables: Sample space and Probability distribution functions. Binomial, Gaussian, and Poisson distribution with examples. Mean and variance. **(5 Lectures)**

Dirac Delta function and its properties: (2)

Definition of Dirac delta function. Representation as limit of a Gaussian function and rectangular function. Properties of Dirac delta function.

PHY-H-CC-T-02: MECHANICS

Collisions: Elastic and inelastic collisions between particles. Centre of Mass and Laboratory frames.

Rotational Dynamics: Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation.

Elasticity: Relation between Elastic constants. Twisting torque on a Cylinder or Wire.

Fluid Motion: Kinematics of Moving Fluids: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube. Euler's Equation. Bernoulli's Theorem.

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PHY-H-GE-T-01: MECHANICS

Rotational Motion: Angular velocity and angular momentum. Torque. Conservation of angular momentum. **(5 Lectures)**

Elasticity: Hooke's law - Stress-strain diagram - Elastic moduli-Relation between elastic constants - Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants - Work done in stretching and work done in twisting a wire - Twisting couple on a cylinder - Determination of Rigidity modulus by static torsion – Torsional pendulum-Determination of Rigidity modulus and moment of inertia -q, *r j* and o by Searles method. **(8 Lectures)**

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Semester II

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-03: ELECTRICITY AND MAGNETISM

Dielectric Properties of Matter:
Electric Field in matter. Polarization, Polarization Charges. Electrical Susceptibility and Dielectric Constant. Capacitor (parallel plate, spherical, cylindrical) filled with dielectric. Displacement vector D. Relations between E, P and D. Gauss' Law in dielectrics. **(8 Lectures)**

Magnetic Field:
Magnetic force between current elements and definition of Magnetic Field B. Biot-Savart's Law and its simple applications: straight wire and circular loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital Law and its application to (1) Solenoid and (2) Toroid. Properties of B: curl and divergence. Vector Potential. Magnetic Force on (1) point charge (2) current carrying wire (3) between current elements. Torque on a current loop in a uniform Magnetic Field. **(9 Lectures)**

PHY-H-CC-T-04: WAVES AND OPTICS

Superposition of Collinear Harmonic oscillations: Linearity and Superposition Principle. Superposition of two collinear oscillations having equal frequencies and (2) different frequencies (Beats). Superposition of N collinear Harmonic Oscillations with (1) equal phase differences and equal frequency differences. **(5 Lectures)**

Superposition of two perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses. **(2 Lectures)**

Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves. Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave. Water Waves: Ripple and Gravity Waves
(4 **Lectures)**

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Velocity of Waves: Velocity of Transverse Vibrations of Stretched Strings. Velocity of Longitudinal Waves in a Fluid in a Pipe. Newton's Formula for Velocity of Sound. Laplace's Correction.**(6 Lectures)**

PHY-H-GE-T-02: WAVES AND OPTICS

Superposition of Two Collinear Harmonic oscillations: Linearity & Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats). **(4 Lectures)**

Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses. **(2 Lectures)**

Waves Motion- General: Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity. Plane waves. Spherical waves, Wave intensity. (7 **Lectures)**

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Semester III

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-06: THERMAL PHYSICS

Introduction to Thermodynamics

Zeroth and First Law of Thermodynamics: Extensive and intensive Thermodynamic Variables, Thermodynamic Equilibrium, Zeroeth Law of Thermodynamics & Concept of Temperature, Concept of Work & Heat, State Functions, First Law of Thermodynamics and its differential form, Internal Energy, First Law & various processes, Applications of First Law: General Relation between CP and CV, Work Done during Isothermal and Adiabatic Processes, Compressibility and Expansion Co-efficient. (8 **Lectures)**

Second Law of Thermodynamics: Reversible and Irreversible process with examples. Conversion of Work into Heat and Heat into Work. Heat Engines. Carnot's Cycle, Carnot engine & efficiency. Refrigerator & coefficient of performance, 2nd Law of Thermodynamics: Kelvin-Planck and Clausius Statements and their Equivalence. Carnot's Theorem. Applications of Second Law of Thermodynamics: Thermodynamic Scale of Temperature and its Equivalence to Perfect Gas Scale. (10 **Lectures)**

Entropy: Concept of Entropy, Clausius Theorem. Clausius Inequality, Second Law of Thermodynamics in terms of Entropy. Entropy of a perfect gas. Principle of Increase of Entropy. Entropy Changes in Reversible and Irreversible processes with examples. Entropy of the Universe. Entropy Changes in Reversible and Irreversible Processes. Principle of Increase of Entropy. Temperature-Entropy diagrams for Carnot's Cycle. Third Law of Thermodynamics. Unattainability of Absolute Zero. (7 **Lectures)**

Thermodynamic Potentials: Extensive and Intensive Thermodynamic Variables.Thermodynamic Potentials: Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy. Their Definitions, Properties and Applications. Surface Films and Variation of Surface Tension with Temperature.

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Magnetic Work, Cooling due to adiabatic demagnetization, First and second order Phase Transitions with examples, Clausius Clapeyron Equation and Ehrenfest equations. (7 **Lectures)**
Maxwell's Thermodynamic Relations: Derivations and applications of Maxwell's Relations, Maxwell's Relations:(1) Clausius Clapeyron equation, (2) Values of $C_p - C_v$, (3) Tds Equations, (4) Joule-Kelvin coefficient for Ideal and Van der Waal Gases, (5) Energy equations, (6) Change of Temperature during Adiabatic Process. (7 **Lectures)**
Kinetic Theory of Gases Distribution of Velocities: Maxwell-Boltzmann Law of Distribution of Velocities in an Ideal Gas and its Experimental Verification. Doppler Broadening of Spectral Lines and Stern's Experiment. Mean, RMS and Most Probable Speeds. Degrees of Freedom. Law of Equipartition of Energy (No proof required). Specific heats of Gases. (7 **Lectures)**
Molecular Collisions: Mean Free Path. Collision Probability. Estimates of Mean Free Path. Transport Phenomenon in Ideal Gases: (1) Viscosity, (2) Thermal Conductivity and (3) Diffusion. Brownian Motion and its Significance. **(4 Lectures)**
Real Gases: Behavior of Real Gases: Deviations from the Ideal Gas Equation. The Virial Equation. Andrew's Experiments on CO_2 Gas. Critical Constants. Continuity of Liquid and Gaseous State. Vapour and Gas. Boyle Temperature. Van der Waal's Equation of State for Real Gases. Values of Critical Constants. Law of Corresponding States. Comparison with Experimental Curves. p-V Diagrams. Joule's Experiment. Free Adiabatic Expansion of a Perfect Gas. Joule-Thomson Porous Plug Experiment. Joule- Thomson Effect for Real and Van der Waal Gases. Temperature of Inversion. Joule- Thomson Cooling. **(10 Lectures)**

Skill Enhancement Courses (Credit: 02 each)

PHY—H-SEC-T-01: ELECTRICAL CIRCUITS & NETWORK SKILLS

Solid-State Devices: Resistors, inductors and capacitors. Diode and rectifiers (half wave and full wave rectifier with L, C, L-C filter arrangement, regulation). Components in Series or in shunt. Response of inductors and capacitors with DC or AC sources. **(4 Lectures)**
Electrical Protection: Relays, Fuses and disconnect switches, Working principle of Circuit breakers, Miniature circuit breaker and its types. **(3 Lectures)**
Electrical Wiring: Conduit wiring (basic idea of house hold wiring). Basics of wiring: Star and Delta Connections. Preparation of extension board, Wiring Materials (Basic information about the wiring components). **(2 Lectures)**

PHY-H-GE-T-03: MECHANICS

Rotational Motion: Angular velocity and angular momentum. Torque. Conservation of angular momentum. **(5 Lectures)**

Elasticity: Hooke's law - Stress-strain diagram - Elastic moduli-Relation between elastic constants - Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants - Work done in stretching and work done in twisting a wire - Twisting couple on a cylinder - Determination of Rigidity modulus by static torsion – Torsional pendulum-Determination of

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Rigidity modulus and moment of inertia -q, *r j* and o by Searles method. **(8 Lectures)**

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Semester IV

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-H-CC-T-09: ELEMENTS OF MODERN PHYSICS

Planck's quantum hypothesis, Planck's constant and light as a collection of photons; Blackbody Radiation: Quantum theory of Light; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson- Germer experiment. Wave description of particles by wave packets. Group and Phase velocities and relation between them. Two-Slit experiment with electrons. Probability. Wave amplitude and wave functions. **(14 Lectures)**

Position measurement- gamma ray microscope thought experiment; Waveparticle duality, Heisenberg uncertainty principle (Uncertainty relations involving Canonical pair of variables): Derivation from Wave Packets impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle- application to virtual particles and range of an interaction. **(5 Lectures)**

Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of a wave function, probabilities and normalization; Probability and probability current densities in one dimension.

(10 Lectures)

One dimensional infinitely rigid box- energy eigenvalues and eigenfunctions, normalization; Quantum dot as example; Quantum mechanical scattering and tunnelling in one dimension-across a step potential & rectangular potential barrier. **(10 Lectures)**

Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, Liquid Drop model: semi-empirical mass formula and binding energy, Nuclear Shell Model and magic numbers. **(6 Lectures)**

Radioactivity: stability of the nucleus; Law of radioactive decay; Mean life and half-life; Alpha decay; Beta decay- energy released, spectrum and Pauli's prediction of neutrino; Gamma ray emission, energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus. (8 Lectures)

Fission and fusion- mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions driving stellar energy (brief qualitative discussions). **(3 Lectures)**

Lasers: Einstein's A and B coefficients. Metastable states. Spontaneous and Stimulated emissions. Optical Pumping and Population Inversion. Three- Level and Four-Level Lasers. Ruby Laser and He-Ne Laser. **(4 Lectures)**

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PHY—H-SEC-T-02: RENEWABLE ENERGY AND ENERGY HARVESTING

Hydro Energy: Hydropower resources, Types of hydroelectric project (Run-of-river schemes, Storage schemes, Pumped-Storage schemes, Low head power plant, Medium head power plant, High head power station), environmental impact of hydro power sources. **(4 Lectures)**
Piezoelectric Energy harvesting: Introduction, Physics and characteristics of piezoelectric effect (No mathematical treatment), materials used for piezoelectricity , recent application of piezoelectric generators. **(5 Lectures)**
Electromagnetic Energy Harvesting: Linear generators (principle of linear generator, applications). **(2 Lecture)**

PHY-H-GE-T-04: WAVES AND OPTICS

Superposition of Two Collinear Harmonic oscillations: Linearity & Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats). **(4 Lectures)**
Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses. **(2 Lectures)**
Waves Motion- General: Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity. Plane waves. Spherical waves, Wave intensity. (7 **Lectures)**

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Semester I

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-CC-T-01: MECHANICS

Collisions: Elastic and inelastic collisions between particles. Centre of Mass and Laboratory frames. **(3 Lectures)**
Rotational Dynamics: Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation. (12 **Lectures)**
Elasticity: Relation between Elastic constants. Twisting torque on a Cylinder or Wire. **(3 Lectures)**
Fluid Motion: Kinematics of Moving Fluids: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube. (2 **Lectures)**

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Semester II

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-CC-T-02: WAVES AND OPTICS

Superposition of Collinear Harmonic oscillations: Linearity and Superposition Principle. Superposition of two collinear oscillations having (1) equal frequencies and (2) different frequencies (Beats). Superposition of N collinear Harmonic Oscillations with (1) equal phase differences and (2) equal frequency differences.
(5 Lectures)
Superposition of two perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures (1:1 and 1:2) and their uses.
(2 Lectures)
Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves. Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave. Water Waves: Ripple and Gravity Waves.
(4 **Lectures)**
Velocity of Waves: Velocity of Transverse Vibrations of Stretched Strings. Velocity of Longitudinal Waves in a Fluid in a Pipe. Newton's Formula for Velocity of Sound. Laplace's Correction. **(6 Lectures)**

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Semester III

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-CC-T-03: ELEMENTS OF MODERN PHYSICS

Planck's quantum, Planck's constant and light as a collection of photons; Blackbody Radiation: Quantum theory of Light; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson-Germer experiment. Wave description of particles by wave packets. Group and Phase velocities and relation between them. Two-Slit experiment with electrons. Probability. Wave amplitude and wave functions. **(14 Lectures)**
Position measurement- gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle (Uncertainty relations involving Canonical pair of variables): Derivation from Wave Packets impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle- application to virtual particles and range of an interaction.
(5 Lectures)

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Semester IV

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

PHY-G-CC-T-04: SOLID STATE PHYSICS

Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis - Central and Non-Central Elements. Unit Cell. Miller Indices. Reciprocal Lattice. Types of Lattices. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Atomic and Geometrical Factor.
(12 Lectures)

Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids. T^3 law **(10 Lectures)**

UNDER-GRADUATE COURSE IN PHYSICS (HONOURS) THE ACADEMIC SESSION 2019-20

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3rd Year

FACULTY NAME: SURAJIT SAHA, DUMKAL COLLEGE

STATISTICAL MECHANICS

Classical Statistics: Macrostate & Microstate, Elementary Concept of Ensemble, Phase Space, Entropy and Thermodynamic Probability, Maxwell-Boltzmann Distribution Law, Partition Function, Thermodynamic Functions of an Ideal Gas, Classical Entropy Expression, Gibbs Paradox, Sackur Tetrode equation, Law of Equipartition of Energy (with proof) - Applications to Specific Heat and its Limitations, Thermodynamic Functions of a Two-Energy Levels System, Negative Temperature. **(18 Lectures)**

Classical Theory of Radiation: Properties of Thermal Radiation. Blackbody Radiation. Pure temperature dependence. Kirchhoff s law. Stefan-Boltzmann law: Thermodynamic proof. Radiation Pressure. Wien's Displacement law. Wien's Distribution Law. Saha's Ionization Formula. Rayleigh-Jean's Law. Ultraviolet Catastrophe. **(9 Lectures)**

Quantum Theory of Radiation: Spectral Distribution of Black Body Radiation. Planck's Quantum Postulates. Planck's Law of Blackbody Radiation: Experimental Verification. Deduction of (1) Wien's Distribution Law, (2) Rayleigh-Jeans Law, (3) Stefan-Boltzmann Law, (4) Wien's Displacement law from Planck's law. **(5 Lectures)**

Bose-Einstein Statistics: B-E distribution law, Thermodynamic functions of a strongly Degenerate Bose Gas, Bose Einstein condensation, properties of liquid He (qualitative description), Radiation as a photon gas and Thermodynamic functions of photon gas. Bose derivation of Planck's law. **(13 Lectures)**

Fermi-Dirac Statistics: Fermi-Dirac Distribution Law, Thermodynamic functions of a Completely and strongly Degenerate Fermi Gas, Fermi Energy, Electron gas in a Metal, Specific Heat of Metals, Relativistic Fermi gas, White Dwarf Stars, Chandrasekhar Mass Limit. **(15 Lectures)**

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SOLID STATE PHYSICS

Crystal Structure: Solids: Amorphous and Crystalline Materials. Lattice Translation Vectors. Lattice with a Basis - Central and Non-Central Elements. Unit Cell. Miller Indices. Reciprocal Lattice. Types of Lattices. Brillouin Zones. Diffraction of X-rays by Crystals. Bragg's Law. Atomic and Geometrical Factor. **(12 Lectures)**

Elementary Lattice Dynamics: Lattice Vibrations and Phonons: Linear Monoatomic and Diatomic Chains. Acoustical and Optical Phonons. Qualitative Description of the Phonon Spectrum in Solids. Dulong and Petit's Law, Einstein and Debye theories of specific heat of solids, T^3 law. **(10 Lectures)**

Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia- and Paramagnetic Domains. Quantum Mechanical Treatment of Paramagnetism. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss. **(8 Lectures)**

Dielectric Properties of Materials: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability. Normal and Anomalous Dispersion. Cauchy and Sellmeir relations. Langevin-Debye equation. Complex Dielectric Constant. Optical Phenomena. Application: Plasma Oscillations, Plasma Frequency, Plasmons, TO modes. **(8 Lectures)**

Ferroelectric Properties of Materials: Structural phase transition, Classification of crystals, Piezoelectric effect, Pyroelectric effect, Ferroelectric effect, Electrostrictive effect, Curie-Weiss Law, Ferroelectric domains, PE hysteresis loop. **(6 lectures)**

Elementary band theory: Kronig Penny model. Band Gap. Conductor, Semiconductor (P and N type) and insulator. Conductivity of Semiconductor, mobility, Hall Effect. Measurement of conductivity (04 probe method) & Hall coefficient. **(10 Lectures)**

Superconductivity: Experimental Results. Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Idea of BCS theory (No derivation) **(6 Lectures)**

ELECTROMAGNETIC THEORY

Maxwell Equations: Review of Maxwell's equations. Displacement Current. Vector and Scalar Potentials. Gauge Transformations: Lorentz and Coulomb Gauge. Boundary Conditions at Interface between Different Media. Wave Equations. Plane Waves in Dielectric Media. Poynting Theorem and Poynting Vector. Electromagnetic (EM) Energy Density. Physical Concept of Electromagnetic Field Energy Density, Momentum Density and Angular Momentum Density. **(12 Lectures)**

EM Wave Propagation in Unbounded Media: Plane EM waves through vacuum and isotropic dielectric medium, transverse nature of plane EM waves, refractive index and dielectric constant, wave impedance. Propagation through conducting media, relaxation time, skin depth. Wave propagation through dilute plasma, electrical conductivity of ionized gases, plasma frequency, refractive index, skin depth, application to propagation through ionosphere. **(10 Lectures)**

EM Wave in Bounded Media: Boundary conditions at a plane interface between two media. Reflection & Refraction of plane waves at plane interface between two dielectric media-Laws of Reflection & Refraction. Fresnel's Formulae for perpendicular & parallel polarization cases, Brewster's law. Reflection & Transmission coefficients. Total internal reflection, evanescent waves. Metallic reflection (normal incidence) **(10 Lectures)**

Polarization of Electromagnetic Waves: Description of Linear, Circular and Elliptical Polarization. Propagation of E.M. Waves in Anisotropic Media. Symmetric Nature of Dielectric Tensor. Fresnel's Formula. Uniaxial and Biaxial Crystals. Light Propagation in Uniaxial Crystal. Double Refraction. Polarization by Double Refraction. Nicol Prism. Ordinary & extraordinary refractive indices. Production & detection of Plane, Circularly and Elliptically Polarized Light. Phase Retardation

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Plates: Quarter-Wave and Half-Wave Plates. Babinet Compensator and its Uses. Analysis of Polarized Light. **(12 Lectures)**

Rotatory Polarization: Optical Rotation. Biot's Laws for Rotatory Polarization. Fresnel's Theory of optical rotation. Calculation of angle of rotation. Experimental verification of Fresnel's theory. Specific rotation. Laurent's half-shade polarimeter. **(5 Lectures)**

Wave Guides: Planar optical wave guides. Planar dielectric wave guide. Condition of continuity at interface. Phase shift on total reflection. Eigenvalue equations. Phase and group velocity of guided waves. Field energy and Power transmission. **(8 Lectures)**

Optical Fibres:- Numerical Aperture. Step and Graded Indices (Definitions Only). Single and Multiple Mode Fibres (Concept and Definition Only). **(3 Lectures)**

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Configurations. Current gains α and β, Relations between α and β. Load Line analysis of Transistors. DC Load line and Q-point. Physical Mechanism of Current Flow. Active, Cutoff and Saturation Regions.
(6 Lectures)
Amplifiers: Transistor Biasing and Stabilization Circuits. Fixed Bias and Voltage Divider Bias. Transistor as 2-port Network. h-parameter Equivalent Circuit. Analysis of a single-stage CE amplifier using Hybrid Model. Input and Output Impedance. Current, Voltage and Power Gains. Classification of Class A, B & C Amplifiers. **(10 Lectures)**
Coupled Amplifier: RC-coupled amplifier and its frequency response. **(4 Lectures)**
Feedback in Amplifiers: Effects of Positive and Negative Feedback on Input Impedance, Output Impedance, Gain, Stability, Distortion and Noise. (**4 Lectures)**
Sinusoidal Oscillators: Barkhausen's Criterion for self-sustained oscillations. RC Phase shift oscillator, determination of Frequency. Hartley & Colpitts oscillators. **(4 Lectures)**
Operational Amplifiers (Black Box approach): Characteristics of an Ideal and Practical Op-Amp. (IC 741) Open-loop and Closed-loop Gain. Frequency Response. CMRR. Slew Rate and concept of Virtual ground. (**4 Lectures)**
Applications of Op-Amps: (1) Inverting and non-inverting amplifiers, (2) Adder, (3)Subtractor, (4) Differentiator, (5) Integrator, (6) Log amplifier, (7) Zero crossing detector (8) Wein bridge oscillator. **(9 Lectures)**
Conversion: Resistive network (Weighted and R-2R Ladder). Accuracy and Resolution. A/D Conversion (successive approximation) **(3 Lectures)**

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Semester I

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-CC-T-01: MATHEMATICAL PHYSICS-I

Vector Calculus:
Recapitulation of vectors: Properties of vectors under rotations. Scalar product and its invariance under rotations. Vector product, Scalar triple product and their interpretation in terms of area and volume respectively. Scalar and Vector fields.
Vector Differentiation: Directional derivatives and normal derivative. Gradient of a scalar field and its geometrical interpretation. Divergence and curl of a vector field. Del and Laplacian operators. Vector identities, Gradient, divergence, curl and Laplacian in spherical and cylindrical coordinates.
Vector Integration: Ordinary Integrals of Vectors. Multiple integrals, Jacobian. Notion of infinitesimal line, surface and volume elements. Line, surface and volume integrals of Vector fields. Flux of a vector field. Gauss' divergence theorem, Green's and Stokes Theorems and their applications (no rigorous proof)

PHY-H-CC-T-02: MECHANICS

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Fundamentals of Dynamics: Reference frames. Inertial frames; Galilean transformations; Galilean invariance. Review of Newton's Laws of Motion. Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse. Momentum of variable-mass system: motion of rocket.

Work and Energy: Work and Kinetic Energy Theorem. Conservative and non-conservative forces. Potential Energy. Energy diagram. Stable and unstable equilibrium. Elastic potential energy. Force as gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy.

Special Theory of Relativity: Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum. Four Vectors (definition and examples only).

PHY-H-GE-T-01: MECHANICS

Vectors: Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter. **(4 Lectures)**

Laws of Motion: Frames of reference. Newton's Laws of motion. Dynamics of a system of particles. Centre of Mass. **(10 Lectures)**

Momentum and Energy: Conservation of momentum. Work and energy. Conservation of energy. Motion of rockets. **(6 Lectures)**

Speed Theory of Relativity: Constancy of speed of light. Postulates of Special Theory of Relativity. Length contraction. Time dilation. Relativistic addition of velocities.(7 Lectures)

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Semester I

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-CC-T-01: MECHANICS

Fundamentals of Dynamics: Reference frames. Inertial frames; Galilean transformations; Galilean invariance. Review of Newton's Laws of Motion. Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse. Momentum of variable-mass system: motion of rocket. **(6 Lectures)**

Work and Energy: Work and Kinetic Energy Theorem. Conservative and non-conservative forces. Potential Energy. Energy diagram. Stable and unstable equilibrium. Elastic potential energy. Force as gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy. **(4 Lectures)**

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Special Theory of Relativity: Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum. Energy-Momentum Four Vector. **(10 Lectures)**

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Semester II

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-CC-T-03: ELECTRICITY AND MAGNETISM

Electric Field and Electric Potential:

Electric field: Electric field lines. Electric flux. Gauss' Law with applications to charge distributions with spherical, cylindrical and planar symmetry. **(6 Lectures)**

Conservative nature of Electrostatic Field. Electrostatic Potential. Laplace's and Poisson equations. The Uniqueness Theorem. Potential and Electric Field of a dipole. Force and Torque on a dipole.**(6 Lectures)**

Electrostatic energy of system of charges. Electrostatic energy of a charged sphere. Conductors in an electrostatic Field. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Parallel-plate capacitor. Capacitance of an isolated conductor. Method of Images and its application to: (1) Plane Infinite Sheet and (2) Sphere. **(10 Lectures)**

PHY-H-CC-T-04: WAVES AND OPTICS

Superposition of Two Harmonic Waves:

Standing (Stationary) Waves in a String: Fixed and Free Ends. Analytical Treatment. Phase and Group Velocities. Changes with respect to Position and Time. Energy of Vibrating String. Transfer of Energy. Normal Modes of Stretched Strings. Plucked and Struck Strings. Melde's Experiment. Longitudinal Standing Waves and Normal Modes. Open and Closed Pipes. Superposition of N Harmonic Waves. **(7 Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence. **(3 Lectures)**

Interference: Division of amplitude and wavefront. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal

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thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index. (**9 Lectures)**

Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer.

PHY-H-GE-T-02: WAVES AND OPTICS

Fluids: Surface Tension: Synclastic and anticlastic surface - Excess of pressure -Application to spherical and cylindrical drops and bubbles - variation of surface tension with temperature - Jaegar's method. Viscosity - Rate flow of liquid in a capillary tube - Poiseuille's formula - Determination of coefficient of viscosity of a liquid - Variations of viscosity of liquid with temperature- lubrication. **(6 Lectures)**

Sound: Simple harmonic motion - forced vibrations and resonance - Fourier's Theorem - Application to saw tooth wave and square wave - Intensity and loudness of sound - Decibels - Intensity levels - musical notes - musical scale. Acoustics of buildings: Reverberation and time of reverberation - Absorption coefficient - Sabine's formula - measurement of reverberation time - Acoustic aspects of halls and auditoria. **(6 Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. **(3 Lectures)**

Interference: Interference: Division of amplitude and division of wavefront. Young's Double Slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index.
(10 Lectures)

Michelson's Interferometer: (1) Idea of form of fringes (no theory needed), (2) Determination of wavelength, (3) Wavelength difference, (4) Refractive index, and (5) Visibility of fringes. (3 **Lectures)**

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Semester II

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-CC-T-02: WAVES AND OPTICS

Superposition of Two Harmonic Waves:
Standing (Stationary) Waves in a String: Fixed and Free Ends. Analytical Treatment. Phase and Group Velocities. Changes with respect to Position and Time. Energy of Vibrating String. Transfer of Energy. Normal Modes of Stretched Strings. Plucked and Struck Strings. Melde's Experiment. Longitudinal Standing Waves and Normal Modes. Open and Closed Pipes. Superposition of N Harmonic Waves. (7 **Lectures)**

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Wave Optics: Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence. **(3 Lectures)**
Interference: Division of amplitude and wavefront. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index. **(9 Lectures)**
Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer. **(4 Lectures)**

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Semester III

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-CC-T-05: MATHEMATICAL PHYSICS-II

Fourier Series: Periodic functions. Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only). Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients. Complex representation of Fourier series. Expansion of functions with arbitrary period. Expansion of non-periodic functions over an interval. Even and odd functions and their Fourier expansions. Application. Summing of Infinite Series. Term-by-Term differentiation and integration of Fourier Series. Parseval Identity. **(14 Lectures)**
Frobenius Method and Special Functions: Singular Points of Second Order Linear Differential Equations and their importance. Frobenius method and its applications to differential equations. Legendre, Bessel, Hermite and Laguerre Differential Equations. Properties of Legendre Polynomials: Rodrigues Formula, Generating Function, Orthogonality. Simple recurrence relations. Expansion of function in a series of Legendre Polynomials. Bessel Functions of the First Kind: Generating Function, simple recurrence relations. Zeros of Bessel Functions and Orthogonality. **(24 Lectures)**
Some Special Integrals: Beta and Gamma Functions and Relation between them. Expression of Integrals in terms of Gamma Functions. Error Function (Probability Integral). **(4 Lectures)**
Theory of Errors: Systematic and Random Errors. Propagation of Errors. Normal Law of Errors. Standard and Probable Error. (**4 Lectures)**
Partial Differential Equations: Solutions to partial differential equations, using separation of variables: Laplace's Equation in problems of rectangular, cylindrical and spherical symmetry. Wave equation and its solution for vibrational modes of a stretched string, rectangular and circular membranes**. (14 Lectures)**

Skill Enhancement Courses (Credit: 02 each)

PHY—H-SEC-T-01: ELECTRICAL CIRCUITS & NETWORK SKILLS

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Basic Electricity Principles: Voltage, Current, Resistance, and Power. Ohm's law, Series, parallel, and series-parallel combinations. AC Electricity and DC Electricity. Familiarization with digital multimeter (name of the circuit elements and their ranges), Analog voltmeter and analog ammeter. **(6 Lectures)**

Generators and Transformers: DC Power sources (basic idea). AC and DC generators (basic principle of action). Inductance, capacitance, and impedance. Operation of transformers (Step-up and step-down). **(4 Lectures)**

PHY-H-GE-T-03: MECHANICS

Vectors: Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter. **(4 Lectures)**
Laws of Motion: Frames of reference. Newton's Laws of motion. Dynamics of a system of particles. Centre of Mass. **(10 Lectures)**
Momentum and Energy: Conservation of momentum. Work and energy. Conservation of energy. Motion of rockets. **(6 Lectures)**
Speed Theory of Relativity: Constancy of speed of light. Postulates of Special Theory of Relativity. Length contraction. Time dilation. Relativistic addition of velocities

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Semester III

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-CC-T-03: ELEMENTS OF MODERN PHYSICS

Size and structure of atomic nucleus and its relation with atomic weight; Impossibility of an electron being in the nucleus as a consequence of the uncertainty principle. Nature of nuclear force, NZ graph, Liquid Drop model: semi-empirical mass formula and binding energy, Nuclear Shell Model and magic numbers.
(6 Lectures)
Radioactivity: stability of the nucleus; Law of radioactive decay; Mean life and half-life; Alpha decay; Beta decay- energy released, spectrum and Pauli's prediction of neutrino; Gamma ray emission, energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus.
(8 Lectures)
Fission and fusion- mass deficit, relativity and generation of energy; Fission - nature of fragments and emission of neutrons. Nuclear reactor: slow neutrons interacting with Uranium 235; Fusion and thermonuclear reactions driving stellar energy (brief qualitative discussions).
(3 Lectures)
Lasers: Einstein's A and B coefficients. Metastable states. Spontaneous and Stimulated emissions. Optical Pumping and Population Inversion. Three-Level and Four-Level Lasers. Ruby Laser and He-Ne Laser. **(4 Lectures)**

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Semester IV

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-H-CC-T-08: MATHEMATICAL PHYSICS-III

Complex Analysis: Brief Revision of Complex Numbers and their Graphical Representation. Euler's formula, De Moivre's theorem, Roots of Complex Numbers. Functions of Complex Variables. Analyticity and Cauchy-Riemann Conditions. Examples of analytic functions. Singular functions: poles and branch points, order of singularity, branch cuts. Integration of a function of a complex variable. Cauchy's Inequality. Cauchy's Integral formula. Simply and multiply connected region. Laurent and Taylor's expansion. Residues and Residue Theorem. Application in solving Definite Integrals. **(30 Lectures)**

Integrals Transforms:

Fourier Transforms: Fourier Integral theorem. Fourier Transform. Examples. Fourier transform of trigonometric, Gaussian, finite wave train & other functions. Representation of Dirac delta function as a Fourier Integral. Fourier transform of derivatives, Inverse Fourier transform, Convolution theorem. Properties of Fourier transforms (translation, change of scale, complex conjugation, etc.). Three dimensional Fourier transforms with examples. Application of Fourier Transforms to differential equations: One dimensional Wave and Diffusion/Heat Flow Equations. **(15 Lectures)**

Laplace Transforms: Laplace Transform (LT) of Elementary functions. Properties of LTs: Change of Scale Theorem, Shifting Theorem. LTs of Derivatives and Integrals of Functions, Derivatives and Integrals of LTs. LT of Unit Step function, Dirac Delta function, Periodic Functions. Convolution Theorem. Inverse LT. Application of Laplace Transforms to Differential Equations: Damped Harmonic Oscillator, Simple Electrical Circuits. **(15 Lectures)**

PHY—H-SEC-T-02: RENEWABLE ENERGY AND ENERGY HARVESTING

Fossil fuels and Alternate Sources of energy: Fossil fuels and nuclear energy, their limitation, need of renewable energy, non-conventional energy sources. **(3 Lectures)**

Solar energy: Solar energy, It's importance, storage of solar energy (Thermal storage and Electrical storage, Mechanical storage), solar pond (Basic idea), Principle of operation of non-convective solar pond, applications of solar pond, solar water heating, flat plate collector, solar cooker (basic idea, Design principle and Constructional details of box type solar cooker and its limitation), solar furnace, solar greenhouses (basic idea, types and advantage), Solar Cell principle (No mathematical treatment), application of solar photovoltaic system, advantage and disadvantage of Photovoltaic solar energy conversion. **(6 Lectures)**

PHY-H-GE-T-04: WAVES AND OPTICS

Fluids: Surface Tension: Synclastic and anticlastic surface - Excess of pressure -Application to

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spherical and cylindrical drops and bubbles - variation of surface tension with temperature - Jaegar's method. Viscosity - Rate flow of liquid in a capillary tube - Poiseuille's formula - Determination of coefficient of viscosity of a liquid - Variations of viscosity of liquid with temperature- lubrication. **(6 Lectures)**

Sound: Simple harmonic motion - forced vibrations and resonance - Fourier's Theorem - Application to saw tooth wave and square wave - Intensity and loudness of sound - Decibels - Intensity levels - musical notes - musical scale. Acoustics of buildings: Reverberation and time of reverberation - Absorption coefficient - Sabine's formula - measurement of reverberation time - Acoustic aspects of halls and auditoria. **(6 Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. **(3 Lectures)**

Interference: Interference: Division of amplitude and division of wavefront. Young's Double Slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index.
(10 Lectures)

Michelson's Interferometer: (1) Idea of form of fringes (no theory needed), (2) Determination of wavelength, (3) Wavelength difference, (4) Refractive index, and (5) Visibility of fringes. (3 **Lectures)**

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Semester IV

FACULTY NAME: MASADULHASSAN, DUMKAL COLLEGE

PHY-G-CC-T-04: SOLID STATE PHYSICS

Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia- and Paramagnetic Domains. Quantum Mechanical Treatment of Paramagnetism. Curie's law, Weiss's Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss. **(8 Lectures)**

Dielectric Properties of Materials: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability. Normal and Anomalous Dispersion. Cauchy and Sellmeir relations. Langevin-Debye equation. Complex Dielectric Constant. Optical Phenomena. Application: Plasma Oscillations, Plasma Frequency, Plasmons, TO modes. **(8 Lectures)**

UNDER-GRADUATE COURSE IN PHYSICS (HONOURS) THE ACADEMIC SESSION 2019-20

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3rd Year

FACULTY NAME:MASADULHASSAN, DUMKAL COLLEGE

CLASSICAL MECHANICS

Classical Mechanics of Point Particles: Generalised coordinates and velocities. Hamilton's Principle, Lagrangian and Euler-Lagrange equations. Applications to simple systems such as coupled oscillators. Canonical momenta & Hamiltonian. Hamilton's equations of motion. Applications: Hamiltonian for a harmonic oscillator, particle in a central force field. Poisson brackets. Canonical transformations. **(22 Lectures)**

PHYSICAL OPTICS

Wave Optics: Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence. **(3 Lectures)**
Interference: Division of amplitude and wavefront. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index. (**9 Lectures)**
Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer. **(4 Lectures)**
Diffraction: Kirchhoff s Integral Theorem, Fresnel-Kirchhoff s Integral formula and its application to rectangular slit. **(5 Lectures)**
Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope. Double slit. Multiple slits. Diffraction grating. Resolving power of grating. **(8 Lectures)**
Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire. (7 **Lectures)**

NUCLEAR AND PARTICLE PHYSICS

General Properties of Nuclei: Constituents of nucleus and their Intrinsic properties, quantitative facts about mass, radii, charge density (matter density), binding energy, average binding energy and its variation with mass number, main features of binding energy versus mass number curve, N/A plot, angular momentum, parity, magnetic moment, electric moments, nuclear excites states. **(10 Lectures)**
Nuclear Models: Liquid drop model approach, semi empirical mass formula and significance of its various terms, condition of nuclear stability, two nucleon separation energies, Fermi gas model (degenerate fermion gas, nuclear symmetry potential in Fermi gas), evidence for nuclear shell

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structure, nuclear magic numbers, basic assumption of shell model, concept of mean field, residual interaction, concept of nuclear force. (12 **Lectures)**

Radioactivity decay:(a) Alpha decay: basics of α-decay processes, theory of a-emission, Gamow factor, Geiger Nuttall law, α-decay spectroscopy. (b) (β- decay: energy kinematics for (β-decay, positron emission, electron capture, neutrino hypothesis. (c) Gamma decay: Gamma rays emission & kinematics, internal conversion. **(9 Lectures)**

Nuclear Reactions: Types of Reactions, Conservation Laws, kinematics of reactions, Q-value, reaction rate, reaction cross section, Concept of compound and direct Reaction, resonance reaction, Coulomb scattering (Rutherford scattering). **(8 Lectures)**

Nuclear Astrophysics: Early universe, primordial nucleosynthesis (particle nuclear interactions), stellar nucleosynthesis, concept of gamow window, heavy element production: r- and s- process path. **(5 Lectures)**

Interaction of Nuclear Radiation with matter: Energy loss due to ionization (Bethe-Block formula), energy loss of electrons, Cerenkov radiation. Gamma ray interaction through matter, photoelectric effect, Compton scattering, pair production, neutron interaction with matter. **(6 Lectures)**

Detector for Nuclear Radiations: Gas detectors: estimation of electric field, mobility of particle, for ionization chamber and GM Counter. Basic principle of Scintillation Detectors and construction of photo-multiplier tube (PMT). Semiconductor Detectors (Si and Ge) for charge particle and photon detection (concept of charge carrier and mobility), neutron detector. **(6 Lectures)**

Particle Accelerators: Accelerator facility available in India: Van-de Graaff generator (Tandem accelerator), Linear accelerator, Cyclotron, Synchrotrons. **(5 Lectures)**

Particle physics: Particle interactions; basic features, types of particles and its families. Symmetries and Conservation Laws: energy and momentum, angular momentum, parity, baryon number, Lepton number, Isospin, Strangeness and charm, concept of quark model, color quantum number and gluons. **(14 Lectures)**

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SESSION: 2018-2019, PART-II

S.L NO.	TEACHER NAME	GROUP	MARS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	(A) Management of physical education & sports	30	1	Management of sports and games in School, college and University	2
				2	Types of tournament- (a) knock-out system (b) league system (c) combination system	2
				3	Lay-out of play-fields and basic rules (a) Kabaddi, (b)Kho-Kho, (c) Volleyball, (d) Badminton, (e)Football, (f)Hockey, (g) Cricket, (h) Track and Field event.	3
				4	Care and maintenance of sports equipment.	1
		(B) Principles of physical education	20	5	Meaning and principles of sports training, Conditioning, Warming-up and Cooling-down.	1
				6	Components of physical fitness, speed, strength, endurance, agility and flexibility. Health related physical fitness and performance related physical fitness.	2
				7	Load and adaptation, load fctors, over load-couses and remedies.	2
				8	Training methods, circuit training, interval, fartek, cross-country, weight training.	2
				9	Mechanical principles applied to sports. Motion-types and laws of motion, anatomical leaver and its types, equilibrium-its types and factors, centre of gravity, fource and its types-centrifugal, centripetal, friection and water resistance.	1
		Practical	50	1	Kabaddi, Kho-Kho, Football, Track and Field event.	2
				2	Gymnastics, Yoga	1

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SESSION: 2018-2019, PART-II

S.L NO.	TEACHER NAME	GROUP	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SK	(C) Health education and First-Aid	30	10	Meaning of Health education	1
				11	Major area of Health Education. Health service-daily health inspection and follow up, health records, clinic and health center. Healthful environment-healthful environment in educational institutions, offices, factories, play ground, auditorium etc.Environmental Hygiene-lighting, ventilation, water supply, waste-disposal.	3
				12	Environmental pollution-air, water, soil pollution-causes and control.	2
				13	Mental health-problems of maladjustment, minor menial disorders-their causes and precautions.	1
				14	Safety education-safety at Home, School, College, Play ground, Streets.	2
				15	Prevention and control of Communicable dieses-Malaria, Cholera, Common Cold, Influenza	2
				16	First Aid- Sprain, muscle pull, dislocation, fracture, cramps, shock, wonds and bleeding, snake bites, drowning, electric shock, burns and artificial respiration.	2
		(D) Exercise physiology	20	17	Muscular system, various types of muscles, structure of muscle, effects of Exercises on muscle, muscular contraction, Ecentric concentric static, isometric, isotonic, isokinetic exercises, motor unit.	2
				18	Effect of Exercises on circulatory system, blood pressure.	1
				19	Effect on Exercises on respiratory system, vital-capacity, oxygen debt.	2
				20	Cardiovascular endurance, fatigue, muscular endurance.	2
		Practical	50	1	Volleyball, Hockey, Cricket, Badminton	3
				2	First Aid, Practical Not Book.	2

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SESSION: 2018-2019, PART-III

S.L NO.	TEACHER NAME	GROUP	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	(A) Therapeutic aspects of physical activities	30	1	Osteoporosis- cause, symptom Treatment, Obesity and its control by sports and physical education, cardiovascular disease and its control coronary artery disease, Hypertension, stroke, congestive Heart failure, Diabetes.	2
				2	Defination of corrective. Different types of sports injury with treatment- Muscles injury, sprain, bones fracture and dislocation. Waist injury. Massage and different methods of massage- principle of massage, rubbing method, kneading, vibrate method. Massage effects the muscle and circulatory system of blood. Important of exercise in daily life. Isokeinetic exercise.	2
				3	Physiotherapy and different methods of physiotherapy-principles of physiotherapy, importance of physiotherapy, different methods of physiotherapy- Electrotherapy, Hydrotherapy, Cryotherapy, Thermotherapy. Difference between physiotherapy and exercise therapy.	2
				4	Rehabilitation and its basic principles. Rehabilitation modalities. Relaxation technique.	2
		(A) Practical	20	1	Barometer ability test- standing broad jump, zigzag run, medicine bull pass.	2
				2	A) Administration of fitness testing procedure- medicine bull put, standing broad jump, pull up. B) Measurement of endurance test- i)Measurement of muscular endurance(Knees bent sit-up) ii) Cardiorespiratory endurance(Cooper test) iii) Cardio vascular efficiency(Harvard step test), C) Speed Measurement test.	2
				3	Athletic (running, jumping, throwing), kho-kho, volleyball, football, cricket, basketball, hockey, badminton, kabaddi.	3

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S.L NO.	TEACHER NAME	GROUP	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	(B) Physical activities and life style	30	5	Modern concept of health and wellness, modern concept of physical fitness, Component of physical fitness, Role of health and physical fitness in the modern society, life style, healthy life style and physical activities, active life style.	3
				6	Growth and development, Difference between growth and development, Characteristic of development process, Physical activity and characteristics of growth and development in infancy stage, Physical activities and characteristics of growth and development in childhood stage.	2
				7	Characteristics of adolescent stage and some physical activities, Write different physical activities for pregnant mother, Physical activities for house wife, Social containts on women participation in sports and games of athletics.	3
				8	Ageing effects and physical activities, Physical activities for aged, Risks of exercise among aged.	1
				9	Disabled and their physical activities- Disabled, Physical disabled, Mantel disabled, Social disabled, Emotional disabled, Juvenile delinquency.	2
		(A) Practical	20	4	Corrective exercise for knee injury, Corrective exercise for shoulder injury, Corrective exercise for hip injury, Corrective exercise for ankle injury, Corrective exercise for trunk injury.	3
				5	N.C.C, Blood donation camp, Scouts and guides, Bratachary, Adventure sports, N.S.S.	2
				6	Visit to a higher level tournament and record book .	1

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SUBJECT: CORE PAPER-1: FOUNDATION AND HISTORY OF PHYSICAL EDUCATION

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Corse Code- CC1A Unit- I: Introduction	10	1.1	Meaning and definition of Physical Education.	1
				1.2	Aim and objectives of Physical Education.	1
				1.3	Modern concept of Physical Education.	1
				1.4	Importance of Physical Education.	1
		Unit- II: Biological and Sociological Foundations of Physical Education	10	2.1	Biological Foundation- Meaning and definition of growth and development. Factors affecting growth and development. Differences of growth and development. Principles of growth and development.	3
				2.2	Age- Chronological age, anatomical age, physiological age and mental age.	3
				2.3	Sociological Foundation- Meaning and definition of Sociology, Society and Socialization.	2
				2.4	Role of games and sports in National and International integration.	2
		Practical	20	1	Learn and demonstrate the technique of Suryanamaskar.	3
				2	Development of physical fitness through Callisthenics and Aerobic activities.	3

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S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- III: History of Physical Education	10	3.1	Historical development of Physical Education and Sports in India- Pre-Independence period and Post-Independence period.	2
				3.2	Olympic Movement- Ancient Olympic Games and Modern Olympic Games.	2
				3.3	Brief historical background of Asian Games and Commonwealth Games.	2
				3.4	National Sports Awards- Arjuna Award, Rajiv Gandhi Khel Ratna Award, Dronacharya Award	2
		Unit- IV: Yoga Education	10	4.1	Meaning and definition of the term Yoga, types, aim, objectives and important of Yoga.	2
				4.2	History of Yoga.	3
				4.3	Astanga Yoga	2
				4.4	Hatha Yoga	2
		INTERNAL ASSESSMENT	15	1	Internal assessment & class attendance	1

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SEMESTER-2 (January-Jun), Corse Code- CC1B, SESSION: 2018-2019

CORE PAPER- 2: Management of Physical Education and Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Unit- II: Tournaments	10	2.1	Tournaments: Meaning and definition and types of tournaments (Knock-out, League, Combination, Challenge).	3
				2.2	Procedure of drawing fixture.	3
				2.3	Method of organising Annual Athletic Meet and Play Day.	2
				2.4	Method of organising of Intramural and Extramural competition.	2
		Unit- IV: Leadership	10	4.2	Meaning and definition of leadership.	1
				4.3	Principles of leadership activities.	2
				4.4	Qualities of good leader in Physical Education.	1
				4.2	Hierarchy of Leadership in School, College and University level.	2
		Practica	20	1	Track and Field events (any one).	3
		Lay out knowledge and Officiating ability-		2	Games: Football, Kabaddi, Kho-Kho and Volleyball (any one).	4

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SEMESTER-2 (January-Jun), Corse Code- CC1B, SESSION: 2018-2019

CORE PAPER- 2: Management of Physical Education and Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- I: Introduction	10	1.1	Concept and definition of Sports Management.	2
				1.2	Important of Sports Management.	2
				1.3	Purpose of Sports Management.	2
				1.4	**Principles of Sports Management.**	1
		Unit- III: Facilities and Equipment	10	3.1	Method of calculation of Standard Athletic Track marking.	3
				3.2	Care and maintenance of play Ground and gymnasium.	2
				3.3	Importance, care and maintenance of sports Equipment.	2
				3.4	**Time Table: Meaning, importance and factors affecting school's physical education Time Table.**	2
		INTERNAL ASSESSMENT	15	1	**Internal assessment & class attendance**	2

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SESSION: 2019-2020, PART-III

S.L NO.	TEACHER NAME	GROUP	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	(A) Therapeutic aspects of physical activities	30	1	Osteoporosis- cause, symptom Treatment, Obesity and its control by sports and physical education, cardiovascular disease and its control coronary artery disease, Hypertension, stroke, congestive Heart failure, Diabetes.	2
				2	Defination of corrective. Different types of sports injury with treatment- Muscles injury, sprain, bones fracture and dislocation. Waist injury. Massage and different methods of massage-principle of massage, rubbing method, kneading, vibrate method. Massage effects the muscle and circulatory system of blood. Important of exercise in daily life. Isokeinetic exercise.	3
				3	Physiotherapy and different methods of physiotherapy-principles of physiotherapy, importance of physiotherapy, different methods of physiotherapy- Electrotherapy, Hydrotherapy, Cryotherapy, Thermotherapy. Difference between physiotherapy and exercise therapy.	3
				4	Rehabilitation and its basic principles. Rehabilitation modalities. Relaxation technique.	2
		(A) Practical	20	1	Barometer ability test- standing broad jump, zigzag run, medicine bull pass.	2
				2	A) Administration of fitness testing procedure- medicine bull put, standing broad jump, pull up. B) Measurement of endurance test- i)Measurement of muscular endurance(Knees bent sit-up) ii) Cardiorespiratory endurance(Cooper test) iii) Cardio vascular efficiency(Harvard step test), C) Speed Measurement test.	3
				3	Athletic (running, jumping, throwing), kho-kho, volleyball, football, cricket, basketball, hockey, badminton, kabaddi.	3

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S.L NO.	TEACHER NAME	GROUP	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	(B) Physical activities and life style	30	5	Modern concept of health and wellness, modern concept of physical fitness, Component of physical fitness, Role of health and physical fitness in the modern society, life style, healthy life style and physical activities, active life style.	3
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				9	Disabled and their physical activities- Disabled, Physical disabled, Mantel disabled, Social disabled, Emotional disabled, Juvenile delinquency.	2
		(A) Practical	20	4	Corrective exercise for knee injury, Corrective exercise for shoulder injury, Corrective exercise for hip injury, Corrective exercise for ankle injury, Corrective exercise for trunk injury.	3
				5	N.C.C, Blood donation camp, Scouts and guides, Bratachary, Adventure sports, N.S.S.	2
				6	Visit to a higher level tournament and record book .	1

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SUBJECT: CORE PAPER-1: FOUNDATION AND HISTORY OF PHYSICAL EDUCATION

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Corse Code- CC1A Unit- I: Introduction	10	1.1	Meaning and definition of Physical Education.	2
				1.2	Aim and objectives of Physical Education.	1
				1.3	Modern concept of Physical Education.	1
				1.4	Importance of Physical Education.	2
		Unit- II: Biological and Sociological Foundations of Physical Education	10	2.1	Biological Foundation- Meaning and definition of growth and development. Factors affecting growth and development. Differences of growth and development. Principles of growth and development.	3
				2.2	Age- Chronological age, anatomical age, physiological age and mental age.	3
				2.3	Sociological Foundation- Meaning and definition of Sociology, Society and Socialization.	2
				2.4	Role of games and sports in National and International integration.	2
		Practical	20	1	Learn and demonstrate the technique of Suryanamaskar.	2
				2	Development of physical fitness through Callisthenics and Aerobic activities.	2

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S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- III: History of Physical Education	10	3.1	Historical development of Physical Education and Sports in India- Pre-Independence period and Post-Independence period.	3
				3.2	Olympic Movement- Ancient Olympic Games and Modern Olympic Games.	3
				3.3	Brief historical background of Asian Games and Commonwealth Games.	2
				3.4	National Sports Awards- Arjuna Award, Rajiv Gandhi Khel Ratna Award, Dronacharya Award	2
		Unit- IV: Yoga Education	10	4.1	Meaning and definition of the term Yoga, types, aim, objectives and important of Yoga.	3
				4.2	History of Yoga.	2
				4.3	Astanga Yoga	2
				4.4	Hatha Yoga	2
		INTERNAL ASSESSMENT	15	1	Internal Assessment & class attendance	1

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SEMESTER-3, (July-dec.) Corse Code- CC1C, & SEC1, SESSION: 2019-2020,

SUBJECT: CORE PAPER- 3: Anatomy, Physiology and Exercise Physiology

SEC1: Track and Field

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Unit- I: Introduction	10	1.1	Meaning and definition of Anatomy, Physiology and Exercise Physiology.	3
				1.2	Importance of Anatomy, Physiology and Exercise Physiology in Physical Education.	2
				1.3	Human Cell- Structure and function.	2
				1.4	Tissue- Types and functions.	2
		Unit- II: Musculo-skeletal System	10	2.1	Skeletal System- Structure of Skeletal System. Classification and location of bones and joints. Anatomical differences between male and female.	3
				2.2	Muscular System- Type, location, function and structure of muscle.	3
				2.3	Types of muscular contraction.	2
				2.4	Effect of exercise on muscular system.	2
		INTERNAL ASSESSMENT	15	1	Internal Assessment & class attendance	1
		SEC1: UNIT-2: Field events	20	2.1	Long Jump: Approach Run, Take-off, Flight in the air (Hang Style/Hitch Kick) and Landing.	3
				2.2	High jump: Approach Run, Take-off, Bar Clearance (Straddle) and Landing.	4
				2.3	Shot put: Holding the Shot, Placement, Initial Stance, Glide, Delivery Stance and Recovery (Perry O'Brien Technique).	4
				2.4	Discus Throw: Holding the Discus, Initial Stance, Primary Swing, Turn, Release and Recovery (Rotation in the circle).	4
				2.5	Javelin Throw: Grip, Carry, Release and Recovery (3/5 Impulse stride).	3
		SEC1: INTERNAL ASSESSMENT	10	1	Internal Assessment & class attendance	1

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SUBJECT: CORE PAPER- 3: Anatomy, Physiology and Exercise Physiology

SEC1: Track and Field

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- III: Circulatory System	10	1.1	Blood- Composition and function.	3
				1.2	Heart- Structure and functions. Mechanism of blood circulation through heart.	3
				1.3	Blood Pressure, Athletic Heart and Bradycardia.	2
				1.4	Effect of exercise on circulatory system.	2
		Unit- IV: Respiratory System	10	2.1	Structure and function of Respiratory organs.	2
				2.2	Mechanism of Respiration.	2
				2.3	Vital Capacity, O2 Debt and Second Wind.	3
				2.4	Effect of exercise on respiratory system.	2
		CC: Practical	20	1	Assessments of BMI and WHR.	1
				2	Assessment of Heart rate, Blood Pressure, Respiratory Rate, and Pick Flow Rate	3
		SEC1: UNIT-1: Track Events	20	1.1	Starting Techniques: Standing start and Crouch start (its variations) use of Block.	3
				1.2	Acceleration with proper running techniques.	3
				1.3	Finishing technique: Run Through, Forward Lunging and Shoulder Shrug.	4
				1.4	Relay Race: Starting, Baton Holding/Carrying, Baton Exchange in between zone, and Finishing	3

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SEMESTER-2 (January-Jun), Corse Code- CC1B, SESSION: 2019-2020,

CORE PAPER- 2: Management of Physical Education and Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Unit- II: Tournaments	10	2.1	Tournaments: Meaning and definition and types of tournaments (Knock-out, League, Combination, Challenge).	4
				2.2	Procedure of drawing fixture.	3
				2.3	Method of organising Annual Athletic Meet and Play Day.	3
				2.4	Method of organising of Intramural and Extramural competition.	3
		Unit- IV: Leadership	10	4.2	Meaning and definition of leadership.	2
				4.3	Principles of leadership activities.	3
				4.4	Qualities of good leader in Physical Education.	3
				4.2	Hierarchy of Leadership in School, College and University level.	3
		Practica	20	1	Track and Field events (any one).	3
		Lay out knowledge and Officiating ability-		2	Games: Football, Kabaddi, Kho-Kho and Volleyball (any one).	4

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SEMESTER-2 (January-Jun), Corse Code- CC1B, SESSION: 2019-2020,

CORE PAPER- 2: Management of Physical Education and Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- I: Introduction	10	1.1	Concept and definition of Sports Management.	2
				1.2	Important of Sports Management.	2
				1.3	Purpose of Sports Management.	2
				1.4	Principles of Sports Management.	3
		Unit- III: Facilities and Equipment	10	3.1	Method of calculation of Standard Athletic Track marking.	3
				3.2	Care and maintenance of play ground and gymnasium.	3
				3.3	Importance, care and maintenance of sports Equipment.	2
				3.4	Time Table: Meaning, importance and factors affecting school's physical education Time Table.	3
		INTERNAL ASSESSMENT	15	1	Internal assessment & class attendance	1

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SEMESTER-4, (January-Jun), Corse Code- CC1D, & SEC2, SESSION: 2019-2020,

SUBJECT: CORE PAPER- 4: Health Education, Physical Fitness and Wellness

SEC2: Gymnastics and Yoga

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS		CLASS
1.	MD YUSUF ALI	Unit- II: Health Problems in India- Prevention and Control	10	2.1	Communicable Diseases- Malaria, Dengue and Chicken Pox and Diarrhoea.		3
				2.2	Non-communicable Diseases- Obesity, Diabetes and AIDS, Asthma.		2
				2.3	Nutrition- Nutritional requirements for daily living. Balance Diet. Health disorders due to deficiencies of Vitamins and Minerals.		3
				2.4	**Postural deformities- Causes and corrective exercise of Kyphosis, Lordosis, Scoliosis, Knock Knees and Flat Foot.**		3
		Unit- IV: Health and First-aid Management	10	4.1	First aid- Meaning, definition, importance and golden rules of First-aid.		3
				4.2	Concept of sports injuries- Sprain, Strain, Facture and Dislocation.		3
				4.3	Management of sports injuries through the application of Hydro-therapy and Thermo- therapy.		3
				4.4	Management of sports injuries through the application of Exercise and Massage therapy.		3
		PRACTICAL	20	1.	First-aid Practical- Triangular Bandage: Slings (Arm Sling, Collar & Cuff Sling), Roller Bandages: Simple Spiral, Reverse Spiral, Figure of Eight, Spica.		2
				2.	Practical knowledge on Hydro-therapy and Thermo-therapy.		2
		SEC2: UNIT-3 & 4: Asanas & Pranayama (any two)	20	3.1	**Standing Position**	**3.1.1 Ardhachandrasana, 3.1.1 Brikshasana, 3.1.1Achandrasana, 3.1.1Padahastasana**	1
				3.2	**Sitting Position**	**3.2.1Ardhakurmasana, 3.2.2 Paschimottanasana 3.2.3Gomukhasana**	1
				3.3	**Supine Position**	**3.3.1Setubandhasana, 3.3.2 Halasana, 3.3.3Matsyasana**	1
				3.4	**Prone Position**	**3.4.1 Bhujangasana, 3.4.2 Salvasana, 3.4.3 Dhanurasana**	1
				3.5	**Inverted Position**	**3.5.1 Sarbangasana, 3.5.2 Shirsasana, 3.5.3 Bhagrasana**	1
				4	**Pranayama**	**4.1 Kapalbhati, 4.2 Bhramri, 4.3 Anulam Vilom**	1

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SUBJECT: CORE PAPER- 4: Health Education, Physical Fitness and Wellness

SEC2: Gymnastics and Yoga

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- I: Introduction	10	1.1	Concept, definition and dimension of Health.	3
				1.2	Definition, aim, objectives and principles of Health Education.	2
				1.3	Health Agencies- World Health Organization (WHO), United Nations Educational Scientific and Cultural Organization (UNESCO).	3
				1.4	**School Health Program- Health Service, Health Instruction, Health Supervision, Health appraisal and Health Record.**	3
		Unit- III: Physical Fitness and Wellness	10	3.1	Physical Fitness- Meaning, definition and Importance of Physical Fitness.	3
				3.2	Components of Physical Fitness- Health and Performance related Physical Fitness.	3
				3.3	Concept of Wellness. Relationship between Physical activities and Wellness.	2
				3.4	Ageing- Physical activities and its importance	2
		INTERNAL ASSESSMENT	15	1	**Internal Assessment & class attendance**	1
		SEC2: UNIT-1 & 2: GYMNASTICS	20	1	**1.1 Forward Roll, 1.1 T-Balance, 1.1 Forward Roll with Split leg,** **1.1 Backward Roll, 1.1 Cart-Wheel**	2
				2	**2.1 Dive and Forward Roll, 2.2 Hand Spring, 2.3 Head Spring, 2.4 Neck Spring, 2.5 Hand Stand and Forward Roll, 2.6 Summersault**	2
		SEC1: INTERNAL ASSESSMENT	10	1	**Internal Assessment & class attendance**	1

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SEMESTER-1 (July-dec.) Corse Code- CC1A, SESSION: 2020-2021,

SUBJECT: CORE PAPER-1: FOUNDATION AND HISTORY OF PHYSICAL EDUCATION

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Corse Code- CC1A Unit- I: Introduction	10	1.1	Meaning and definition of Physical Education.	2
				1.2	Aim and objectives of Physical Education.	2
				1.3	Modern concept of Physical Education.	2
				1.4	Importance of Physical Education.	2
		Unit- II: Biological and Sociological Foundations of Physical Education	10	2.1	Biological Foundation- Meaning and definition of growth and development. Factors affecting growth and development. Differences of growth and development. Principles of growth and development.	4
				2.2	Age- Chronological age, anatomical age, physiological age and mental age.	3
				2.3	Sociological Foundation- Meaning and definition of Sociology, Society and Socialization.	2
				2.4	Role of games and sports in National and International integration.	2
		Practical	20	1	Learn and demonstrate the technique of Suryanamaskar.	2
				2	Development of physical fitness through Callisthenics and Aerobic activities.	3

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SEMESTER-1 (July-dec.), Corse Code- CC1A, SESSION: 2020-2021,

SUBJECT: CORE PAPER-1: FOUNDATION AND HISTORY OF PHYSICAL EDUCATION

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- III: History of Physical Education	10	3.1	Historical development of Physical Education and Sports in India- Pre-Independence period and Post-Independence period.	3
				3.2	Olympic Movement- Ancient Olympic Games and Modern Olympic Games.	3
				3.3	Brief historical background of Asian Games and Commonwealth Games.	2
				3.4	National Sports Awards- Arjuna Award, Rajiv Gandhi Khel Ratna Award, Dronacharya Award	3
		Unit- IV: Yoga Education	10	4.1	Meaning and definition of the term Yoga, types, aim, objectives and important of Yoga.	3
				4.2	History of Yoga.	2
				4.3	Astanga Yoga	2
				4.4	Hatha Yoga	2
		INTERNAL ASSESSMENT	15	1	Internal Assessment & class attendance	1

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SEMESTER-3, (July-dec.) Corse Code- CC1C, & SEC1, SESSION: 2020-2021,

SUBJECT: CORE PAPER- 3: Anatomy, Physiology and Exercise Physiology

SEC1: Track and Field

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Unit- I: Introduction	10	1.1	Meaning and definition of Anatomy, Physiology and Exercise Physiology.	3
				1.2	Importance of Anatomy, Physiology and Exercise Physiology in Physical Education.	2
				1.3	Human Cell- Structure and function.	2
				1.4	Tissue- Types and functions.	3
		Unit- II: Musculo-skeletal System	10	2.1	Skeletal System- Structure of Skeletal System. Classification and location of bones and joints. Anatomical differences between male and female.	4
				2.2	Muscular System- Type, location, function and structure of muscle.	3
				2.3	Types of muscular contraction.	3
				2.4	Effect of exercise on muscular system.	3
		INTERNAL ASSESSMENT	15	1	Internal Assessment & class attendance	3
		SEC1: UNIT-2: Field events	20	2.1	Long Jump: Approach Run, Take-off, Flight in the air (Hang Style/Hitch Kick) and Landing.	3
				2.2	High jump: Approach Run, Take-off, Bar Clearance (Straddle) and Landing.	3
				2.3	Shot put: Holding the Shot, Placement, Initial Stance, Glide, Delivery Stance and Recovery (Perry O'Brien Technique).	3
				2.4	Discus Throw: Holding the Discus, Initial Stance, Primary Swing, Turn, Release and Recovery (Rotation in the circle).	3
				2.5	Javelin Throw: Grip, Carry, Release and Recovery (3/5 Impulse stride).	3
		SEC1: INTERNAL ASSESSMENT	10	1	Internal Assessment & class attendance	1

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SUBJECT: CORE PAPER- 3: Anatomy, Physiology and Exercise Physiology

SEC1: Track and Field

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
3	MUHAMMAD ALI SAIKH	Unit- III: Circulatory System	10	1.1	Blood- Composition and function.	2
				1.2	Heart- Structure and functions. Mechanism of blood circulation through heart.	3
				1.3	Blood Pressure, Athletic Heart and Bradycardia.	2
				1.4	Effect of exercise on circulatory system.	2
2.		Unit- IV: Respiratory System	10	2.1	Structure and function of Respiratory organs.	2
				2.2	Mechanism of Respiration.	2
				2.3	Vital Capacity, O2 Debt and Second Wind.	3
				2.4	Effect of exercise on respiratory system.	2
		CC: Practical	20	1	Assessments of BMI and WHR.	2
				2	Assessment of Heart rate, Blood Pressure, Respiratory Rate, and Pick Flow Rate	2
		SEC1: UNIT-1: Track Events	20	1.1	Starting Techniques: Standing start and Crouch start (its variations) use of Block.	3
				1.2	Acceleration with proper running techniques.	3
				1.3	Finishing technique: Run Through, Forward Lunging and Shoulder Shrug.	3
				1.4	Relay Race: Starting, Baton Holding/Carrying, Baton Exchange in between zone, and Finishing	3

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SEMESTER-5, (July-dec.) Corse Code- DSE 1A, & SEC3, SESSION: 2020-2021,

SUBJECT: Sports Training

SEC3: Indian Games and Racket Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Unit- II: Principle of Training and Conditioning	10	2.1	Warming up and Cooling down- Meaning, types and methods.	2
				2.2	Conditioning- Concept of Conditioning and its principles.	3
				2.3	Training Methods- Circuit Training, Interval Training, Weight Training.	2
				2.4	Periodisation- Meaning, types, aim and contents of different periods.	2
		Unit- III: Training Load and Adaptation	10	3.1	Training Load- Meaning, definition, types and factors of training load.	3
				3.2	Components of training load.	2
				3.3	Over Load- Meaning, causes, symptoms and tackling of over load.	3
				3.4	Adaptation- Meaning and conditions of adaptation, Supercompensation.	2
		DSE: Practical	20	1.	Practical Experience of Weight Training and Circuit Training (any one).	2
				2.	Measurement of Speed, Strength (Grip/Leg), Explosive Strength (Leg) and Flexibility (any two).	3
		SEC3: Indian Games and Racket Sports. KABADDI A. Fundamental skills	20	1.	Skills in Raiding: Touching with hands, Use of leg-toe touch, squat leg thrust, side kick, mule kick, arrow fly kick, crossing of baulk line. Crossing of Bonus line.	3
				2.	Skills of holding the raider: Various formations, catching from particular position, different catches, catching formation and techniques.	3
				3.	Additional skills in raiding: Escaping from various holds, techniques of escaping from chain formation, offense and defence.	3
				4.	Game practice with application of Rules and Regulations.	2
				B.	Rules and their interpretations and duties of the officials.	2
		KHO-KHO A. Fundamental skills		1.	Skills in Chasing: Sit on the box (Parallel & Bullet toe method), Get up from the box (Proximal & Distyal foot method), Give Kho (Simple, Early, Late & Judgment), Pole Turn, Pole Dive, Tapping, Hammering, Rectification of foul.	4
				2.	Skills in running: Chain Play, Ring play and Chain & Ring mixed play.	2
				3.	Game practice with application of Rules and Regulations.	2
				B.	Rules and their interpretations and duties of the officials.	2

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SEMESTER-5, (July-dec.) Corse Code- DSE 1A, & SEC3, SESSION: 2020-2021,

SUBJECT: Sports Training

SEC3: Indian Games and Racket Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- I: Introduction	10	2.1	Meaning and definition of Sports Training.	2
				2.2	Aim and characteristics of Sports Training.	2
				2.3	Principles of Sports Training.	2
				2.4	Importance of Sports Training.	2
		Unit- IV: Training Techniques	10	3.1	Strength- Means and methods of strength development.	2
				3.2	Speed- Means and methods of speed development.	2
				3.3	Endurance- Means and methods of endurance development.	2
				3.4	Flexibility- Means and methods of flexibility development.	2
		INTERNAL ASSESSMENT	20	1	**Internal Assessment & class attendance**	1
		SEC3: Indian Games and Racket Sports.	20	1.	1. Basic Knowledge: Various parts of the Racket and Grip.	2
				2.	2. Service: Short service, Long service, Long-high service.	2
		BADMINTON		3.	3. Shots: Over head shot, Defensive clear shot, Attacking clear shot, Drop shot, Net shot, Smash.	3
		A. Fundamental skills		4.	4. Game practice with application of Rules and Regulations.	2
				B.	B. Rules and their interpretations and duties of the officials.	3
		TABLE TENNIS		1.	1. Basic Knowledge: Various parts of the Racket and Grip (Shake Hand & Pen Hold Grip).	2
		A. Fundamental skills		2.	2. Stance: Alternate & Parallel.	2
				3.	3. Push and Service: Backhand & Forehand.	2
				4.	4. Chop: Backhand & Forehand.	2
				5.	5. Receive: Push and Chop with both Backhand & Forehand.	2
				6.	6. Game practice with application of Rules and Regulations.	2
				B.	B. Rules and their interpretations and duties of the officials.	2
		INTERNAL ASSESSMENT	10	1	**Internal Assessment & class attendance**	1

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SEMESTER-2 (January-Jun), Corse Code- CC1B, SESSION: 2020-2021,

CORE PAPER- 2: Management of Physical Education and Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Unit- II: Tournaments	10	2.1	Tournaments: Meaning and definition and types of tournaments (Knock-out, League, Combination, Challenge).	4
				2.2	Procedure of drawing fixture.	3
				2.3	Method of organising Annual Athletic Meet and Play Day.	3
				2.4	Method of organising of Intramural and Extramural competition.	3
		Unit- IV: Leadership	10	4.2	Meaning and definition of leadership.	2
				4.3	Principles of leadership activities.	3
				4.4	Qualities of good leader in Physical Education.	3
				4.2	Hierarchy of Leadership in School, College and University level.	3
		Practica	20	1	Track and Field events (any one).	3
		Lay out knowledge and Officiating ability-		2	Games: Football, Kabaddi, Kho-Kho and Volleyball (any one).	4

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CORE PAPER- 2: Management of Physical Education and Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- I: Introduction	10	1.1	Concept and definition of Sports Management.	2
				1.2	Important of Sports Management.	2
				1.3	Purpose of Sports Management.	2
				1.4	Principles of Sports Management.	3
		Unit- III: Facilities and Equipment	10	3.1	Method of calculation of Standard Athletic Track marking.	3
				3.2	Care and maintenance of play ground and gymnasium.	3
				3.3	Importance, care and maintenance of sports Equipment.	2
				3.4	Time Table: Meaning, importance and factors affecting school's physical education Time Table.	3
		INTERNAL ASSESSMENT	15	1	Internal assessment & class attendance	1

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SEMESTER-4, (January-Jun), Corse Code- CC1D, & SEC2, SESSION: 2020-2021,

SUBJECT: CORE PAPER- 4: Health Education, Physical Fitness and Wellness

SEC2: Gymnastics and Yoga

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS		CLASS
1.	MD YUSUF ALI	Unit- II: Health Problems in India- Prevention and Control	10	2.1	Communicable Diseases- Malaria, Dengue and Chicken Pox and Diarrhoea.		3
				2.2	Non-communicable Diseases- Obesity, Diabetes and AIDS, Asthma.		2
				2.3	Nutrition- Nutritional requirements for daily living. Balance Diet. Health disorders due to deficiencies of Vitamins and Minerals.		3
				2.4	Postural deformities- Causes and corrective exercise of Kyphosis, Lordosis, Scoliosis, Knock Knees and Flat Foot.		3
		Unit- IV: Health and First-aid Management	10	4.1	First aid- Meaning, definition, importance and golden rules of First-aid.		3
				4.2	Concept of sports injuries- Sprain, Strain, Facture and Dislocation.		3
				4.3	Management of sports injuries through the application of Hydro-therapy and Thermo- therapy.		3
				4.4	Management of sports injuries through the application of Exercise and Massage therapy.		3
		PRACTICAL	20	1.	First-aid Practical- Triangular Bandage: Slings (Arm Sling, Collar & Cuff Sling), Roller Bandages: Simple Spiral, Reverse Spiral, Figure of Eight, Spica.		2
					Practical knowledge on Hydro-therapy and Thermo-therapy.		2
		SEC2: UNIT-3 & 4: Asanas & Pranayama (any two) SEC2: UNIT-3 & 4: Asanas & Pranayama (any two)	20	3.1	Standing Position	3.1.1 Ardhachandrasana, 3.1.2 Brikshasana, 3.1.3 Padahastasana	1
				3.2	Sitting Position	3.2.1Ardhakurmasana, 3.2.2 Paschimottanasana 3.2.3Gomukhasana	1
				3.3	Supine Position	3.3.1Setubandhasana, 3.3.2 Halasana, 3.3.3Matsyasana	1
				3.4	Prone Position	3.4.1 Bhujangasana, 3.4.2 Salvasana, 3.4.3 Dhanurasana	1
				3.5	Inverted Position	3.5.1 Sarbangasana, 3.5.2 Shirsasana, 3.5.3 Bhagrasana	1
				1.	Pranayama (any two)	4.1 Kapalbhati, 4.2 Bhramri, 4.3 Anulam Vilom	1

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SEMESTER-4, (January-Jun), Corse Code- CC1D, & SEC2, SESSION: 2020-2021,

SUBJECT: CORE PAPER- 4: Health Education, Physical Fitness and Wellness

SEC2: Gymnastics and Yoga

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- I: Introduction	10	1.1	Concept, definition and dimension of Health.	3
				1.2	Definition, aim, objectives and principles of Health Education.	2
				1.3	Health Agencies- World Health Organization (WHO), United Nations Educational Scientific and Cultural Organization (UNESCO).	3
				1.4	**School Health Program- Health Service, Health Instruction, Health Supervision, Health appraisal and Health Record.**	3
		Unit- III: Physical Fitness and Wellness	10	3.1	Physical Fitness- Meaning, definition and Importance of Physical Fitness.	3
				3.2	Components of Physical Fitness- Health and Performance related Physical Fitness.	3
				3.3	Concept of Wellness. Relationship between Physical activities and Wellness.	2
				3.4	Ageing- Physical activities and its importance	2
		INTERNAL ASSESSMENT	15	1	**Internal Assessment & class attendance**	1
		SEC2: UNIT-1 & 2: GYMNASTICS	20	1	**1.1 Forward Roll, 1.1 T-Balance, 1.1 Forward Roll with Split leg, 1.1 Backward Roll, 1.1 Cart-Wheel**	2
		SEC1: INTERNAL ASSESSMENT	10	2	**2.1 Dive and Forward Roll, 2.2 Hand Spring, 2.3 Head Spring, 2.4 Neck Spring, 2.5 Hand Stand and Forward Roll, 2.6 Summersault**	**2**

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SEMESTER-6, (January-Jun), Corse Code- DSE 1B, SESSION: 2020-2021,

SUBJECT: Psychology in Physical Education and Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Unit- I: Introduction	10	1.1	Meaning and definition Psychology.	3
				1.2	Importance and scope of Psychology.	2
				1.3	Meaning and definition Sports Psychology.	2
				1.4	Need for knowledge of Sports Psychology in the field of Physical Education.	3
		Unit- IV: Stress and Anxiety	10	4.1	Stress- Meaning, definition and types of Stress.	3
				4.2	Causes of Stress.	2
				4.3	Anxiety- Meaning, definition and types of Anxiety.	3
				4.4	Management of Stress and Anxiety through physical activity and sports.	3
		INTERNAL ASSESSMENT	15	1	Internal Assessment & class attendance	1

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SEMESTER-6, (January-Jun), SEC4, SESSION: 2020-2021,

SUBJECT: SEC4: BALL GAMES (Any two)

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	SEC4: BALL GAMES (Any two). FOOTBALL A. Fundamental skills	20	1.	Kicking: Kicking the ball with inside of the foot, Kicking the ball with Full Instep of the foot, Kicking the ball with Inner Instep of the foot, Kicking the ball with Outer Instep of the foot and Lofted Kick.	3
				2.	Trapping: Trapping- the Rolling ball, and the Bouncing ball with sole of the foot.	2
				3.	Dribbling: Dribbling the ball with Instep of the foot, Dribbling the ball with Inner and Outer Instep of the foot.	2
				4.	Heading: In standing, running and jumping condition.	2
				5.	Throw-in: Standing throw-in and Running throw-in.	3
				6.	Feinting: With the lower limb and upper part of the body.	2
				7	Tackling: Simple Tackling, Slide Tackling.	2
				8	Goal Keeping: Collection of Ball, Ball clearance- kicking, throwing and deflecting.	3
				9	Game practice with application of Rules and Regulations.	2
				B.	Rules and their interpretation and duties of officials.	3
		HANDBALL A. Fundamental Skills		1.	Catching, Throwing and Ball control,	2
				2.	Goal Throws: Jump shot, Center shot, Dive shot, Reverse shot.	2
				3.	Dribbling: High and low.	2
				4.	Attack and counter attack, simple counter attack, counter attack from two wings and center.	2
				5.	Blocking, GoalKeeping and Defensive skills.	2
				6.	Game practice with application of Rules and Regulations.	2
				B.	Rules and their interpretation and duties of officials.	2
		BASKETBALL A. Fundamental Skills		1.	Passing: Two hand Chest Pass, Two hands Bounce Pass, One hand Baseball Pass, Side arm Pass, Overhead Pass, Hook Pass.	2
				2.	Receiving: Two hand receiving, One hand receiving, Receiving in stationary position, Receiving while Jumping and Receiving while Running.	2
				3.	Dribbling: How to start dribble, drop dribble, High Dribble, Low Dribble, Reverse Dribble, Rolling Dribble.	2
				4.	Shooting: Lay-up shot and its variations, One hand set shot, Two hands jump shot, Hook shot, Free Throw.	2
				5.	Rebounding: Defensive rebound and Offensive rebound.	2
				6.	Individual Defence: Guarding the player with the ball and without the ball, Pivoting.	2
				7.	Game practice with application of Rules and Regulations.	2
				B.	Rules and their interpretation and duties of officials.	2

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SEMESTER-6, (January-Jun), Corse Code- DSE 1B, SESSION: 2020-2021,

SUBJECT: Psychology in Physical Education and Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- II: Learning	10	2.1	Meaning and definition of learning.	2
				2.2	Theories of learning and Laws of learning.	2
				2.3	Learning curve: Meaning and Types.	3
				2.4	Transfer of learning- Meaning, definition type and factors affecting transfer of learning.	3
		Unit- III: Psychological Factors	10	3.1	Motivation- Meaning, definition, type and importance of Motivation in Physical Education and Sports.	2
				3.2	Emotion- Meaning, definition, type and importance of Emotion in Physical Education and Sports.	3
				3.3	Personality- Meaning, definition and type Personality traits.	3
				3.4	Role of physical activities in the development of personality.	2
		PRACTICAL	20	1.	**Assessment of Personality, Stress and Anxiety (any one)**	2
				2.	**Measurement of Reaction Time, Depth Perception and Mirror Drawing (any one).**	2

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SEMESTER-6, (January-Jun), SEC4, SESSION: 2020-2021,

SUBJECT: SEC4: BALL GAMES (Any two)

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	**SEC4: BALL GAMES (Any two).** **VOLLEYBALL** **A. Fundamental skills**	20	**1.**	Service: Under arm service, Side arm service, Tennis service, Floating service.	3
				2.	Pass: Under arm pass, Over head pass.	2
				3.	Spiking and Blocking.	2
				4.	Game practice with application of Rules and Regulations.	3
				5.	Rules and their interpretation and duties of officials.	2
		NETBALL **A. Fundamental Skills**		**1.**	Catching: one handed, two handed, with feet grounded and in flight.	2
				2.	Throwing (Different passes and their uses): One hand passes (shoulder, high shoulder, underarm, bounce, lob), two hand passes (Push, overhead and bounce).	3
				3.	Footwork: Landing on one foot, landing on two feet, Pivot, Running pass.	3
				4.	Shooting: One hand, forward step shot, and backward step shot.	2
				5.	Techniques of free dodge and sprint, sudden sprint, sprint and stop, sprinting with change at speed.	3
				6.	Defending: Marking the player, marking the ball, blocking, inside the circle, outside the circle. Defending the circle edge against the passing.	2
				7.	Intercepting: Pass and shot.	2
				8.	Game practice with application of Rules and Regulations.	3
				B.	Rules and their interpretation and duties of officials.	2
		THROWBALL **A. Fundamental Skills**		**1.**	Overhand service, Side arm service, two hand catching, one hand overhead return, side arm return.	3
				2.	Rules and their interpretations and duties of officials.	2
		INTERNAL ASSESSMENT	**10**	**1**	**Internal Assessment & class attendance**	1

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SEMESTER-1 (July-dec.) Corse Code- CC1A, SESSION: 2021-2022,

SUBJECT: CORE PAPER-1: FOUNDATION AND HISTORY OF PHYSICAL EDUCATION

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Corse Code- CC1A Unit- I: Introduction	10	1.1	Meaning and definition of Physical Education.	1
				1.2	Aim and objectives of Physical Education.	1
				1.3	Modern concept of Physical Education.	1
				1.4	Importance of Physical Education.	1
		Unit- II: Biological and Sociological Foundations of Physical Education	10	2.1	Biological Foundation- Meaning and definition of growth and development. Factors affecting growth and development. Differences of growth and development. Principles of growth and development.	3
				2.2	Age- Chronological age, anatomical age, physiological age and mental age.	3
				2.3	Sociological Foundation- Meaning and definition of Sociology, Society and Socialization.	2
				2.4	Role of games and sports in National and International integration.	2
		Practical	20	1	Learn and demonstrate the technique of Suryanamaskar.	3
				2	Development of physical fitness through Callisthenics and Aerobic activities.	3

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SEMESTER-1 (July-dec.), Corse Code- CC1A, SESSION: 2021-2022,

SUBJECT: CORE PAPER-1: FOUNDATION AND HISTORY OF PHYSICAL EDUCATION

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- III: History of Physical Education	10	3.1	Historical development of Physical Education and Sports in India- Pre-Independence period and Post-Independence period.	3
				3.2	Olympic Movement- Ancient Olympic Games and Modern Olympic Games.	3
				3.3	Brief historical background of Asian Games and Commonwealth Games.	2
				3.4	National Sports Awards- Arjuna Award, Rajiv Gandhi Khel Ratna Award, Dronacharya Award	3
		Unit- IV: Yoga Education	10	4.1	Meaning and definition of the term Yoga, types, aim, objectives and important of Yoga.	3
				4.2	History of Yoga.	2
				4.3	Astanga Yoga	2
				4.4	Hatha Yoga	2
		INTERNAL ASSESSMENT	15	1	Internal Assessment & class attendance	1

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SEMESTER-3, (July-dec.) Corse Code- CC1C, & SEC1, SESSION: 2021-2022,

SUBJECT: CORE PAPER- 3: Anatomy, Physiology and Exercise Physiology

SEC1: Track and Field

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Unit- I: Introduction	10	1.1	Meaning and definition of Anatomy, Physiology and Exercise Physiology.	3
				1.2	Importance of Anatomy, Physiology and Exercise Physiology in Physical Education.	2
				1.3	Human Cell- Structure and function.	2
				1.4	Tissue- Types and functions.	3
		Unit- II: Musculo-skeletal System	10	2.1	Skeletal System- Structure of Skeletal System. Classification and location of bones and joints. Anatomical differences between male and female.	4
				2.2	Muscular System- Type, location, function and structure of muscle.	3
				2.3	Types of muscular contraction.	3
				2.4	Effect of exercise on muscular system.	3
		INTERNAL ASSESSMENT	15	1	Internal Assessment & class attendance	3
		SEC1: UNIT-2: Field events	20	2.1	Long Jump: Approach Run, Take-off, Flight in the air (Hang Style/Hitch Kick) and Landing.	3
				2.2	High jump: Approach Run, Take-off, Bar Clearance (Straddle) and Landing.	3
				2.3	Shot put: Holding the Shot, Placement, Initial Stance, Glide, Delivery Stance and Recovery (Perry O'Brien Technique).	3
				2.4	Discus Throw: Holding the Discus, Initial Stance, Primary Swing, Turn, Release and Recovery (Rotation in the circle).	3
				2.5	Javelin Throw: Grip, Carry, Release and Recovery (3/5 Impulse stride).	3
		SEC1: INTERNAL ASSESSMENT	10	1	Internal Assessment & class attendance	1

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SEMESTER-3, (July-dec.) Corse Code- CC1C, & SEC1, SESSION: 2021-2022,

SUBJECT: CORE PAPER- 3: Anatomy, Physiology and Exercise Physiology

SEC1: Track and Field

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- III: Circulatory System	10	1.1	Blood- Composition and function.	2
				1.2	Heart- Structure and functions. Mechanism of blood circulation through heart.	3
				1.3	Blood Pressure, Athletic Heart and Bradycardia.	2
				1.4	Effect of exercise on circulatory system.	2
		Unit- IV: Respiratory System	10	2.1	Structure and function of Respiratory organs.	2
				2.2	Mechanism of Respiration.	2
				2.3	Vital Capacity, O2 Debt and Second Wind.	3
				2.4	Effect of exercise on respiratory system.	2
		CC: Practical	20	1	Assessments of BMI and WHR.	2
				2	Assessment of Heart rate, Blood Pressure, Respiratory Rate, and Pick Flow Rate	2
		SEC1: UNIT-1: Track Events	20	1.1	Starting Techniques: Standing start and Crouch start (its variations) use of Block.	3
				1.2	Acceleration with proper running techniques.	3
				1.3	Finishing technique: Run Through, Forward Lunging and Shoulder Shrug.	3
				1.4	Relay Race: Starting, Baton Holding/Carrying, Baton Exchange in between zone, and Finishing	3

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SEMESTER-5, (July-dec.) Corse Code- DSE 1A, & SEC3, SESSION: 2021-2022,

SUBJECT: Sports Training

SEC3: Indian Games and Racket Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Unit- II: Principle of Training and Conditioning	10	2.1	Warming up and Cooling down- Meaning, types and methods.	2
				2.2	Conditioning- Concept of Conditioning and its principles.	3
				2.3	Training Methods- Circuit Training, Interval Training, Weight Training.	2
				2.4	Periodisation- Meaning, types, aim and contents of different periods.	2
		Unit- III: Training Load and Adaptation	10	3.1	Training Load- Meaning, definition, types and factors of training load.	3
				3.2	Components of training load.	2
				3.3	Over Load- Meaning, causes, symptoms and tackling of over load.	3
				3.4	Adaptation- Meaning and conditions of adaptation, Supercompensation.	2
		DSE: Practical	20	1.	Practical Experience of Weight Training and Circuit Training (any one).	2
				2.	Measurement of Speed, Strength (Grip/Leg), Explosive Strength (Leg) and Flexibility (any two).	3
		SEC3: Indian Games and Racket Sports. KABADDI A. Fundamental skills	20	1.	Skills in Raiding: Touching with hands, Use of leg-toe touch, squat leg thrust, side kick, mule kick, arrow fly kick, crossing of baulk line. Crossing of Bonus line.	3
				2.	Skills of holding the raider: Various formations, catching from particular position, different catches, catching formation and techniques.	3
				3.	Additional skills in raiding: Escaping from various holds, techniques of escaping from chain formation, offense and defence.	3
				4.	Game practice with application of Rules and Regulations.	2
		KHO-KHO A. Fundamental skills		B.	Rules and their interpretations and duties of the officials.	2
				1.	Skills in Chasing: Sit on the box (Parallel & Bullet toe method), Get up from the box (Proximal & Distyal foot method), Give Kho (Simple, Early, Late & Judgment), Pole Turn, Pole Dive, Tapping, Hammering, Rectification of foul.	4
				2.	Skills in running: Chain Play, Ring play and Chain & Ring mixed play.	2
				3.	Game practice with application of Rules and Regulations.	2
				B.	Rules and their interpretations and duties of the officials.	2

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SEMESTER-5, (July-dec.) Corse Code- DSE 1A, & SEC3, SESSION: 2021-2022,

SUBJECT: Sports Training

SEC3: Indian Games and Racket Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- I: Introduction	10	2.1	Meaning and definition of Sports Training.	2
				2.2	Aim and characteristics of Sports Training.	2
				2.3	Principles of Sports Training.	2
				2.4	Importance of Sports Training.	2
		Unit- IV: Training Techniques	10	3.1	Strength- Means and methods of strength development.	2
				3.2	Speed- Means and methods of speed development.	2
				3.3	Endurance- Means and methods of endurance development.	2
				3.4	Flexibility- Means and methods of flexibility development.	2
		INTERNAL ASSESSMENT	20	1	Internal Assessment & class attendance	1
		SEC3: Indian Games and Racket Sports.	20	1.	1. Basic Knowledge: Various parts of the Racket and Grip.	2
				2.	2. Service: Short service, Long service, Long-high service.	2
		BADMINTON		3.	3. Shots: Over head shot, Defensive clear shot, Attacking clear shot, Drop shot, Net shot, Smash.	3
		A. Fundamental skills		4.	4. Game practice with application of Rules and Regulations.	2
				B.	B. Rules and their interpretations and duties of the officials.	3
		TABLE TENNIS		1.	1. Basic Knowledge: Various parts of the Racket and Grip (Shake Hand & Pen Hold Grip).	2
		A. Fundamental skills		2.	2. Stance: Alternate & Parallel.	2
				3.	3. Push and Service: Backhand & Forehand.	2
				4.	4. Chop: Backhand & Forehand.	2
				5.	5. Receive: Push and Chop with both Backhand & Forehand.	2
				6.	6. Game practice with application of Rules and Regulations.	2
				B.	B. Rules and their interpretations and duties of the officials.	2
		INTERNAL ASSESSMENT	10	1	Internal Assessment & class attendance	1

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SEMESTER-2 (January-Jun), Corse Code- CC1B, SESSION: 2021-2022,

CORE PAPER- 2: Management of Physical Education and Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Unit- II: Tournaments	10	2.1	Tournaments: Meaning and definition and types of tournaments (Knock-out, League, Combination, Challenge).	4
				2.2	Procedure of drawing fixture.	3
				2.3	Method of organising Annual Athletic Meet and Play Day.	3
				2.4	Method of organising of Intramural and Extramural competition.	3
		Unit- IV: Leadership	10	4.2	Meaning and definition of leadership.	2
				4.3	Principles of leadership activities.	3
				4.4	Qualities of good leader in Physical Education.	3
				4.2	Hierarchy of Leadership in School, College and University level.	3
		Practica	20	1	Track and Field events (any one).	3
		Lay out knowledge and Officiating ability-		2	Games: Football, Kabaddi, Kho-Kho and Volleyball (any one).	4

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SEMESTER-2 (January-Jun), Corse Code- CC1B, SESSION: 2021-2022,

CORE PAPER- 2: Management of Physical Education and Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- I: Introduction	10	1.1	Concept and definition of Sports Management.	2
				1.2	Important of Sports Management.	2
				1.3	Purpose of Sports Management.	2
				1.4	Principles of Sports Management.	3
		Unit- III: Facilities and Equipment	10	3.1	Method of calculation of Standard Athletic Track marking.	3
				3.2	Care and maintenance of play ground and gymnasium.	3
				3.3	Importance, care and maintenance of sports Equipment.	2
				3.4	Time Table: Meaning, importance and factors affecting school's physical education Time Table.	3
		INTERNAL ASSESSMENT	15	1	Internal assessment & class attendance	1

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SEMESTER-4, (January-Jun), Corse Code- CC1D, & SEC2, SESSION: 2021-2022,

SUBJECT: CORE PAPER- 4: Health Education, Physical Fitness and Wellness

SEC2: Gymnastics and Yoga

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS		CLASS
1.	MD YUSUF ALI	Unit- II: Health Problems in India- Prevention and Control	10	2.1	Communicable Diseases- Malaria, Dengue and Chicken Pox and Diarrhoea.		3
				2.2	Non-communicable Diseases- Obesity, Diabetes and AIDS, Asthma.		2
				2.3	Nutrition- Nutritional requirements for daily living. Balance Diet. Health disorders due to deficiencies of Vitamins and Minerals.		3
				2.4	Postural deformities- Causes and corrective exercise of Kyphosis, Lordosis, Scoliosis, Knock Knees and Flat Foot.		3
		Unit- IV: Health and First-aid Management	10	4.1	First aid- Meaning, definition, importance and golden rules of First-aid.		3
				4.2	Concept of sports injuries- Sprain, Strain, Facture and Dislocation.		3
				4.3	Management of sports injuries through the application of Hydro-therapy and Thermo- therapy.		3
				4.4	Management of sports injuries through the application of Exercise and Massage therapy.		3
		PRACTICAL	20	1.	First-aid Practical- Triangular Bandage: Slings (Arm Sling, Collar & Cuff Sling), Roller Bandages: Simple Spiral, Reverse Spiral, Figure of Eight, Spica.		2
					Practical knowledge on Hydro-therapy and Thermo-therapy.		2
		SEC2: UNIT-3 & 4: Asanas & Pranayama (any two) SEC2: UNIT-3 & 4: Asanas & Pranayama (any two)	20	3.1	Standing Position	3.1.1 Ardhachandrasana, 3.1.2 Brikshasana, 3.1.3 Padahastasana	1
				3.2	Sitting Position	3.2.1Ardhakurmasana, 3.2.2 Paschimottanasana 3.2.3Gomukhasana	1
				3.3	Supine Position	3.3.1Setubandhasana, 3.3.2 Halasana, 3.3.3Matsyasana	1
				3.4	Prone Position	3.4.1 Bhujangasana, 3.4.2 Salvasana, 3.4.3 Dhanurasana	1
				3.5	Inverted Position	3.5.1 Sarbangasana, 3.5.2 Shirsasana, 3.5.3 Bhagrasana	1
				1.	Pranayama (any two)	4.1 Kapalbhati, 4.2 Bhramri, 4.3 Anulam Vilom	1

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SEMESTER-4, (January-Jun), Corse Code- CC1D, & SEC2, SESSION: 2021-2022,

SUBJECT: CORE PAPER- 4: Health Education, Physical Fitness and Wellness

SEC2: Gymnastics and Yoga

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- I: Introduction	10	1.1	Concept, definition and dimension of Health.	3
				1.2	Definition, aim, objectives and principles of Health Education.	2
				1.3	Health Agencies- World Health Organization (WHO), United Nations Educational Scientific and Cultural Organization (UNESCO).	3
				1.4	School Health Program- Health Service, Health Instruction, Health Supervision, Health appraisal and Health Record.	3
		Unit- III: Physical Fitness and Wellness	10	3.1	Physical Fitness- Meaning, definition and Importance of Physical Fitness.	3
				3.2	Components of Physical Fitness- Health and Performance related Physical Fitness.	3
				3.3	Concept of Wellness. Relationship between Physical activities and Wellness.	2
				3.4	Ageing- Physical activities and its importance	2
		INTERNAL ASSESSMENT	15	1	Internal Assessment & class attendance	1
		SEC2: UNIT-1 & 2: GYMNASTICS	20	1	1.1 Forward Roll, 1.1 T-Balance, 1.1 Forward Roll with Split leg, 1.1 Backward Roll, 1.1 Cart-Wheel	2
		SEC1: INTERNAL ASSESSMENT	10	2	2.1 Dive and Forward Roll, 2.2 Hand Spring, 2.3 Head Spring, 2.4 Neck Spring, 2.5 Hand Stand and Forward Roll, 2.6 Summersault	2

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SEMESTER-6, (January-Jun), Corse Code- DSE 1B, SESSION: 2021-2022,

SUBJECT: Psychology in Physical Education and Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Unit- I: Introduction	10	1.1	Meaning and definition Psychology.	2
				1.2	Importance and scope of Psychology.	3
				1.3	Meaning and definition Sports Psychology.	2
				1.4	Need for knowledge of Sports Psychology in the field of Physical Education.	2
		Unit- IV: Stress and Anxiety	10	4.1	Stress- Meaning, definition and types of Stress.	3
				4.2	Causes of Stress.	3
				4.3	Anxiety- Meaning, definition and types of Anxiety.	2
				4.4	Management of Stress and Anxiety through physical activity and sports.	3
		INTERNAL ASSESSMENT	15	1	Internal Assessment & class attendance	1

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SEMESTER-6, (January-Jun), SEC4, SESSION: 2021-2022,

SUBJECT: SEC4: BALL GAMES (Any two)

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	SEC4: BALL GAMES (Any two). FOOTBALL A. Fundamental skills	20	1.	Kicking: Kicking the ball with inside of the foot, Kicking the ball with Full Instep of the foot, Kicking the ball with Inner Instep of the foot, Kicking the ball with Outer Instep of the foot and Lofted Kick.	3
				2.	Trapping: Trapping- the Rolling ball, and the Bouncing ball with sole of the foot.	2
				3.	Dribbling: Dribbling the ball with Instep of the foot, Dribbling the ball with Inner and Outer Instep of the foot.	2
				4.	Heading: In standing, running and jumping condition.	2
				5.	Throw-in: Standing throw-in and Running throw-in.	3
				6.	Feinting: With the lower limb and upper part of the body.	2
				7	Tackling: Simple Tackling, Slide Tackling.	2
				8	Goal Keeping: Collection of Ball, Ball clearance- kicking, throwing and deflecting.	3
				9	Game practice with application of Rules and Regulations.	2
				B.	Rules and their interpretation and duties of officials.	3
		HANDBALL A. Fundamental Skills		1.	Catching, Throwing and Ball control,	2
				2.	Goal Throws: Jump shot, Center shot, Dive shot, Reverse shot.	2
				3.	Dribbling: High and low.	2
				4.	Attack and counter attack, simple counter attack, counter attack from two wings and center.	2
				5.	Blocking, GoalKeeping and Defensive skills.	2
				6.	Game practice with application of Rules and Regulations.	2
				B.	Rules and their interpretation and duties of officials.	2
		BASKETBALL A. Fundamental Skills		1.	Passing: Two hand Chest Pass, Two hands Bounce Pass, One hand Baseball Pass, Side arm Pass, Overhead Pass, Hook Pass.	2
				2.	Receiving: Two hand receiving, One hand receiving, Receiving in stationary position, Receiving while Jumping and Receiving while Running.	2
				3.	Dribbling: How to start dribble, drop dribble, High Dribble, Low Dribble, Reverse Dribble, Rolling Dribble.	2
				4.	Shooting: Lay-up shot and its variations, One hand set shot, Two hands jump shot, Hook shot, Free Throw.	2
				5.	Rebounding: Defensive rebound and Offensive rebound.	2
				6.	Individual Defence: Guarding the player with the ball and without the ball, Pivoting.	2
				7.	Game practice with application of Rules and Regulations.	2
				B.	Rules and their interpretation and duties of officials.	2

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SUBJECT: Psychology in Physical Education and Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- II: Learning	10	2.1	Meaning and definition of learning.	2
				2.2	Theories of learning and Laws of learning.	2
				2.3	Learning curve: Meaning and Types.	3
				2.4	Transfer of learning- Meaning, definition type and factors affecting transfer of learning.	3
		Unit- III: Psychological Factors	10	3.1	Motivation- Meaning, definition, type and importance of Motivation in Physical Education and Sports.	2
				3.2	Emotion- Meaning, definition, type and importance of Emotion in Physical Education and Sports.	3
				3.3	Personality- Meaning, definition and type Personality traits.	3
				3.4	Role of physical activities in the development of personality.	2
		PRACTICAL	20	1.	Assessment of Personality, Stress and Anxiety (any one)	2
				2.	Measurement of Reaction Time, Depth Perception and Mirror Drawing (any one).	2

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SEMESTER-6, (January-Jun), SEC4, SESSION: 2021-2022,

SUBJECT: SEC4: BALL GAMES (Any two)

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	SEC4: BALL GAMES (Any two). VOLLEYBALL A. Fundamental skills	20	1.	Service: Under arm service, Side arm service, Tennis service, Floating service.	3
				2.	Pass: Under arm pass, Over head pass.	2
				3.	Spiking and Blocking.	2
				4.	Game practice with application of Rules and Regulations.	3
				5.	Rules and their interpretation and duties of officials.	2
		NETBALL A. Fundamental Skills		1.	Catching: one handed, two handed, with feet grounded and in flight.	2
				2.	Throwing (Different passes and their uses): One hand passes (shoulder, high shoulder, underarm, bounce, lob), two hand passes (Push, overhead and bounce).	3
				3.	Footwork: Landing on one foot, landing on two feet, Pivot, Running pass.	3
				4.	Shooting: One hand, forward step shot, and backward step shot.	2
				5.	Techniques of free dodge and sprint, sudden sprint, sprint and stop, sprinting with change at speed.	3
				6.	Defending: Marking the player, marking the ball, blocking, inside the circle, outside the circle. Defending the circle edge against the passing.	2
				7.	Intercepting: Pass and shot.	2
				8.	Game practice with application of Rules and Regulations.	3
				B.	Rules and their interpretation and duties of officials.	2
		THROWBALL A. Fundamental Skills		1.	Overhand service, Side arm service, two hand catching, one hand overhead return, side arm return.	3
				2.	Rules and their interpretations and duties of officials.	2
		INTERNAL ASSESSMENT	10	1	Internal Assessment & class attendance	1

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SEMESTER-1 (July-dec.) Corse Code- CC1A, SESSION: 2022-2023,

SUBJECT: CORE PAPER-1: FOUNDATION AND HISTORY OF PHYSICAL EDUCATION

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Corse Code- CC1A Unit- I: Introduction	10	1.1	Meaning and definition of Physical Education.	1
				1.2	Aim and objectives of Physical Education.	1
				1.3	Modern concept of Physical Education.	1
				1.4	Importance of Physical Education.	1
		Unit- II: Biological and Sociological Foundations of Physical Education	10	2.1	Biological Foundation- Meaning and definition of growth and development. Factors affecting growth and development. Differences of growth and development. Principles of growth and development.	3
				2.2	Age- Chronological age, anatomical age, physiological age and mental age.	3
				2.3	Sociological Foundation- Meaning and definition of Sociology, Society and Socialization.	2
				2.4	Role of games and sports in National and International integration.	2
		Practical	20	1	Learn and demonstrate the technique of Suryanamaskar.	3
				2	Development of physical fitness through Callisthenics and Aerobic activities.	3

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SUBJECT: CORE PAPER-1: FOUNDATION AND HISTORY OF PHYSICAL EDUCATION

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- III: History of Physical Education	10	3.1	Historical development of Physical Education and Sports in India- Pre-Independence period and Post-Independence period.	3
				3.2	Olympic Movement- Ancient Olympic Games and Modern Olympic Games.	3
				3.3	Brief historical background of Asian Games and Commonwealth Games.	2
				3.4	National Sports Awards- Arjuna Award, Rajiv Gandhi Khel Ratna Award, Dronacharya Award	3
		Unit- IV: Yoga Education	10	4.1	Meaning and definition of the term Yoga, types, aim, objectives and important of Yoga.	3
				4.2	History of Yoga.	2
				4.3	Astanga Yoga	2
				4.4	Hatha Yoga	2
		INTERNAL ASSESSMENT	15	1	Internal Assessment & class attendance	1

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SEMESTER-3, (July-dec.) Corse Code- CC1C, & SEC1, SESSION: 2022-2023,

SUBJECT: CORE PAPER- 3: Anatomy, Physiology and Exercise Physiology

SEC1: Track and Field

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Unit- I: Introduction	10	1.1	Meaning and definition of Anatomy, Physiology and Exercise Physiology.	3
				1.2	Importance of Anatomy, Physiology and Exercise Physiology in Physical Education.	2
				1.3	Human Cell- Structure and function.	2
				1.4	Tissue- Types and functions.	3
		Unit- II: Musculo-skeletal System	10	2.1	Skeletal System- Structure of Skeletal System. Classification and location of bones and joints. Anatomical differences between male and female.	4
				2.2	Muscular System- Type, location, function and structure of muscle.	3
				2.3	Types of muscular contraction.	3
				2.4	Effect of exercise on muscular system.	3
		INTERNAL ASSESSMENT	15	1	Internal Assessment & class attendance	3
		SEC1: UNIT-2: Field events	20	2.1	Long Jump: Approach Run, Take-off, Flight in the air (Hang Style/Hitch Kick) and Landing.	3
				2.2	High jump: Approach Run, Take-off, Bar Clearance (Straddle) and Landing.	3
				2.3	Shot put: Holding the Shot, Placement, Initial Stance, Glide, Delivery Stance and Recovery (Perry O'Brien Technique).	3
				2.4	Discus Throw: Holding the Discus, Initial Stance, Primary Swing, Turn, Release and Recovery (Rotation in the circle).	3
				2.5	Javelin Throw: Grip, Carry, Release and Recovery (3/5 Impulse stride).	3
		SEC1: INTERNAL ASSESSMENT	10	1	Internal Assessment & class attendance	1

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SEMESTER-3, (July-dec.) Corse Code- CC1C, & SEC1, SESSION: 2022-2023,

SUBJECT: CORE PAPER- 3: Anatomy, Physiology and Exercise Physiology

SEC1: Track and Field

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- III: Circulatory System	10	1.1	Blood- Composition and function.	2
				1.2	Heart- Structure and functions. Mechanism of blood circulation through heart.	3
				1.3	Blood Pressure, Athletic Heart and Bradycardia.	2
				1.4	Effect of exercise on circulatory system.	2
		Unit- IV: Respiratory System	10	2.1	Structure and function of Respiratory organs.	2
				2.2	Mechanism of Respiration.	2
				2.3	Vital Capacity, O2 Debt and Second Wind.	3
				2.4	Effect of exercise on respiratory system.	2
		CC: Practical	20	1	Assessments of BMI and WHR.	2
				2	Assessment of Heart rate, Blood Pressure, Respiratory Rate, and Pick Flow Rate	2
		SEC1: UNIT-1: Track Events	20	1.1	Starting Techniques: Standing start and Crouch start (its variations) use of Block.	3
				1.2	Acceleration with proper running techniques.	3
				1.3	Finishing technique: Run Through, Forward Lunging and Shoulder Shrug.	3
				1.4	Relay Race: Starting, Baton Holding/Carrying, Baton Exchange in between zone, and Finishing	3

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SEMESTER-5, (July-dec.) Corse Code- DSE 1A, & SEC3, SESSION: 2022-2023,

SUBJECT: Sports Training

SEC3: Indian Games and Racket Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Unit- II: Principle of Training and Conditioning	10	2.1	Warming up and Cooling down- Meaning, types and methods.	2
				2.2	Conditioning- Concept of Conditioning and its principles.	3
				2.3	Training Methods- Circuit Training, Interval Training, Weight Training.	2
				2.4	Periodisation- Meaning, types, aim and contents of different periods.	2
		Unit- III: Training Load and Adaptation	10	3.1	Training Load- Meaning, definition, types and factors of training load.	3
				3.2	Components of training load.	2
				3.3	Over Load- Meaning, causes, symptoms and tackling of over load.	3
				3.4	Adaptation- Meaning and conditions of adaptation, Supercompensation.	2
		DSE: Practical	20	1.	Practical Experience of Weight Training and Circuit Training (any one).	2
				2.	Measurement of Speed, Strength (Grip/Leg), Explosive Strength (Leg) and Flexibility (any two).	3
		SEC3: Indian Games and Racket Sports. KABADDI A. Fundamental skills	20	1.	Skills in Raiding: Touching with hands, Use of leg-toe touch, squat leg thrust, side kick, mule kick, arrow fly kick, crossing of baulk line. Crossing of Bonus line.	3
				2.	Skills of holding the raider: Various formations, catching from particular position, different catches, catching formation and techniques.	3
				3.	Additional skills in raiding: Escaping from various holds, techniques of escaping from chain formation, offense and defence.	3
				4.	Game practice with application of Rules and Regulations.	2
		KHO-KHO A. Fundamental skills		B.	Rules and their interpretations and duties of the officials.	2
				1.	Skills in Chasing: Sit on the box (Parallel & Bullet toe method), Get up from the box (Proximal & Distyal foot method), Give Kho (Simple, Early, Late & Judgment), Pole Turn, Pole Dive, Tapping, Hammering, Rectification of foul.	4
				2.	Skills in running: Chain Play, Ring play and Chain & Ring mixed play.	2
				3.	Game practice with application of Rules and Regulations.	2
				B.	Rules and their interpretations and duties of the officials.	2

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SEMESTER-5, (July-dec.) Corse Code- DSE 1A, & SEC3, SESSION: 2022-20223,

SUBJECT: Sports Training

SEC3: Indian Games and Racket Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- I: Introduction	10	2.1	Meaning and definition of Sports Training.	2
				2.2	Aim and characteristics of Sports Training.	2
				2.3	Principles of Sports Training.	2
				2.4	Importance of Sports Training.	2
		Unit- IV: Training Techniques	10	3.1	Strength- Means and methods of strength development.	2
				3.2	Speed- Means and methods of speed development.	2
				3.3	Endurance- Means and methods of endurance development.	2
				3.4	Flexibility- Means and methods of flexibility development.	2
		INTERNAL ASSESSMENT	20	1	Internal Assessment & class attendance	1
		SEC3: Indian Games and Racket Sports.	20	1.	1. Basic Knowledge: Various parts of the Racket and Grip.	2
				2.	2. Service: Short service, Long service, Long-high service.	2
		BADMINTON		3.	3. Shots: Over head shot, Defensive clear shot, Attacking clear shot, Drop shot, Net shot, Smash.	3
		A. Fundamental skills		4.	4. Game practice with application of Rules and Regulations.	2
				B.	B. Rules and their interpretations and duties of the officials.	3
		TABLE TENNIS		1.	1. Basic Knowledge: Various parts of the Racket and Grip (Shake Hand & Pen Hold Grip).	2
		A. Fundamental skills		2.	2. Stance: Alternate & Parallel.	2
				3.	3. Push and Service: Backhand & Forehand.	2
				4.	4. Chop: Backhand & Forehand.	2
				5.	5. Receive: Push and Chop with both Backhand & Forehand.	2
				6.	6. Game practice with application of Rules and Regulations.	2
				B.	B. Rules and their interpretations and duties of the officials.	2
		INTERNAL ASSESSMENT	10	1	Internal Assessment & class attendance	1

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SEMESTER-2 (January-Jun), Corse Code- CC1B, SESSION: 2022-2023,

CORE PAPER- 2: Management of Physical Education and Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	
1.	MD YUSUF ALI	Unit- II: Tournaments	10	2.1	Tournaments: Meaning and definition and types of tournaments (Knock-out, League, Combination, Challenge).	4
				2.2	Procedure of drawing fixture.	3
				2.3	Method of organising Annual Athletic Meet and Play Day.	3
				2.4	Method of organising of Intramural and Extramural competition.	3
		Unit- IV: Leadership	10	4.2	Meaning and definition of leadership.	2
				4.3	Principles of leadership activities.	3
				4.4	Qualities of good leader in Physical Education.	3
				4.2	Hierarchy of Leadership in School, College and University level.	3
		Practica Lay out knowledge and Officiating ability-	20	1	Track and Field events (any one).	3
				2	Games: Football, Kabaddi, Kho-Kho and Volleyball (any one).	4

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SEMESTER-2 (January-Jun), Corse Code- CC1B, SESSION: 2022-2023,

CORE PAPER- 2: Management of Physical Education and Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- I: Introduction	10	1.1	Concept and definition of Sports Management.	4
				1.2	Important of Sports Management.	3
				1.3	Purpose of Sports Management.	3
				1.4	Principles of Sports Management.	3
		Unit- III: Facilities and Equipment	10	3.1	Method of calculation of Standard Athletic Track marking.	2
				3.2	Care and maintenance of play ground and gymnasium.	3
				3.3	Importance, care and maintenance of sports Equipment.	3
				3.4	Time Table: Meaning, importance and factors affecting school's physical education Time Table.	3
		INTERNAL ASSESSMENT	15	1	Internal assessment & class attendance	3

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SEMESTER-4, (January-Jun), Corse Code- CC1D, & SEC2, SESSION: 2022-2023,

SUBJECT: CORE PAPER- 4: Health Education, Physical Fitness and Wellness

SEC2: Gymnastics and Yoga

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS		CLASS
1.	MD YUSUF ALI	Unit- II: Health Problems in India- Prevention and Control	10	2.1	Communicable Diseases- Malaria, Dengue and Chicken Pox and Diarrhoea.		3
				2.2	Non-communicable Diseases- Obesity, Diabetes and AIDS, Asthma.		2
				2.3	Nutrition- Nutritional requirements for daily living. Balance Diet. Health disorders due to deficiencies of Vitamins and Minerals.		3
				2.4	Postural deformities- Causes and corrective exercise of Kyphosis, Lordosis, Scoliosis, Knock Knees and Flat Foot.		3
		Unit- IV: Health and First-aid Management	10	4.1	First aid- Meaning, definition, importance and golden rules of First-aid.		3
				4.2	Concept of sports injuries- Sprain, Strain, Facture and Dislocation.		3
				4.3	Management of sports injuries through the application of Hydro-therapy and Thermo- therapy.		3
				4.4	Management of sports injuries through the application of Exercise and Massage therapy.		3
		PRACTICAL	20	1.	First-aid Practical- Triangular Bandage: Slings (Arm Sling, Collar & Cuff Sling), Roller Bandages: Simple Spiral, Reverse Spiral, Figure of Eight, Spica.		2
					Practical knowledge on Hydro-therapy and Thermo-therapy.		2
		SEC2: UNIT-3 & 4: Asanas & Pranayama (any two) SEC2: UNIT-3 & 4: Asanas & Pranayama (any two)	20	3.1	Standing Position	3.1.1 Ardhachandrasana, 3.1.2 Brikshasana, 3.1.3 Padahastasana	1
				3.2	Sitting Position	3.2.1Ardhakurmasana, 3.2.2 Paschimottanasana 3.2.3Gomukhasana	1
				3.3	Supine Position	3.3.1Setubandhasana, 3.3.2 Halasana, 3.3.3Matsyasana	1
				3.4	Prone Position	3.4.1 Bhujangasana, 3.4.2 Salvasana, 3.4.3 Dhanurasana	1
				3.5	Inverted Position	3.5.1 Sarbangasana, 3.5.2 Shirsasana, 3.5.3 Bhagrasana	1
				1.	Pranayama (any two)	4.1 Kapalbhati, 4.2 Bhramri, 4.3 Anulam Vilom	1

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SUBJECT: CORE PAPER- 4: Health Education, Physical Fitness and Wellness

SEC2: Gymnastics and Yoga

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- I: Introduction	10	1.1	Concept, definition and dimension of Health.	3
				1.2	Definition, aim, objectives and principles of Health Education.	2
				1.3	Health Agencies- World Health Organization (WHO), United Nations Educational Scientific and Cultural Organization (UNESCO).	3
				1.4	School Health Program- Health Service, Health Instruction, Health Supervision, Health appraisal and Health Record.	3
		Unit- III: Physical Fitness and Wellness	10	3.1	Physical Fitness- Meaning, definition and Importance of Physical Fitness.	3
				3.2	Components of Physical Fitness- Health and Performance related Physical Fitness.	3
				3.3	Concept of Wellness. Relationship between Physical activities and Wellness.	2
				3.4	Ageing- Physical activities and its importance	2
		INTERNAL ASSESSMENT	15	1	Internal Assessment & class attendance	1
		SEC2: UNIT-1 & 2: GYMNASTICS	20	1	1.1 Forward Roll, 1.1 T-Balance, 1.1 Forward Roll with Split leg, 1.1 Backward Roll, 1.1 Cart-Wheel	2
		SEC1: INTERNAL ASSESSMENT	10	2	2.1 Dive and Forward Roll, 2.2 Hand Spring, 2.3 Head Spring, 2.4 Neck Spring, 2.5 Hand Stand and Forward Roll, 2.6 Summersault	2

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SEMESTER-6, (January-Jun), Corse Code- DSE 1B, SESSION: 2022-2023,

SUBJECT: Psychology in Physical Education and Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	Unit- I: Introduction	10	1.1	Meaning and definition Psychology.	2
				1.2	Importance and scope of Psychology.	3
				1.3	Meaning and definition Sports Psychology.	2
				1.4	Need for knowledge of Sports Psychology in the field of Physical Education.	2
		Unit- IV: Stress and Anxiety	10	4.1	Stress- Meaning, definition and types of Stress.	3
				4.2	Causes of Stress.	3
				4.3	Anxiety- Meaning, definition and types of Anxiety.	2
				4.4	Management of Stress and Anxiety through physical activity and sports.	3
		INTERNAL ASSESSMENT	15	1	Internal Assessment & class attendance	1

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SEMESTER-6, (January-Jun), SEC4, SESSION: 2022-2023,

SUBJECT: SEC4: BALL GAMES (Any two)

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
1.	MD YUSUF ALI	SEC4: BALL GAMES (Any two). FOOTBALL A. Fundamental skills	20	1.	Kicking: Kicking the ball with inside of the foot, Kicking the ball with Full Instep of the foot, Kicking the ball with Inner Instep of the foot, Kicking the ball with Outer Instep of the foot and Lofted Kick.	3
				2.	Trapping: Trapping- the Rolling ball, and the Bouncing ball with sole of the foot.	2
				3.	Dribbling: Dribbling the ball with Instep of the foot, Dribbling the ball with Inner and Outer Instep of the foot.	2
				4.	Heading: In standing, running and jumping condition.	2
				5.	Throw-in: Standing throw-in and Running throw-in.	3
				6.	Feinting: With the lower limb and upper part of the body.	2
				7	Tackling: Simple Tackling, Slide Tackling.	2
				8	Goal Keeping: Collection of Ball, Ball clearance- kicking, throwing and deflecting.	3
				9	Game practice with application of Rules and Regulations.	2
				B.	Rules and their interpretation and duties of officials.	3
		HANDBALL A. Fundamental Skills		1.	Catching, Throwing and Ball control,	2
				2.	Goal Throws: Jump shot, Center shot, Dive shot, Reverse shot.	2
				3.	Dribbling: High and low.	2
				4.	Attack and counter attack, simple counter attack, counter attack from two wings and center.	2
				5.	Blocking, GoalKeeping and Defensive skills.	2
				6.	Game practice with application of Rules and Regulations.	2
				B.	Rules and their interpretation and duties of officials.	2
		BASKETBALL A. Fundamental Skills		1.	Passing: Two hand Chest Pass, Two hands Bounce Pass, One hand Baseball Pass, Side arm Pass, Overhead Pass, Hook Pass.	2
				2.	Receiving: Two hand receiving, One hand receiving, Receiving in stationary position, Receiving while Jumping and Receiving while Running.	2
				3.	Dribbling: How to start dribble, drop dribble, High Dribble, Low Dribble, Reverse Dribble, Rolling Dribble.	2
				4.	Shooting: Lay-up shot and its variations, One hand set shot, Two hands jump shot, Hook shot, Free Throw.	2
				5.	Rebounding: Defensive rebound and Offensive rebound.	2
				6.	Individual Defence: Guarding the player with the ball and without the ball, Pivoting.	2

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				7.	Game practice with application of Rules and Regulations.	2
				B.	Rules and their interpretation and duties of officials.	2

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SUBJECT: Psychology in Physical Education and Sports

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	Unit- II: Learning	10	2.1	Meaning and definition of learning.	2
				2.2	Theories of learning and Laws of learning.	2
				2.3	Learning curve: Meaning and Types.	3
				2.4	Transfer of learning- Meaning, definition type and factors affecting transfer of learning.	3
		Unit- III: Psychological Factors	10	3.1	Motivation- Meaning, definition, type and importance of Motivation in Physical Education and Sports.	2
				3.2	Emotion- Meaning, definition, type and importance of Emotion in Physical Education and Sports.	3
				3.3	Personality- Meaning, definition and type Personality traits.	3
				3.4	Role of physical activities in the development of personality.	2
		PRACTICAL	20	1.	Assessment of Personality, Stress and Anxiety (any one)	2
				2.	Measurement of Reaction Time, Depth Perception and Mirror Drawing (any one).	2

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SEMESTER-6, (January-Jun), SEC4, SESSION: 2022-2023,

SUBJECT: SEC4: BALL GAMES (Any two)

S.L NO.	TEACHER NAME	UNIT	MARKS	CHAPTER	SYLLABUS	CLASS
2.	MUHAMMAD ALI SAIKH	SEC4: BALL GAMES (Any two). VOLLEYBALL A. Fundamental skills	20	1.	Service: Under arm service, Side arm service, Tennis service, Floating service.	3
				2.	Pass: Under arm pass, Over head pass.	2
				3.	Spiking and Blocking.	2
				4.	Game practice with application of Rules and Regulations.	3
				5.	Rules and their interpretation and duties of officials.	2
		NETBALL A. Fundamental Skills		1.	Catching: one handed, two handed, with feet grounded and in flight.	2
				2.	Throwing (Different passes and their uses): One hand passes (shoulder, high shoulder, underarm, bounce, lob), two hand passes (Push, overhead and bounce).	3
				3.	Footwork: Landing on one foot, landing on two feet, Pivot, Running pass.	3
				4.	Shooting: One hand, forward step shot, and backward step shot.	2
				5.	Techniques of free dodge and sprint, sudden sprint, sprint and stop, sprinting with change at speed.	3
				6.	Defending: Marking the player, marking the ball, blocking, inside the circle, outside the circle. Defending the circle edge against the passing.	2
				7.	Intercepting: Pass and shot.	2
				8.	Game practice with application of Rules and Regulations.	3
				B.	Rules and their interpretation and duties of officials.	2
		THROWBALL A. Fundamental Skills		1.	Overhand service, Side arm service, two hand catching, one hand overhead return, side arm return.	3
				2.	Rules and their interpretations and duties of officials.	2
		INTERNAL ASSESSMENT	10	1	Internal Assessment & class attendance	1

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Syllabus Distribution for the academic session 2022-23

B.Sc. Honours. in Computer Science

Name of the Teacher- Sadekul Islam(SI)

Year /Part	SEM	Paper	Marks -Theory(T) /Practical(P)	Group	Title	Credit
I	I	CC1	40-T	A	Computer Fundamental and Programming using C	4
			20-P	B	Programming using C Lab	2
		CC2	40-T	A	Digital System Design	4
			20-P	B	Digital System Design Lab	2
		GE1	40-T	A	Computer Fundamental and Programming using C	4
			20-P	B	Programming using C Lab	2
	II	CC3	40-T	A	Programming in C++	4
			20-P		Programming in C++ Lab	2
		CC4	60-T	A	Computer System Architecture	6
		GE2	40-T	A	Database Management Systems	4
			20-P	B	Database Management Systems Lab	2
2	III	CC5	40-T	A	Data Structures	4
			20-P	B	Data Structures Lab	2
		CC6	40-T	A	Design and Analysis of Algorithms	4
			20-P	B	Design and Analysis of Algorithms Lab	2
		CC7	40-T	A	Discrete Structures	6
		GE1	40-T	A	Computer Fundamental and Programming using C	4
			20-P	B	Programming using C Lab	2
	IV	CC8	60-T	A	Operating System	6
		CC9	60-T	A	Computer Networks	6
		CC10	40-T	A	Database Management Systems	4
			20-P	B	Database Management Systems Lab	2
		GE2	40-T	A	Database Management Systems	4
			20-P	B	Database Management Systems Lab	2
3	V	CC11	60-T	A	Theory of Computation	6
		CC12	40-T	A	Internet Technologies	4
			20-P	B	Internet Technologies LAB	2
		DSE1	40-T	A	Microprocessor/ Digital Image Processing	6
			20-T	B	Microprocessor/ Digital Image Processing Lab	
		DSE2	40-T	A	Numerical Methods/ Machine Learning	4
			20-P	B	Numerical Methods/ Machine Learning Lab	2
	VI	CC13	60-T	A	Software Engineering	6
		CC14	40-T	A	Computer Graphics	4
			20-T	B	Computer Graphics Lab	2
		DDSE3	40-T	A	System Programming/Introduction to Data Science	4
			20-P	B	System Programming/Introduction to Data Science Lab	2
		DSE4	60-p	A	Project Work/Dissertation	6

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1	I	CC1	40-T	A	Computer Fundamental and Programming using C	4
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		CC2	40-T	A	Digital System Design	4
			20-P	B	Digital System Design Lab	2
		GE1	40-T	A	Computer Fundamental and Programming using C	4
			20-P	B	Programming using C Lab	2
	II	CC3	40-T	A	Programming in C++	4
			20-P		Programming in C++ Lab	2
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1	I	CC1	40-T	A	Computer Fundamental and Programming using C	4
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			20-P	B	Database Management Systems Lab	2
3		VII	80-T	A	Graph Theory	2
				B	Discrete Mathetical Structures	2
				C	Numerical Optimization Techniques	2
				D	Formal Language and Automata Theory	2
		VIII	80-T	A	Graphics	2
				B	Computer Organization-II	2
				C	Data Communication & Computer Network, Internet Technology	2
		IX	80-T	A	Software Engineering	2
				B	Data Base Management System	2
				C	System Software	3
		X	80-P	A	RDBMS	3
				B	Unix Shell Programming	6
		XI	80-P	A	Project	

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1	I	CC1	40-T	A	Computer Fundamental and Programming using C	4
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		GE2	40-T	A	Database Management Systems	4
			20-P	B	Database Management Systems Lab	2
2		IV	50-T	A	Computer Organization-I	4
				B	Microprocessor	2
		V	50-T	A	Data Structures	4
				B	Object Oriented Programming	2
		VI	100-P	A	Hardware: Microprocessor	3
				B	Software: Object Oriented Programming	3
3		VII	80-T	A	Graph Theory	2
				B	Discrete Mathetical Structures	2
				C	Numerical Optimization Techniques	2
				D	Formal Language and Automata Theory	2
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				B	Computer Organization-II	2
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				B	Data Base Management System	2
				C	System Software	2
		X	80-P	A	RDBMS	3
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		XI	80-P	A	Project	6

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Distribution of Syllabus 2016-2017 Session (Part-I)

NAME OF TEACHER	Year	PAPER	CONTENT
Achintya Kumar Gangopadhyay	Part-I	Paper -1	সাহিত্যের ইতিহাস প্রাচীন ও মধ্যযুগ (চর্যাপদ, তুর্কী আক্রমণ, শ্রীকৃষ্ণকীর্তন, বৈষ্ণব পদাবলী)
		Paper -1	সাহিত্যের ইতিহাস আধুনিক যুগ (কাব্য)
		Paper -2	অলংকার
		Paper -2	বৈষ্ণব পদাবলী
Soma Karmakar	Part-I	Paper -1	সাহিত্যের ইতিহাস মধ্যযুগ (মঙ্গলকাব্য)
		Paper -1	সাহিত্যের ইতিহাস আধুনিক যুগ (উপন্যাস, ছোটগল্প)
		Paper -1	ভাষাতত্ত্ব (পর্ব- ঋ,ঞ, ট, ঠ)
		Paper -2	রামায়ণ
Jahangir Hussein	Part-I	Paper -1	সাহিত্যের ইতিহাস প্রাচীন যুগ (আরাকান সাহিত্য, শাক্ত পদাবলী)
		Paper -1	সাহিত্যের ইতিহাস আধুনিক যুগ (নাটক ও সাময়িক পত্র)
		Paper -1	ভাষাতত্ত্ব (পর্ব- ক, খ, গ,ঘ)
		Paper -2	ছন্দ
Rabiul Hague	Part-I	Paper -1	সাহিত্যের ইতিহাস প্রাচীন যুগ (অনুবাদ সাহিত্য, জীবনী সাহিত্য)
		Paper -1	সাহিত্যের ইতিহাস আধুনিক যুগ (গদ্য ও প্রবন্ধ)
		Paper -1	ভাষাতত্ত্ব (পর্ব- ঙ, চ, ছ,জ)
		Paper - 2	অন্নদামঙ্গল

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Distribution of Syllabus 2016-2017 Session (Part-II)

NAME OF TEACHER	Year	PAPER	CONTENT
Achintya Kumar Gangopadhyay	Part-II	Paper-3	কপালকুণ্ডলা
		Paper- 4	নির্বাচিত সমালোচনা সংকলন (পর্ব- গ)
Soma Karmakar	Part-II	Paper- 3	ঘরে বাইরে
		Paper- 4	প্রবন্ধ সাহিত্যের রূপভেদ
		Paper- 4	প্রবন্ধ সঙ্কলন (পর্ব-ঙ)
Jahangir Hussein	Part-II	Paper- 3	গৃহদাহ
		Paper- 4	নির্বাচিত প্রবন্ধ (পর্ব –খ)
Rabiul Hague	Part-II	Paper- 3	কথাসাহিত্যের রূপভেদ
		Paper- 3	গল্পগুচ্ছ
		Paper- 4	পালামৌ

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Distribution of Syllabus 2016-2017 Session (Part-III)

NAME OF TEACHER	Year	PAPER	CONTENT
Achintya Kumar Gangopadhyay	Part-III	Paper- 5	এবং ইন্দ্রজিৎ
		Paper- 6	আধুনিক কবিতা
		Paper- 6	চিত্রা
		Paper- 7	চিলেকোঠার সেপাই
		Paper- 8	ইংরেজি সাহিত্যের ইতিহাস
		Paper- 8	কাব্য জিজ্ঞাসা
		Paper- 8	কাব্যসৌন্দর্য বিচার
Soma Karmakar	Part-III	Paper- 5	ডাকঘর
		Paper- 6	কাব্যের রূপরীতি
		Paper- 6	বীরাঙ্গনা
		Paper- 7	কবি
		Paper- 8	লোকসাহিত্য
Jahangir Hussein	Part-III	Paper- 5	[illegible]
		Paper- 5	[illegible]
		Paper- 6	সঞ্চিতা
		Paper- 7	পথের পাঁচালী
		Paper- 8	সাহিত্যের পথে
		Paper- 8	সাহিত্যের [illegible]
Rabiul Hague	Part-III	Paper- 5	নাটকের রূপরীতি
		Paper- 6	[illegible]
		Paper- 7	অরণ্যের অধিকার
		Paper- 7	আধুনিক গল্প
		Paper - 8	সংস্কৃত সাহিত্যের ইতিহাস

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DEPARTMENT OF BENGALI

Distribution of Syllabus 2017-2018 Session (Part-I)

NAME OF TEACHER	Year	PAPER	CONTENT
Dr. Achintya Kumar Gangopadhyay	Part-I	Paper -1	সাহিত্যের ইতিহাস প্রাচীন ও মধ্যযুগ (চর্যাপদ, তুর্কী আক্রমণ, শ্রীকৃষ্ণকীর্তন, বৈষ্ণব পদাবলী)
		Paper -1	সাহিত্যের ইতিহাস আধুনিক যুগ (কাব্য)
		Paper -2	অলংকার
		Paper -2	বৈষ্ণব পদাবলী
Soma Karmakar	Part-I	Paper -1	সাহিত্যের ইতিহাস মধ্যযুগ (মঙ্গলকাব্য)
		Paper -1	সাহিত্যের ইতিহাস আধুনিক যুগ (উপন্যাস, ছোটগল্প)
		Paper -1	ভাষাতত্ত্ব (পর্ব- ঋ,ঞ, ট, ঠ)
		Paper -2	রামায়ণ
Jahangir Hussein	Part-I	Paper -1	সাহিত্যের ইতিহাস প্রাচীন যুগ (আরাকান সাহিত্য, শাক্ত পদাবলী)
		Paper -1	সাহিত্যের ইতিহাস আধুনিক যুগ (নাটক ও সাময়িক পত্র)
		Paper -1	ভাষাতত্ত্ব (পর্ব- ক, খ, গ,ঘ)
		Paper -2	ছন্দ
Rabiul Hague	Part-I	Paper -1	সাহিত্যের ইতিহাস প্রাচীন যুগ (অনুবাদ সাহিত্য, জীবনী সাহিত্য)
		Paper -1	সাহিত্যের ইতিহাস আধুনিক যুগ (গদ্য ও প্রবন্ধ)
		Paper -1	ভাষাতত্ত্ব (পর্ব- ঙ, চ, ছ,জ)
		Paper - 2	অন্নদামঙ্গল

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Distribution of Syllabus 2017-2018 Session (Part-II)

NAME OF TEACHER	Year	PAPER	CONTENT
Dr. Achintya Kumar Gangopadhyay	Part-II	Paper-3	কপালকুণ্ডলা
		Paper- 4	নির্বাচিত সমালোচনা সংকলন (পর্ব- গ)
Soma Karmakar	Part-II	Paper- 3	ঘরে বাইরে
		Paper- 4	প্রবন্ধ সাহিত্যের রূপভেদ
		Paper- 4	প্রবন্ধ সঙ্কলন (পর্ব-ঙ)
Jahangir Hussein	Part-II	Paper- 3	গৃহদাহ
		Paper- 4	নির্বাচিত প্রবন্ধ (পর্ব -খ)
Rabiul Hague	Part-II	Paper- 3	কথাসাহিত্যের রূপভেদ
		Paper- 3	গল্পগুচ্ছ
		Paper- 4	পালামৌ

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Distribution of Syllabus 2017-2018 Session (Part-III)

NAME OF TEACHER	Year	PAPER	CONTENT
Dr. Achintya Kumar Gangopadhyay	Part-III	Paper- 5	এবং ইন্দ্রজিৎ
		Paper- 6	আধুনিক কবিতা
		Paper- 6	চিত্রা
		Paper- 7	চিলেকোঠার সেপাই
		Paper- 8	ইংরেজি সাহিত্যের ইতিহাস
		Paper- 8	কাব্য জিজ্ঞাসা
		Paper- 8	কাব্যসৌন্দর্য বিচার
Soma Karmakar	Part-III	Paper- 5	[illegible]
		Paper- 6	কাব্যের রূপরীতি
		Paper- 6	[illegible]
		Paper- 7	কবি
		Paper- 8	লোকসাহিত্য
Jahangir Hussein	Part-III	Paper- 5	[illegible]
		Paper- 5	পুরাকথা
		Paper- 6	সঞ্চিতা
		Paper- 7	পথের পাঁচালী
		Paper- 8	সাহিত্যের পথে
		Paper- 8	সাহিত্যের স্বরূপ
Rabiul Hague	Part-III	Paper- 5	নাটকের রূপরীতি
		Paper- 6	[illegible]
		Paper- 7	অরণ্যের অধিকার
		Paper- 7	আধুনিক গল্প
		Paper - 8	সংস্কৃত সাহিত্যের ইতিহাস

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Dr. Achintya Kumar Gangopadhyay	Part-II	Paper-3	কপালকুণ্ডলা
		Paper- 4	নির্বাচিত সমালোচনা সংকলন (পর্ব- গ)
Soma Karmakar	Part-II	Paper- 3	ঘরে বাইরে
		Paper- 4	প্রবন্ধ সঙ্কলন (পর্ব-ঙ)
Tamal Kanti Pal	Part-II	Paper- 3	গৃহদাহ
		Paper- 4	নির্বাচিত প্রবন্ধ (পর্ব -খ)
Motiur Biswas	Part-II	Paper- 3	কথাসাহিত্যের রূপভেদ
		Paper- 3	গল্পগুচ্ছ
Rejuanur Jaman Shah	Part-II	Paper- 4	প্রবন্ধ সাহিত্যের রূপভেদ
		Paper- 4	পালামৌ

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NAME OF TEACHER	Year	PAPER	CONTENT
Dr. Achintya Kumar Gangopadhyay	Part-III	Paper- 5	এবং ইন্দ্রজিৎ
		Paper- 6	আধুনিক কবিতা
		Paper- 7	ডিসেকেটর দেপাই
		Paper- 8	ইংরাজি সাহিত্যের ইতিহাস
		Paper- 8	কাব্য জিজ্ঞাসা
Soma Karmakar	Part-III	Paper- 6	কাব্যের রূপরীতি
		Paper- 6	বীরাঙ্গনা
		Paper- 7	কবি
		Paper- 8	লোকসাহিত্য
		Paper- 8	কাব্যসৌন্দর্য বিচার
Tamal Kanti Pal	Part-III	Paper- 5	রঙ্গমঞ্চ ও থিয়েটারের ধার
		Paper- 5	ডাকঘর
		Paper- 6	অঙ্গকথা
		Paper- 8	সাহিত্যের পথে
Motiur Biswas	Part-III	Paper- 5	নাটকের রূপরীতি
		Paper- 5	নূরুলদীন
		Paper- 6	গঙ্গিতা
		Paper- 7	পথের পাঁচালী
		Paper- 8	সাহিত্যের নানারূপ
Rejuanur Jaman Shah	Part-III	Paper- 6	চিত্রা
		Paper- 7	অরণ্যের অধিকার
		Paper- 7	আধুনিক গল্প
		Paper - 8	সংস্কৃত সাহিত্যের ইতিহাস

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Distribution of Syllabus 2018-2019 Session (1st SEMESTER)

NAME OF TEACHER	SEMESTER	PAPER	CONTENT
Dr. Achintya Kumar Gangopadhyay	1st semester	BNG-H-CC-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ্যযুগ)
		BNG-H-CC-T-2	বাংলা সাহিত্যের ইতিহাস
		BNG-H-GE-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ্যযুগ)
		BNG-G-AECC-T-1	বাংলা
Soma Karmakar	1st semester	BNG-H-CC-T-1	বাংলা ভাষাতত্ত্ব (প্রথম ভাগ)
		BNG-H-CC-T-2	বাংলা ভাষাতত্ত্ব (দ্বিতীয় ভাগ)
		BNG-H-GE-T-1	ছন্দ
		BNG-G-CC-T-1	ছন্দ ও অলঙ্কার
		BNG-G-AECC-T-1	ছোটগল্প
Tamal Kanti Pal	1st semester	BNG-H-CC-T-1	বাংলা সাহিত্যের ইতিহাস (মধ্যযুগ)
		BNG-H-CC-T-2	বাংলা সাহিত্যের ইতিহাস (আধুনিক যুগ)
		BNG-H-GE-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ্যযুগ)
		BNG-G-AECC-T-1	কবিতা
Motiur Biswas	1st semester	BNG-H-CC-T-1	বাংলা সাহিত্যের ইতিহাস (মধ্যযুগ)
		BNG-H-CC-T-2	বাংলা সাহিত্যের ইতিহাস (আধুনিক যুগ)
		BNG-H-GE-T-1	বৈষ্ণব পদাবলী
		BNG-G-CC-T-1	বৈষ্ণব পদাবলী
Rejanur Jaman Shah	1st semester	BNG-H-CC-T-1	বাংলাসাহিত্যেরইতিহাস (প্রাচীন ও মধ্যযুগ)
		BNG-H-CC-T-2	বাংলাসাহিত্যেরইতিহাস

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Distribution of Syllabus 2018-2019 Session (2nd SEMESTER)

Dr. Achintya Kumar Gangopadhyay	**2nd semester**	**BNG-H-CC-T-4**	অলঙ্কার
		BENG-H-AECC-T-1	বাংলা
		BNG-H-GE-T-2	কাব্যকবিতা
		BNG-G-CC-T-2	বাংলা সাহিত্যের ইতিহাস (আধুনিক যুগ)
Soma Karmakar	**2nd semester**	**BNG-H-CC-T-3**	বৈষ্ণব পদাবলী
		BNG-H-GE-T-2	ভাষাতত্ত্ব
		BNG-H-AECC-T-1	পত্র রচনা, প্রতিবেদন
		BNG-G-LCC-T-1	মেঘনাদবধ কাব্য
		BNG-G-CC-T-2	বাংলা ভাষাতত্ত্ব
Tamal Kanti Pal	**2nd semester**	**BNG-H-CC-T-3**	কৃত্তিবাসী রামায়ণ
		BNG-H-CC-T-4	অন্নদামঙ্গল
		BNG-H-GE-T-2	উপন্যাস ও ছোটগল্প
		BNG-H-AECC-T-1	ছোটগল্প ও কবিতা
		BNG-G-LCC-T-1	শাক্ত পদাবলী
Motiur Biswas	**2nd semester**	**BNG-H-CC-T-3**	বৈষ্ণব পদাবলী
		BNG-H-CC-T-4	শাক্ত পদাবলী
		BNG-H-GE-T-2	সাময়িক পত্র ও নাটক
		BNG-H-AECC-T-1	পরিভাষা
		BNG-G-CC-T-2	উপন্যাস, ছোটগল্প, সাময়িক পত্র ও নাটক
		BNG-H-CC-T-4	শাক্তপদাবলী
		BENG-H-GE-T-2	বাংলাসাহিত্যেরইতিহাস

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Rejanur Jaman Shah	2nd semester	BENG-G-LCC-T-1	শাক্তপদাবলী
		BENG-G-LCC-T-1	পদ্মানদীরমাঝি
		BENG-G-CC-T-2	উপন্যাস ও ছোটগল্প

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Distribution of Syllabus 2018-2019 Session (3rd SEMESTER)

Dr. Achintya Kumar Gangopadhyay	3rd semester	BNG-H-CC-T-6	রাজসিংহ
		BNG-H-GE-T-3	সাহিত্যের ইতিহাস
		BNG-H-SEC-T-1	ছোটগল্পের নাট্যরূপ ও গ্রন্থ পর্যালোচনা
		BNG-G-CC-T-3	জীবনস্মৃতি
		BNG-G-SEC-T-1	ছোটগল্পের নাট্যরূপ ও গ্রন্থপর্যালোচনা
Soma Karmakar	3rd semester	BNG-H-CC-T-5	কথাসাহিত্যের রূপভেদ
		BNG-H-CC-T-6	ঘরে বাইরে
		BNG-H-CC-T-7	প্রবন্ধ নিবন্ধের রূপভেদ
		BNG-H-GE-T-1	ছন্দ
		BNG-H-SEC-T-1	বানান বিধি, প্রুফ রিডিং এবং গ্রন্থ পর্যালোচনা
		BNG-G-CC-T-3	জীবনস্মৃতি
		BNG-G-SEC-T-1	বানান বিধি, প্রুফ সংশোধন
Tamal Kanti Pal	3rd semester	BNG-H-CC-T-5	আধুনিক বাংলা ছোটগল্প
		BNG-H-GE-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ্যযুগ)
		BNG-G-CC-T-3	ভ্রমণকাহিনী
		BNG-G-SEC-T-1	কবিতা ও নাটক পাঠ
Motiur Biswas	3rd semester	BNG-H-CC-T-5	রবীন্দ্রনাথের ছোটগল্প
		BNG-H-CC-T-6	শ্রীকান্ত (প্রথম পর্ব)
		BNG-H-CC-T-7	আমার জীবন
		BNG-H-GE-T-1	বৈষ্ণব পদাবলী
		BNG-G-CC-T-3	পদাবলী
		BNG-G-SEC-T-1	গ্রন্থ পর্যালোচনা
Rejanur Jaman Shah	3rd semester	BNG-H-CC-T-7	কমলাকান্তের দপ্তর
		BNG-G-CC-T-3	জীবনী, আত্মজীবনী
		BNG-G-LCC-T-2	কবিতা

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Dr. Achintya Kumar Gangopadhyay	Part-III	Paper- 5	এবং ইন্দ্রজিৎ
		Paper- 6	আধুনিক কবিরা
		Paper- 7	চিলেকোঠার সেপাই
		Paper- 8	ইংরাজি সাহিত্যের ইতিহাস
		Paper- 8	কাব্য জিজ্ঞাসা
Soma Karmakar	Part-III	Paper- 6	কাব্যের রূপরীতি
		Paper- 6	বীরাঙ্গনা
		Paper- 7	কবি
		Paper- 8	লোকসাহিত্য
		Paper- 8	কাব্যসৌন্দর্য বিচার
Tamal Kanti Pal	Part-III	Paper- 5	রঙ্গমঞ্চ ও থিয়েটারের ধারা
		Paper- 5	ডাকঘর
		Paper- 6	অশ্রুকণা
		Paper- 8	সাহিত্যের পথে
Motiur Biswas	Part-III	Paper- 5	নাটকের রূপরীতি
		Paper- 6	নূরজাহান
		Paper- 6	সঞ্চিতা
		Paper- 7	পথের পাঁচালী
		Paper- 8	সাহিত্যের নানিরূপ
Rejuanur Jaman Shah	Part-III	Paper- 6	চিত্রা
		Paper- 7	অরণ্যের অধিকার
		Paper- 7	আধুনিক গল্প
		Paper - 8	সংস্কৃত সাহিত্যের ইতিহাস

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DEPARTMENT OF BENGALI

Distribution of Syllabus 2019-2020 Session (1st SEMESTER)

NAME OF TEACHER	SEMESTER	PAPER	CONTENT
Dr. Achintya Kumar Gangopadhyay	1st semester	BNG-H-CC-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ্যযুগ)
		BNG-H-CC-T-2	বাংলা সাহিত্যের ইতিহাস
		BNG-H-GE-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ্যযুগ)
		BNG-G-AECC-T-1	বাংলা
Soma Karmakar	1st semester	BNG-H-CC-T-1	বাংলা ভাষাতত্ত্ব (প্রথম ভাগ)
		BNG-H-CC-T-2	বাংলা ভাষাতত্ত্ব (দ্বিতীয় ভাগ)
		BNG-H-GE-T-1	ছন্দ
		BNG-G-CC-T-1	ছন্দ ও অলঙ্কার
		BNG-G-AECC-T-1	ছোটগল্প
Tamal Kanti Pal	1st semester	BNG-H-CC-T-1	বাংলা সাহিত্যের ইতিহাস (মধ্যযুগ)
		BNG-H-CC-T-2	বাংলা সাহিত্যের ইতিহাস (আধুনিক যুগ)
		BNG-H-GE-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ্যযুগ)
		BNG-G-AECC-T-1	কবিতা
Motiur Biswas	1st semester	BNG-H-CC-T-1	বাংলা সাহিত্যের ইতিহাস (মধ্যযুগ)
		BNG-H-CC-T-2	বাংলা সাহিত্যের ইতিহাস (আধুনিক যুগ)
		BNG-H-GE-T-1	বৈষ্ণব পদাবলী
		BNG-G-CC-T-1	বৈষ্ণব পদাবলী
Rejanur Jaman Shah	1st semester	BNG-H-CC-T-1	বাংলাসাহিত্যেরইতিহাস (প্রাচীন ও মধ্যযুগ)
		BNG-H-CC-T-2	বাংলাসাহিত্যেরইতিহাস

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Distribution of Syllabus 2019-2020 Session (2nd SEMESTER)

Dr. Achintya Kumar Gangopadhyay	2nd semester	BNG-H-CC-T-4	অলঙ্কার
		BENG-H-AECC-T-1	বাংলা
		BNG-H-GE-T-2	কাব্যকবিতা
		BNG-G-CC-T-2	বাংলা সাহিত্যের ইতিহাস (আধুনিক যুগ)
Soma Karmakar	2nd semester	BNG-H-CC-T-3	বৈষ্ণব পদাবলী
		BNG-H-GE-T-2	ভাষাতত্ত্ব
		BNG-H-AECC-T-1	পত্র রচনা, প্রতিবেদন
		BNG-G-LCC-T-1	মেঘনাদবধ কাব্য
		BNG-G-CC-T-2	বাংলা ভাষাতত্ত্ব
Tamal Kanti Pal	2nd semester	BNG-H-CC-T-3	কৃত্তিবাসী রামায়ণ
		BNG-H-CC-T-4	অন্নদামঙ্গল
		BNG-H-GE-T-2	উপন্যাস ও ছোটগল্প
		BNG-H-AECC-T-1	ছোটগল্প ও কবিতা
		BNG-G-LCC-T-1	শাক্ত পদাবলী
Motiur Biswas	2nd semester	BNG-H-CC-T-3	বৈষ্ণব পদাবলী
		BNG-H-CC-T-4	শাক্ত পদাবলী
		BNG-H-GE-T-2	সাময়িক পত্র ও নাটক
		BNG-H-AECC-T-1	পরিভাষা
		BNG-G-CC-T-2	উপন্যাস, ছোটগল্প, সাময়িক পত্র ও নাটক
Rejanur Jaman Shah	2nd semester	BNG-H-CC-T-4	শাক্তপদাবলী
		BENG-H-GE-T-2	বাংলাসাহিত্যেরইতিহাস
		BENG-G-LCC-T-1	শাক্তপদাবলী
		BENG-G-LCC-T-1	পত্রলেখনীরনানা
		BENG-G-CC-T-2	উপন্যাস ও ছোটগল্প

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Distribution of Syllabus 2019-2020 Session (3rd SEMESTER)

Dr. Achintya Kumar Gangopadhyay	**3rd semester**	**BNG-H-CC-T-6**	রাজসিংহ
		BNG-H-GE-T-3	সাহিত্যের ইতিহাস
		BNG-H-SEC-T-1	ছোটগল্পের নাট্যরূপ ও গ্রন্থ পর্যালোচনা
		BNG-G-CC-T-3	জীবনস্মৃতি
		BNG-G-SEC-T-1	ছোটগল্পের নাট্যরূপ ও গ্রন্থপর্যালোচনা
Soma Karmakar	**3rd semester**	**BNG-H-CC-T-5**	কথাসাহিত্যের রূপভেদ
		BNG-H-CC-T-6	ঘরে বাইরে
		BNG-H-CC-T-7	প্রবন্ধ নিবন্ধের রূপভেদ
		BNG-H-GE-T-1	ছন্দ
		BNG-H-SEC-T-1	বানান বিধি, প্রুফ রিডিং এবং গ্রন্থ পর্যালোচনা
		BNG-G-CC-T-3	জীবনস্মৃতি
		BNG-G-SEC-T-1	বানান বিধি, প্রুফ সংশোধন
Tamal Kanti Pal	**3rd semester**	**BNG-H-CC-T-5**	আধুনিক বাংলা ছোটগল্প
		BNG-H-GE-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ্যযুগ)
		BNG-G-CC-T-3	ভ্রমণকাহিনী
		BNG-G-SEC-T-1	কবিতা ও নাটক পাঠ
Motiur Biswas	**3rd semester**	**BNG-H-CC-T-5**	রবীন্দ্রনাথের ছোটগল্প
		BNG-H-CC-T-6	শ্রীকান্ত (প্রথম পর্ব)
		BNG-H-CC-T-7	আমার জীবন
		BNG-H-GE-T-1	বৈষ্ণব পদাবলী
		BNG-G-CC-T-3	পালামৌ
		BNG-G-SEC-T-1	গ্রন্থ পর্যালোচনা
Rejanur Jaman Shah	**3rd semester**	**BNG-H-CC-T-7**	কমলাকান্তের দপ্তর
		BNG-G-CC-T-3	জীবনী, আত্মজীবনী
		BNG-G-LCC-T-2	কবিতা

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Distribution of Syllabus 2019-2020 Session (4th SEMESTER)

Dr. Achintya Kumar Gangopadhyay	4th semester	BNG-H-CC-T-8	রবীন্দ্রনাথের প্রবন্ধ
		BNG-H-CC-T-9	কাব্যের রূপভেদ ও কাব্যজিজ্ঞাসা
		BNG-H-GE-T-4	কাব্য-কবিতা
		BNG-H-SEC-T-2	পর্ব- ৩
		BNG-G-CC-T-4	প্রবন্ধ
		BNG-G-SEC-T-2	পর্ব- ৩
Soma Karmakar	4th semester	BNG-H-CC-T-9	বীরাঙ্গনা
		BNG-H-CC-T-10	প্রাক্ চল্লিশ কবিতা
		BNG-H-SEC-T-2	গবেষণার রীতি পদ্ধতি, সাহিত্য বিষয়ক প্রবন্ধ রচনা
		BNG-G-LCC-T-2	ছোটগল্প
		BNG-H-CC-T-4	কপালকুণ্ডলা
		BNG-G-SEC-T-2	প্রতিবেদন ও বিজ্ঞাপন রচনা
Tamal Kanti Pal	4th semester	BNG-H-CC-T-8	বাংলা সমালোচনামূলক প্রবন্ধ
		BNG-H-CC-T-9	উনবিংশ শতকের গীতিকবিতা সংকলন
		BNG-H-CC-T-10	সঞ্চয়িতা
		BNG-H-GE-T-2	সাহিত্যের ইতিহাস : গদ্য, প্রবন্ধ ও কাব্য-কবিতা
		BNG-G-CC-T-4	একেই কি বলে সভ্যতা
		BNG-G-SEC-T-2	সাহিত্য বিষয়ক প্রবন্ধ রচনা
Motiur Biswas	4th semester	BNG-H-CC-T-9	কাব্যের সংজ্ঞা ও রূপভেদ
		BNG-H-CC-T-10	উত্তর চল্লিশ বাংলা কবিতা
		BNG-H-GE-T-2	ভাষাতত্ত্ব
		BNG-G-LCC-T-2	ডাকঘর
		BNG-G-CC-T-4	বাংলা প্রবন্ধ
		BNG-G-SEC-T-2	সম্ভাষণ ও সংবাদ পাঠ
Rejanur Jaman Shah	4th semester	BNG-H-CC-T-8	সমালোচনামূলক প্রবন্ধ
		BNG-H-GE-T-4	উপন্যাস ও ছোটগল্প

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NAME OF TEACHER	S EMESTER	PAPER	CONTENT
Dr. Achintya Kumar Gangopadhyay	1st semester	BNG-H-CC-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ্যযুগ)
		BNG-H-CC-T-2	বাংলা সাহিত্যের ইতিহাস
		BNG-H-GE-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ্যযুগ)
		BNG-G-AECC-T-1	বাংলা
Soma Karmakar	1st semester	BNG-H-CC-T-1	বাংলা ভাষাতত্ত্ব (প্রথম ভাগ)
		BNG-H-CC-T-2	বাংলা ভাষাতত্ত্ব (দ্বিতীয় ভাগ)
		BNG-H-GE-T-1	ছন্দ
		BNG-G-CC-T-1	ছন্দ ও অলঙ্কার
		BNG-G-AECC-T-1	ছোটগল্প
Tamal Kanti Pal	1st semester	BNG-H-CC-T-1	বাংলা সাহিত্যের ইতিহাস (মধ্যযুগ)
		BNG-H-CC-T-2	বাংলা সাহিত্যের ইতিহাস (আধুনিক যুগ)
		BNG-H-GE-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ্যযুগ)
		BNG-G-AECC-T-1	কবিতা
Motiur Biswas	1st semester	BNG-H-CC-T-1	বাংলা সাহিত্যের ইতিহাস (মধ্যযুগ)
		BNG-H-CC-T-2	বাংলা সাহিত্যের ইতিহাস (আধুনিক যুগ)
		BNG-H-GE-T-1	বৈষ্ণব পদাবলী
		BNG-G-CC-T-1	বৈষ্ণব পদাবলী
Rejanur Jaman Shah	1st semester	BNG-H-CC-T-1	বাংলাসাহিত্যেরইতিহাস (প্রাচীন ও মধ্যযুগ)
		BNG-H-CC-T-2	বাংলাসাহিত্যেরইতিহাস

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Dr. Achintya Kumar Gangopadhyay	2nd semester	BNG-H-CC-T-4	অলঙ্কার
		BENG-H-AECC-T-1	বাংলা
		BNG-H-GE-T-2	কাব্যকবিতা
		BNG-G-CC-T-2	বাংলা সাহিত্যের ইতিহাস (আধুনিক যুগ)
Soma Karmakar	2nd semester	BNG-H-CC-T-3	বৈষ্ণব পদাবলী
		BNG-H-GE-T-2	ভাষাতত্ত্ব
		BNG-H-AECC-T-1	পত্র রচনা, প্রতিবেদন
		BNG-G-LCC-T-1	মেঘনাদবধ কাব্য
		BNG-G-CC-T-2	বাংলা ভাষাতত্ত্ব
Tamal Kanti Pal	2nd semester	BNG-H-CC-T-3	কৃত্তিবাসী রামায়ণ
		BNG-H-CC-T-4	অন্নদামঙ্গল
		BNG-H-GE-T-2	উপন্যাস ও ছোটগল্প
		BNG-H-AECC-T-1	ছোটগল্প ও কবিতা
		BNG-G-LCC-T-1	শাক্ত পদাবলী
Mollar Biswas	2nd semester	BNG-H-CC-T-3	বৈষ্ণব পদাবলী
		BNG-H-CC-T-4	শাক্ত পদাবলী
		BNG-H-GE-T-2	সাময়িক পত্র ও নাটক
		BNG-H-AECC-T-1	পত্রিভাষা
		BNG-G-CC-T-2	উপন্যাস, ছোটগল্প, সাময়িক পত্র ও নাটক
Rejaaur Jaman Shah	2nd semester	BNG-H-CC-T-4	শাক্তপদাবলী
		BENG-H-GE-T-2	বাংলাসাহিত্যেরইতিহাস
		BENG-G-LCC-T-1	শাক্তপদাবলী
		BENG-G-LCC-T-1	পদ্মানদীরমাঝি
		BENG-G-CC-T-2	উপন্যাস ও ছোটগল্প

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Dr. Achintya Kumar Gangopadhyay	3rd semester	BNG-H-CC-T-6	রাজসিংহ
		BNG-H-GE-T-3	সাহিত্যের ইতিহাস
		BNG-H-SEC-T-1	ছোটগল্পের নাট্যরূপ ও গ্রন্থ পর্যালোচনা
		BNG-G-CC-T-3	জীবনস্মৃতি
		BNG-G-SEC-T-1	ছোটগল্পের নাট্যরূপ ও গ্রন্থপর্যালোচনা
Soma Karmakar	3rd semester	BNG-H-CC-T-5	কথাসাহিত্যের রূপভেদ
		BNG-H-CC-T-6	ঘরে বাইরে
		BNG-H-CC-T-7	প্রবন্ধ নিবন্ধের রূপভেদ
		BNG-H-GE-T-1	ছন্দ
		BNG-H-SEC-T-1	বানান বিধি, প্রুফ রিডিং এবং গ্রন্থ পর্যালোচনা
		BNG-G-CC-T-3	জীবনস্মৃতি
		BNG-G-SEC-T-1	বানান বিধি, প্রুফ সংশোধন
Tamal Kanti Pal	3rd semester	BNG-H-CC-T-5	আধুনিক বাংলা ছোটগল্প
		BNG-H-GE-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ্যযুগ)
		BNG-G-CC-T-3	ভ্রমণকাহিনী
		BNG-G-SEC-T-1	কবিতা ও নাটক পাঠ
Motiur Biswas	3rd semester	BNG-H-CC-T-5	রবীন্দ্রনাথের ছোটগল্প
		BNG-H-CC-T-6	শ্রীকান্ত (প্রথম পর্ব)
		BNG-H-CC-T-7	আমার জীবন
		BNG-H-GE-T-1	বৈষ্ণব পদাবলী
		BNG-G-CC-T-3	পালামৌ
		BNG-G-SEC-T-1	গ্রন্থ পর্যালোচনা
Rejanur Jaman Shah	3rd semester	BNG-H-CC-T-7	কমলাকান্তের দপ্তর
		BNG-G-CC-T-3	জীবনী, আত্মজীবনী
		BNG-G-LCC-T-2	কবিতা

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Distribution of Syllabus 2020-2021 Session (4th SEMESTER)

Dr. Achintya Kumar Gangopadhyay	4th semester	BNG-H-CC-T-8	রবীন্দ্রনাথের প্রবন্ধ
		BNG-H-CC-T-9	কাব্যের রূপভেদ ও কাব্যজিজ্ঞাসা
		BNG-H-GE-T-4	কাব্য-কবিতা
		BNG-H-SEC-T-2	পর্ব- ৩
		BNG-G-CC-T-4	প্রবন্ধ
		BNG-G-SEC-T-2	পর্ব- ৩
Soma Karmakar	4th semester	BNG-H-CC-T-9	বীরাঙ্গনা
		BNG-H-CC-T-10	প্রাক্ চল্লিশ কবিতা
		BNG-H-SEC-T-2	গবেষণার রীতি পদ্ধতি, সাহিত্য বিষয়ক প্রবন্ধ রচনা
		BNG-G-LCC-T-2	ছোটগল্প
		BNG-H-CC-T-4	কপালকুণ্ডলা
		BNG-G-SEC-T-2	প্রতিবেদন ও বিজ্ঞাপন রচনা
Tamal Kanti Pal	4th semester	BNG-H-CC-T-8	বাংলা সমালোচনামূলক প্রবন্ধ
		BNG-H-CC-T-9	উনবিংশ শতকের গীতিকবিতা সংকলন
		BNG-H-CC-T-10	সঞ্চয়িতা
		BNG-H-GE-T-2	সাহিত্যের ইতিহাস ; গল্প, প্রবন্ধ ও কাব্য-কবিতা
		BNG-G-CC-T-4	একেই কি বলে সভ্যতা
		BNG-G-SEC-T-2	সাহিত্য বিষয়ক প্রবন্ধ রচনা
Motiur Biswas	4th semester	BNG-H-CC-T-9	কাব্যের সংজ্ঞা ও রূপভেদ
		BNG-H-CC-T-10	উত্তর চল্লিশ বাংলা কবিতা
		BNG-H-GE-T-2	ভাষাতত্ত্ব
		BNG-G-LCC-T-2	ডাকঘর
		BNG-G-CC-T-4	বাংলা প্রবন্ধ
		BNG-G-SEC-T-2	সম্ভাষণ ও সংবাদ পাঠ
Rejanur Jaman Shah	4th semester	BNG-H-CC-T-8	সমালোচনামূলক প্রবন্ধ
		BNG-H-GE-T-4	উপন্যাস ও ছোটগল্প

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Dr. Achintya Kumar Gangopadhyay	**5th semester**	**BNG-H-CC-T-11**	হাঁসুলিবাঁকের ইতিকথা
		BNG-H-DSE-T-1	সাহিত্যতত্ত্ব
		BNG-H-DSE-T-2	বাংলাদেশ বহিরবঙ্গের প্রবন্ধ
		BNG-G-DSE-T-1	সাহিত্যতত্ত্ব
		BNG-G-SEC-T-3	তত্ত্বমূলক গান
		BNG-G-SEC-T-3	পর্ব- ৩
Soma Karmakar	**5th semester**	**BNG-H-CC-T-12**	নাটকের রূপভেদ এবং রঙ্গমঞ্চ থিয়েটারের ধারা
		BNG-H-DSE-T-1	সাহিত্যতত্ত্ব
		BNG-H-DSE-T-2	নাটক - কবর
		BNG-G-DSE-T-4	সাহিত্যতত্ত্ব
		BNG-G-GE-T-1	রথের রশি
Tamal Kanti Pal	**5th semester**	**BNG-H-CC-T-11**	পথের পাঁচালী
		BNG-H-CC-T-12	রথের রশি
		BNG-H-DSE-T-1	সাহিত্য সমালোচনামূলক প্রবন্ধ
		BNG-H-DSE-T-2	প্রবন্ধ
		BNG-G-GE-T-1	নীলদর্পণ
		BNG-G-SEC-T-3	তত্ত্বমূলক গান
Motiur Biswas	**5th semester**	**BNG-H-CC-T-11**	অমাবস্যার গান
		BNG-H-DSE-T-2	ছোটগল্প
		BNG-G-DSE-T-4	সাহিত্য সমালোচনা
		BNG-G-GE-T-1	নাটকের রূপভেদ ও বাংলা রঙ্গমঞ্চ
		BNG-G-SEC-T-3	ভাওয়াইয়া, ভাটিয়ালি, আলকাপ
Rejanur Jaman Shah	5th semester	**BNG-G-GE-T-1**	নাটকের রূপভেদ
		BNG-G-GE-T-1	রঙ্গমঞ্চ ও থিয়েটারের ধারা
		BNG-H-DSE-T-2	বাংলাদেশবহিরবঙ্গেরকবিতা

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Distribution of Syllabus 2021-2022 Session (1st SEMESTER)

NAME OF TEACHER	SEMESTER	PAPER	CONTENT
Dr. Achintya Kumar Gangopadhyay	1st semester	BNG-H-CC-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন যুগ)
		BNG-H-CC-T-2	বাংলা সাহিত্যের ইতিহাস (আধুনিক যুগ)
		BNG-H-GE-T-1	অলঙ্কার
		BNG-G-CC-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ্যযুগ)
Soma Karmakar	1st semester	BNG-H-CC-T-1	বাংলা ভাষাতত্ত্ব (প্রথম ভাগ)
		BNG-H-CC-T-2	বাংলা ভাষাতত্ত্ব (দ্বিতীয় ভাগ)
		BNG-H-GE-T-1	ছন্দ
		BNG-G-CC-T-1	ছন্দ ও অলঙ্কার
		BNG-G-AECC-T-1	ছোটগল্প
Tamal Kanti Pal	1st semester	BNG-H-CC-T-1	বাংলা সাহিত্যের ইতিহাস (মধ্যযুগ)
		BNG-H-CC-T-2	বাংলা সাহিত্যের ইতিহাস (আধুনিক যুগ)
		BNG-H-GE-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ্যযুগ)
		BNG-G-AECC-T-1	কবিতা
Motiur Biswas	1st semester	BNG-H-CC-T-1	বাংলা সাহিত্যের ইতিহাস (মধ্যযুগ)
		BNG-H-CC-T-2	বাংলা সাহিত্যের ইতিহাস (আধুনিক যুগ)
		BNG-H-GE-T-1	বৈষ্ণব পদাবলী
		BNG-G-CC-T-1	বৈষ্ণব পদাবলী

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Dr. Achintya Kumar Gangopadhyay	**2nd semester**	**BNG-H-CC-T-3**	ছন্দ
		BNG-H-CC-T-4	অলঙ্কার
		BNG-H-GE-T-2	গল্প, প্রবন্ধ ও কাব্য কবিতা
		BNG-G-LCC-T-1	উপন্যাস – পল্লীসমাজ
		BNG-G-CC-T-2	বাংলা সাহিত্যের ইতিহাস (আধুনিক যুগ)
Soma Karmakar	**2nd semester**	**BNG-H-CC-T-3**	বৈষ্ণব পদাবলী
		BNG-H-GE-T-2	ভাষাতত্ত্ব
		BNG-H-AECC-T-1	পত্র রচনা, প্রতিবেদন
		BNG-G-LCC-T-1	মেঘনাদবধ কাব্য
		BNG-G-CC-T-2	বাংলা ভাষাতত্ত্ব
Tamal Kanti Pal	**2nd semester**	**BNG-H-CC-T-3**	কৃত্তিবাসী রামায়ণ
		BNG-H-CC-T-4	অন্নদামঙ্গল
		BNG-H-GE-T-2	উপন্যাস ও ছোটগল্প
		BNG-H-AECC-T-1	ছোটগল্প ও কবিতা
		BNG-G-LCC-T-1	শাক্ত পদাবলী
Motiur Biswas	**2nd semester**	**BNG-H-CC-T-3**	বৈষ্ণব পদাবলী
		BNG-H-CC-T-4	শাক্ত পদাবলী
		BNG-H-GE-T-2	সাময়িক পত্র ও নাটক
		BNG-H-AECC-T-1	পরিভাষা
		BNG-G-CC-T-2	উপন্যাস, ছোটগল্প, সাময়িক পত্র ও নাটক

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Dr. Achintya Kumar Gangopadhyay	3rd semester	BNG-H-CC-T-6	রাজসিংহ
		BNG-H-CC-T-7	কমলাকান্তের দপ্তর
		BNG-H-GE-T-3	সাহিত্যের ইতিহাস
		BNG-H-SEC-T-1	ছোটগল্পের নাট্যরূপ ও গ্রন্থ পর্যালোচনা
		BNG-G-CC-T-3	জীবনস্মৃতি
		BNG-G-SEC-T-1	ছোটগল্পের নাট্যরূপ ও গ্রন্থপর্যালোচনা
Soma Karmakar	3rd semester	BNG-H-CC-T-5	কথাসাহিত্যের রূপভেদ
		BNG-H-CC-T-6	ঘরে বাইরে
		BNG-H-CC-T-7	প্রবন্ধ নিবন্ধের রূপভেদ
		BNG-H-GE-T-1	ছন্দ
		BNG-H-SEC-T-1	বানান বিধি, প্রুফ রিডিং এবং গ্রন্থ পর্যালোচনা
		BNG-G-CC-T-3	জীবনস্মৃতি
		BNG-G-SEC-T-1	বানান বিধি, প্রুফ সংশোধন
Tamal Kanti Pal	3rd semester	BNG-H-CC-T-5	আধুনিক বাংলা ছোটগল্প
		BNG-H-GE-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ্যযুগ)
		BNG-G-CC-T-3	জীবনী, আত্মজীবনী ও ভ্রমণকাহিনী
		BNG-G-LCC-T-2	কবিতা
		BNG-G-SEC-T-1	কবিতা ও নাটক পাঠ
Motiur Biswas	3rd semester	BNG-H-CC-T-5	রবীন্দ্রনাথের ছোটগল্প
		BNG-H-CC-T-6	শ্রীকান্ত (প্রথম পর্ব)
		BNG-H-CC-T-7	আমার জীবন
		BNG-H-GE-T-1	বৈষ্ণব পদাবলী
		BNG-G-CC-T-3	পালামৌ
		BNG-G-SEC-T-1	গ্রন্থ পর্যালোচনা

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Dr. Achintya Kumar Gangopadhyay	4th semester	BNG-H-CC-T-8	রবীন্দ্রনাথের প্রবন্ধ
		BNG-H-CC-T-8	সমালোচনামূলক প্রবন্ধ
		BNG-H-CC-T-9	কাব্যের রূপভেদ ও কাব্যজিজ্ঞাসা
		BNG-H-GE-T-4	কাব্য-কবিতা
		BNG-H-SEC-T-2	পর্ব- ৩
		BNG-G-CC-T-4	প্রবন্ধ
		BNG-G-SEC-T-2	পর্ব- ৩
Soma Karmakar	4th semester	BNG-H-CC-T-9	বীরাঙ্গনা
		BNG-H-CC-T-10	প্রাক্ চল্লিশ কবিতা
		BNG-H-SEC-T-2	গবেষণার রীতি পদ্ধতি, সাহিত্য বিষয়ক প্রবন্ধ রচনা
		BNG-G-LCC-T-2	ছোটগল্প
		BNG-H-CC-T-4	কপালকুণ্ডলা
		BNG-G-SEC-T-2	প্রতিবেদন ও বিজ্ঞাপন রচনা
Tamal Kanti Pal	4th semester	BNG-H-CC-T-8	বাংলা সমালোচনামূলক প্রবন্ধ
		BNG-H-CC-T-9	উনবিংশ শতকের গীতিকবিতা সংকলন
		BNG-H-CC-T-10	সঞ্চয়িতা
		BNG-H-GE-T-2	সাহিত্যের ইতিহাস : গদ্য, প্রবন্ধ ও কাল-কবিতা
		BNG-G-CC-T-4	একেই কি বলে সভ্যতা
		BNG-G-SEC-T-2	সাহিত্য বিষয়ক প্রবন্ধ রচনা
Motiur Biswas	4th semester	BNG-H-CC-T-9	কাব্যের সংজ্ঞা ও রূপভেদ
		BNG-H-CC-T-10	উত্তর চল্লিশ বাংলা কবিতা
		BNG-H-GE-T-2	ভাষাতত্ত্ব
		BNG-H-GE-T-4	উপন্যাস ও ছোটগল্প
		BNG-G-LCC-T-2	ডাকঘর
		BNG-G-CC-T-4	বাংলা প্রবন্ধ
		BNG-G-SEC-T-2	সম্ভাষণ ও সংবাদ পাঠ

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Dr. Achintya Kumar Gangopadhyay	5th semester	BNG-H-CC-T-11	হাঁসুলিবাঁকের ইতিকথা
		BNG-H-DSE-T-1	সাহিত্যতত্ত্ব
		BNG-H-DSE-T-2	বাংলাদেশ বহিরবঙ্গের প্রবন্ধ
		BNG-H-DSE-T-2	বাংলাদেশ বহিরবঙ্গের কবিতা
		BNG-G-DSE-T-1	সাহিত্যতত্ত্ব
		BNG-G-SEC-T-3	তত্ত্বমূলক গান
		BNG-G-SEC-T-3	পর্ব- ৩
Soma Karmakar	5th semester	BNG-H-CC-T-12	নাটকের রূপভেদ এবং রঙ্গমঞ্চ থিয়েটারের ধারা
		BNG-H-DSE-T-1	সাহিত্যতত্ত্ব
		BNG-H-DSE-T-2	নাটক - কবর
		BNG-G-DSE-T-4	সাহিত্যতত্ত্ব
		BNG-G-GE-T-1	রথের রশি
Tamal Kanti Pal	5th semester	BNG-H-CC-T-11	পথের পাঁচালী
		BNG-H-CC-T-12	রথের রশি
		BNG-H-DSE-T-1	সাহিত্য সমালোচনামূলক প্রবন্ধ
		BNG-H-DSE-T-2	প্রবন্ধ
		BNG-G-GE-T-1	নীলদর্পণ
		BNG-G-SEC-T-3	তত্ত্বমূলক গান
Motiur Biswas	5th semester	BNG-H-CC-T-11	অমাবস্যার গান
		BNG-H-DSE-T-2	ছোটগল্প
		BNG-G-DSE-T-4	সাহিত্য সমালোচনা
		BNG-G-GE-T-1	নাটকের রূপভেদ ও বাংলা রঙ্গমঞ্চ
		BNG-G-SEC-T-3	ভাওয়াইয়া, ভাটিয়ালি, আলকাপ

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Dr. Achintya Kumar Gangopadhyay	**6TH semester**	**BNG-H-CC-T-14**	ইংরাজী সাহিত্যের ইতিহাস
		BNG-H-DSE-T-3	গোয়েন্দাসাহিত্য
		BNG-G-DSE-T-2	গোয়েন্দাসাহিত্য
		BNG-H-DSE-T-4	ছোটগল্প
		BNG-G-SEC-T-4	প্রবন্ধ রচনা
Soma Karmakar	**6th semester**	**BNG-H-CC-T-13**	পরিবেশ সংক্রান্ত গল্প
		BNG-H-CC-T-14	লোকসাহিত্য
		BNG-H-DSE-T-4	নাটক- চুটপা আদালত চলছে
		BNG-G-DSE-T-2	বাংলা রূপকথা ও উপকথা
		BNG-G-SEC-T-4	প্রুফ সংশোধন ও আই.পি.এ.
Tamal Kanti Pal	**6th semester**	**BNG-H-CC-T-13**	পরিবেশ সংক্রান্ত প্রবন্ধ
		BNG-H-CC-T-14	সংস্কৃত সাহিত্যের ইতিহাস
		BNG-H-DSE-T-3	আবোল-তাবোল
		BNG-G-GE-T-2	পরিবেশ সংক্রান্ত গল্প ও উপন্যাস
		BNG-G-DSE-T-2	আবোলতাবোল
Motiur Biswas	**6th semester**	**BNG-H-CC-T-13**	উপন্যাস- প্রকৃতি পাঠ
		BNG-H-DES-T-3	বাংলা রূপকথা ও উপকথা
		BNG-H-DSE-T-4	প্রাদেশিক ছোটগল্প
		BNG-G-DSE-T-2	গোয়েন্দা সাহিত্য
		BNG-G-GE-T-2	পরিবেশ সংক্রান্ত কবিতা ও প্রবন্ধ
		BNG-G-SEC-T-4	সাহিত্য বিষয়ক প্রবন্ধ রচনা

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NAME OF TEACHER	SEMESTER	PAPER	CONTENT
Dr. Achintya Kumar Gangopadhyay	1st semester	BNG-H-CC-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন যুগ)
		BNG-H-CC-T-2	বাংলা সাহিত্যের ইতিহাস (আধুনিক যুগ)
		BNG-H-GE-T-1	অলঙ্কার
		BNG-G-CC-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ্যযুগ)
Soma Karmakar	1st semester	BNG-H-CC-T-1	বাংলা ভাষাতত্ত্ব (প্রথম ভাগ)
		BNG-H-CC-T-2	বাংলা ভাষাতত্ত্ব (দ্বিতীয় ভাগ)
		BNG-H-GE-T-1	ছন্দ
		BNG-G-CC-T-1	ছন্দ ও অলঙ্কার
		BNG-G-AECC-T-1	ছোটগল্প
Tamal Kanti Pal	1st semester	BNG-H-CC-T-1	বাংলা সাহিত্যের ইতিহাস (মধ্যযুগ)
		BNG-H-CC-T-2	বাংলা সাহিত্যের ইতিহাস (আধুনিক যুগ)
		BNG-H-GE-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ্যযুগ)
		BNG-G-AECC-T-1	কবিতা
Motiur Biswas	1st semester	BNG-H-CC-T-1	বাংলা সাহিত্যের ইতিহাস (মধ্যযুগ)
		BNG-H-CC-T-2	বাংলা সাহিত্যের ইতিহাস (আধুনিক যুগ)
		BNG-H-GE-T-1	বৈষ্ণব পদাবলী
		BNG-G-CC-T-1	বৈষ্ণব পদাবলী

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Dr. Achintya Kumar Gangopadhyay	**2nd semester**	**BNG-H-CC-T-3**	ছন্দ
		BNG-H-CC-T-4	অলঙ্কার
		BNG-H-GE-T-2	গল্প, প্রবন্ধ ও কাব্য কবিতা
		BNG-G-LCC-T-1	উপন্যাস – পল্লীসমাজ
		BNG-G-CC-T-2	বাংলা সাহিত্যের ইতিহাস (আধুনিক যুগ)
Soma Karmakar	**2nd semester**	**BNG-H-CC-T-3**	বৈষ্ণব পদাবলী
		BNG-H-GE-T-2	ভাষাতত্ত্ব
		BNG-H-AECC-T-1	পত্র রচনা, প্রতিবেদন
		BNG-G-LCC-T-1	মেঘনাদবধ কাব্য
		BNG-G-CC-T-2	বাংলা ভাষাতত্ত্ব
Tamal Kanti Pal	**2nd semester**	**BNG-H-CC-T-3**	কৃত্তিবাসী রামায়ণ
		BNG-H-CC-T-4	অন্নদামঙ্গল
		BNG-H-GE-T-2	উপন্যাস ও ছোটগল্প
		BNG-H-AECC-T-1	ছোটগল্প ও কবিতা
		BNG-G-LCC-T-1	শাক্ত পদাবলী
Motiur Biswas	**2nd semester**	**BNG-H-CC-T-3**	বৈষ্ণব পদাবলী
		BNG-H-CC-T-4	শাক্ত পদাবলী
		BNG-H-GE-T-2	সাময়িক পত্র ও নাটক
		BNG-H-AECC-T-1	পরিভাষা
		BNG-G-CC-T-2	উপন্যাস, ছোটগল্প, সাময়িক পত্র ও নাটক

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		BNG-H-CC-T-6	রাজসিংহ
		BNG-H-CC-T-7	কমলাকান্তের দপ্তর
		BNG-H-GE-T-3	সাহিত্যের ইতিহাস
Dr. Achintya Kumar Gangopadhyay	**3rd semester**	**BNG-H-SEC-T-1**	ছোটগল্পের নাট্যরূপ ও গ্রন্থ পর্যালোচনা
		BNG-G-CC-T-3	জীবনস্মৃতি
		BNG-G-SEC-T-1	ছোটগল্পের নাট্যরূপ ও গ্রন্থপর্যালোচনা
		BNG-H-CC-T-5	কথাসাহিত্যের রূপভেদ
		BNG-H-CC-T-6	ঘরে বাইরে
		BNG-H-CC-T-7	প্রবন্ধ নিবন্ধের রূপভেদ
Soma Karmakar	**3rd semester**	**BNG-H-GE-T-1**	ছন্দ
		BNG-H-SEC-T-1	বানান বিধি, প্রুফ রিডিং এবং গ্রন্থ পর্যালোচনা
		BNG-G-CC-T-3	জীবনস্মৃতি
		BNG-G-SEC-T-1	বানান বিধি, প্রুফ সংশোধন
		BNG-H-CC-T-5	আধুনিক বাংলা ছোটগল্প
		BNG-H-GE-T-1	বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ্যযুগ)
Tamal Kanti Pal	**3rd semester**	**BNG-G-CC-T-3**	জীবনী, আত্মজীবনী ও ভ্রমণকাহিনী
		BNG-G-LCC-T-2	কবিতা
		BNG-G-SEC-T-1	কবিতা ও নাটক পাঠ
		BNG-H-CC-T-5	রবীন্দ্রনাথের ছোটগল্প
		BNG-H-CC-T-6	শ্রীকান্ত (প্রথম পর্ব)
		BNG-H-CC-T-7	আমার জীবন
Motiur Biswas	**3rd semester**	**BNG-H-GE-T-1**	বৈষ্ণব পদাবলী

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Dr. Achintya Kumar Gangopadhyay	4th semester	BNG-H-CC-T-8	বাংলা প্রবন্ধ এবং রবীন্দ্রনাথের প্রবন্ধ
		BNG-H-GE-T-2	সাহিত্যের ইতিহাস : উপন্যাস, ছোটগল্প, সাময়িক পত্র, নাটক
		BNG-H-SEC-T-2	প্রতিবেদন, বিজ্ঞাপন রচনা, সঞ্চালনা, সংবাদ পাঠ
		BNG-G-LCC-T-2	কবিতা
Soma Karmakar	4th semester	BNG-H-CC-T-9	বীরাঙ্গনা
		BNG-H-CC-T-10	প্রাক্ চল্লিশ কবিতা
		BNG-H-SEC-T-2	গবেষণার রীতি পদ্ধতি, সাহিত্য বিষয়ক প্রবন্ধ রচনা
		BNG-G-LCC-T-2	ছোটগল্প
		BNG-H-CC-T-4	কপালকুণ্ডলা
		BNG-G-SEC-T-2	প্রতিবেদন ও বিজ্ঞাপন রচনা
Tamal Kanti Pal	4th semester	BNG-H-CC-T-8	বাংলা সমালোচনামূলক প্রবন্ধ
		BNG-H-CC-T-9	উনবিংশ শতকের বাঁচিকবিতা সংকলন
		BNG-H-CC-T-10	সঞ্চয়িতা
		BNG-H-GE-T-2	সাহিত্যের ইতিহাস : গদ্য, প্রবন্ধ ও ছান্দ-কবিতা
		BNG-G-CC-T-4	একেই কি বলে সভ্যতা
		BNG-G-SEC-T-2	সাহিত্য বিষয়ক প্রবন্ধ রচনা
Motiur Biswas	4th semester	BNG-H-CC-T-9	কাব্যের সংজ্ঞা ও রূপভেদ
		BNG-H-CC-T-10	উত্তর চল্লিশ বাংলা কবিতা
		BNG-H-GE-T-2	ভাষাতত্ত্ব
		BNG-G-LCC-T-2	ডাকঘর
		BNG-G-CC-T-4	বাংলা প্রবন্ধ
		BNG-G-SEC-T-2	সঞ্চালনা ও সংবাদ পাঠ

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Dr. Achintya Kumar Gangopadhyay	5th semester	BNG-H-CC-T-11	হাঁসুলিবাঁকের ইতিকথা
		BNG-H-DSE-T-1	সাহিত্যতত্ত্ব
		BNG-H-DSE-T-2	বাংলাদেশ বহিরবঙ্গের প্রবন্ধ
		BNG-H-DSE-T-2	বাংলাদেশ বহিরবঙ্গের কবিতা
		BNG-G-DSE-T-1	সাহিত্যতত্ত্ব
		BNG-G-SEC-T-3	তত্ত্বমূলক গান
Soma Karmakar	5th semester	BNG-G-SEC-T-3	পর্ব- ৩
		BNG-H-CC-T-12	নাটকের রূপভেদ এবং রঙ্গমঞ্চ থিয়েটারের ধারা
		BNG-H-DSE-T-1	সাহিত্যতত্ত্ব
		BNG-H-DSE-T-2	নাটক - কবর
		BNG-G-DSE-T-4	সাহিত্যতত্ত্ব
Tamal Kanti Pal	5th semester	BNG-G-GE-T-1	রথের রশি
		BNG-H-CC-T-11	পথের পাঁচালী
		BNG-H-CC-T-12	রথের রশি
		BNG-H-DSE-T-1	সাহিত্য সমালোচনামূলক প্রবন্ধ
		BNG-H-DSE-T-2	প্রবন্ধ
		BNG-G-GE-T-1	নীলদর্পণ
Motiur Biswas	5th semester	BNG-G-SEC-T-3	তত্ত্বমূলক গান
		BNG-H-CC-T-11	অমাবস্যার গান
		BNG-H-DSE-T-2	ছোটগল্প
		BNG-G-DSE-T-4	সাহিত্য সমালোচনা
		BNG-G-GE-T-1	নাটকের রূপভেদ ও বাংলা রঙ্গমঞ্চ
		BNG-G-SEC-T-3	ভাওয়াইয়া, ভাটিয়ালি, আলকাপ
		BNG-H-CC-T-11	হাঁসুলিবাঁকের ইতিকথা
		BNG-H-DSE-T-1	সাহিত্যতত্ত্ব

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Dr. Achintya Kumar Gangopadhyay	6TH semester	BNG-H-CC-T-14	ইংরাজী সাহিত্যের ইতিহাস
		BNG-H-DSE-T-3	গোয়েন্দাসাহিত্য
		BNG-G-DSE-T-2	গোয়েন্দাসাহিত্য
		BNG-H-DSE-T-4	ছোটগল্প
Soma Karmakar	6th semester	BNG-G-SEC-T-4	প্রবন্ধ রচনা
		BNG-H-CC-T-13	পরিবেশ সংক্রান্ত গল্প
		BNG-H-CC-T-14	লোকসাহিত্য
		BNG-H-DSE-T-4	নাটক- চুটপা আদালত চলছে
		BNG-G-DSE-T-2	বাংলা রূপকথা ও উপকথা
Tamal Kanti Pal	6th semester	BNG-G-SEC-T-4	প্রুফ সংশোধন ও আই.পি.এ.
		BNG-H-CC-T-13	পরিবেশ সংক্রান্ত প্রবন্ধ
		BNG-H-CC-T-14	সংস্কৃত সাহিত্যের ইতিহাস
		BNG-H-DSE-T-3	আবোল-তাবোল
Motiur Biswas	6th semester	BNG-G-GE-T-2	পরিবেশ সংক্রান্ত গল্প ও উপন্যাস
		BNG-G-DSE-T-2	আবোলতাবোল
		BNG-H-CC-T-13	উপন্যাস- প্রকৃতি পাঠ
		BNG-H-DES-T-3	বাংলা রূপকথা ও উপকথা
		BNG-H-DSE-T-4	প্রাদেশিক ছোটগল্প
		BNG-G-DSE-T-2	গোয়েন্দা সাহিত্য
		BNG-G-GE-T-2	পরিবেশ সংক্রান্ত কবিতা ও প্রবন্ধ
		BNG-G-SEC-T-4	সাহিত্য বিষয়ক প্রবন্ধ রচনা

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Curriculum Plan of **Dipanwita Chowdhury** for **Even Semesters**

Department of History

Dumkal College

Name of Teacher	Year	Course	Content	No of Period
Dipanwita Chowdhury	2nd sem (Hons)	**Course-III** Ancient India from the Maurya to Late Gupta period	**Unit-3:** Age of the Guptas	05
			Debates on golden age	03
			Consolidation of Second Magadhan empire	04
			Brahminical revival and growth of feudalism	04
			Decline of the Gupta power	03
			Beginning of political decentralization of India	04
			Assessing Harshavardhana as the last great emperor	03
Dipanwita Chowdhury	2nd sem (Hons GE) & 2nd sem (Gen)	**B.A. (General Program) in History & Also 2nd sem (Hons GE)** **Course – II** History of Medieval India	**Unit-2:** Delhi on the eve of the Mughal ascent - Timur's invasion - the Sayyids and Lodis	8
			Babur's adventure - Babur's central Asian connection - Humayun's misfortune	6
			Sher Shah Sur and Afghan rule in India	5
			Making of the Mughal State from Akbar to Aurangzeb.	10
Dipanwita Chowdhury	4th sem (Hons)	**Course – IX** History of Late Medieval India	**Unit -4:** Emergence of successor states – Bengal, Awadh, Mysore and Hyderabad.	10
Dipanwita Chowdhury	4th sem (Hons	**Skill Enhancement Elective Course** (For both Honours and General) **Course – I**	**Unit-1:** History of Music in Bengal	3
			Influence of Vaishnava poetry of the 13th – 14th century	2
			Mixture of Hindu and Islamic trends	2

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		The Bengal Music	Patronage of Nawabs and big landlords particularly the Baro Bhuiyans	3
Dipanwita Chowdhury	4th sem (Hons)	**Skill Enhancement Elective Course** **Course – II** Studies in Electronic Communication System	**Unit-2:** Technologies and instruments of electronic communication –	4
			state and administration –	4
			people and their culture	4
Dipanwita Chowdhury	6th sem (Hons)	**Course – XIII** Modern Europe: From Nationalism to Socialism	**Unit-4:** The socialist challenge - from utopian to Marxian socialist	4
			The German, French and Russian variety of socialist politics	6
Dipanwita Chowdhury	6th sem (Hons)	**Course – XIV** Trends in World Politics from the First to the Second World War	**Unit-3:** Aspects of the war economy in the inter-war period - the depression and new theories of mixed economy	6
			The collapse of the Weimer state in Germany	3
			The rise of the Nazis to power	3
			Fascism in Italy	3
Dipanwita Chowdhury	6th sem (Hons)	**Discipline Specific Elective Course** Course - I History of Bangladesh from Liberation to the present day	**Unit 3:** Bangladesh after independence – society, economy and politics	8
Dipanwita Chowdhury	6th sem (Hons)	**Discipline Specific Elective Course** Course – III History of Women in India	**Unit-1:** Women in the Indian tradition	3
			Different socio-religious movements in pre-colonial India and women's position re-defined	4

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Dipanwita Chowdhury	6th sem (General)	**Skill Enhancement Course (SEC)** Semester-VI **Course-I** History and Tourism in India	**Unit IV:** Legacy of European Culture in India with special focus on the South, the East and the North East –	8
			revisiting Bengal at Kolkata, Serampore, Chandannagar, Hooghly, the Duars and the hill station of Darjeeling	8

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Curriculum Plan of **Jayanta Kar** for **Even Semesters**

Department of History
Dumkal College

Name of Teacher	Year	Course	Content	No of Period
Jayanta Kar	2nd sem (Hons))	**Course-IV** History of Early Medieval India	**Unit-3:** Condition in the pre-Sultanate period - Polity, Society, Economy, Religion and Culture - towards transition.	08
Jayanta Kar	2nd sem (Hons GE) & 2nd sem (Gen)	**B.A. (General Program) in History & Also 2nd sem (Hons GE)** **Course – II** History of Medieval India	**Unit-1:** Northern India under the Delhi Sultanate - consolidation of the Sultanate from 1206 to 1286 AD;	10
			Decline of the Delhi Sultanate	3
			The Khalji Revolution and the omnipotent state under the Khaljis	4
			The Tughluq period of reforms and counter reforms;	5
			The successor states of Bijoynagar, Bahmani and Benga	8
			Society, economy, art, architecture and literature.	5
Jayanta Kar	2nd sem (Hons GE) & 2nd sem (Gen)	**B.A. (General Program) in History & Also 2nd sem (Hons GE)** **Course – II** History of Medieval India	**Unit-2:** Delhi on the eve of the Mughal ascent - Timur's invasion - the Sayyids and Lodis	8
			Babur's adventure - Babur's central Asian connection - Humayun's misfortune	6
			Sher Shah Sur and Afghan rule in India	5
			Making of the Mughal State from Akbar to Aurangzeb.	10
			Society and culture – religion of the masses - language, music and literature;	10

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			art and architecture.	
Jayanta Kar	4th sem (Hons)	**Course - VIII** History of Mughal India	**Unit-1:** Survey of sources and different aspects of historiography of Mughal India	4
			Reading of the texts of AbulFazal, Badauni, Abdul Hamid Lahori and Bernier	10
			Studies in the writings of Sir Jadunath Sarkar and historians from Delhi and Aligarh schools	6
Dipanwita Chowdhury	4th sem (Hons)	**Course – IX** History of Late Medieval India	**Unit -4:** Emergence of successor states – Bengal, Awadh, Mysore and Hyderabad.	10
Dipanwita Chowdhury	4th sem (Hons	**Skill Enhancement Elective Course** (For both Honours and General) **Course – I** The Bengal Music	**Unit-1:** History of Music in Bengal	3
			Influence of Vaishnava poetry of the 13th – 14th century	2
			Mixture of Hindu and Islamic trends	2
			Patronage of Nawabs and big landlords particularly the Baro Bhuiyans	3
Dipanwita Chowdhury	4th sem (Hons)	**Skill Enhancement Elective Course** **Course – II** Studies in Electronic Communication System	**Unit-2:** Technologies and instruments of electronic communication –	4
			state and administration –	4
			people and their culture	4
Jayanta Kar	4th sem (Gen)	**B.A. (General Program) in History & Also 4th sem (Hons GE)** **Course – IV** History of Europe from the Fifteenth to the Twentieth Century	**Unit-4:** Roots of European imperialism	3
			Nazism and Fascism	4
			The World Wars as the total wars; from the League of Nations to the UNO	8
			The Cold War after 1945 - various military and economic alliances	6
			Regional conflicts in the bi-polar	12

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			world, Vietnam, Korea, Cuba, the middle East and Afghanistan	
Jayanta Kar	6th sem (Hons)	**Course – XIII** Modern Europe: From Nationalism to Socialism	**Unit-3:** Politics of democracy - industrial society and its critics	4
			New concept of welfare state	3
			Revolution in medical science	3
			Reason, social change and social reform -the new woman	5
			Arts transformed	2
Jayanta Kar	6th sem (Hons)	**Course – XIV** Trends in World Politics from the First to the Second World War	**Unit-1:** Different theories of world politics - the Marxist and non-Marxist approaches	5
Jayanta Kar	6th sem (Hons)	**Discipline Specific Elective Course** Course - I History of Bangladesh from Liberation to the present day	**Unit-1:** The genesis – issues of conflict between Pakistani non-Bengali elite group	6
			Rising Bengali middle class of East Pakistan	3
Jayanta Kar	6th sem (Hons)	**Discipline Specific Elective Course** Course – III History of Women in India	**Unit-3:** The nationalist resolution on the women's question	3
			women in the freedom movement in India	3
Jayanta Kar	6th sem (Hons)	**6th sem Hons GE** Course – II History of Medieval India	**Unit-2:** Delhi on the eve of the Mughal ascent - Timur's invasion - the Sayyids and Lodis	5
			Babur's adventure - Babur's central Asian connection - Humayun's misfortune	6

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			Sher Shah Sur and Afghan rule in India	6
			Making of the Mughal State from Akbar to Aurangzeb	8
Jayanta Kar	6th sem (General)	**Skill Enhancement Course (SEC)** Semester-VI **Course-I** History and Tourism in India	**Unit II:** Looking for Immortal India – Kasi, Rameswaram, Kurukshetra, Prayagraja, Gaya, Puri, Madurai, Dwarka, Ujjain, Kanchi, Ayodhya, Mathura, Sringeri, Srirangam, Kedarnath, Badrinath, Pushkar, Tirupati, Nasik, Khajuraho, Kamakhya, and Dakshineswar	12

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Curriculum Plan of **Kartik Chandra Das** for **Even Semesters**

Department of History
Dumkal College

Name of Teacher	Year	Course	Content	No of Period
Kartik Chandra Das	2nd sem (Hons)	**Course-III** Ancient India from the Maurya to Late Gupta period	**Unit-4**: Early India in retrospect	02
			Society and culture and environment	06
			Literature and Philosophy	04
			Art and architecture	06
			Guild - trade and industry	02
Kartik Chandra Das	2nd sem (Hons)	**Course-IV** History of Early Medieval India	**Unit-1:** Sources of History and historiography of the period	04
			Contemporary texts and travelogues	04
			Indigenous literature and archaeology	04
Kartik Chandra Das	2nd sem (Hons GE) & 2nd sem (Gen)	**B.A. (General Program) in History & Also 2nd sem (Hons GE)** **Course – II** History of Medieval India	**Unit –3:** Agrarian crisis and the decline of the Mughal Empire	5
			Regional polity – the Marathas under Shivaji and the Peshwas	8
			The Sikh challenge - emergence of successor states – Bengal, Awadh, Mysore and Hyderabad.	10
Kartik Chandra Das	4th sem (Hons)	**Course - VIII** History of Mughal India	**Unit-3**: Routes of trade and commodity pattern of internal transactions, overseas trade and commodity pattern	8
			Markets and monetary system	6
Kartik Chandra Das	4th sem (Hons)	**Course – IX** History of Late Medieval India	**Unit-3:** Decline of the Mughal Empire - agrarian crisis	6
			The eighteenth-century debate	3

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Kartik Chandra Das	4th sem (Hons)	**Course - X** Rise of Modern Europe	**Unit-3:** People in the French Revolution – aristocracy, bourgeois, peasants and workers	8
			The Constituent Assembly and its achievements	3
			Girondins and Jacobins - the Reign of Terror and the Rise and fall of the Jacobin Republic	6
			The Thermidorian reaction and the Directory	3
			The Napoleonic Era	8
			Interpreting the French Revolution.	2
Kartik Chandra Das	4th sem (Hons)	**Skill Enhancement Elective Course** (For both Honours and General) **Course – I** The Bengal Music	**Unit-3:** Aspects of folk culture and folk music of Bengal – Baul, Bhatiali, Bhawaiya, Dhamali, Gambhira, Jhumur, Kavigaan and Jatra	10
Kartik Chandra Das	4th sem (Gen)	**B.A. (General Program) in History** & **Also 4th sem** (Hons GE) **Course – IV (**History of Europe from the Fifteenth to the Twentieth Century)	**Unit-2:** Seventeenth century crisis	2
			From scientific to Industrial Revolution	4
			Glorious Revolution in England and great changes in political, economic and state structure	4
			American War of Independence, birth of new democratic politics	5
			Rise of industrial societies in Europe	2
			The transition debate	3
Kartik Chandra Das	6th sem (Hons)	**Discipline Specific Elective Course** Course – III History of Women in India	**Unit-2:** Feminism revisited in the Indian context	3
			the women's question in 19th century India during colonial modernization – the debates on Sati and Purdah	4
Kartik Chandra Das	6th sem (Hons)	**6th sem Hons GE** Course – II History of Medieval India	**Unit – 4:** Mughal India in retrospect - state and religion	2
			Evolution of the administrative system– mansab and jagir	5

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			Management of land and agriculture	4
			Features of urban economy, trade and industry	6
			society and culture – religion of the masses - language, music and literature	8
			Art and architecture	4
Kartik Chandra Das	6th sem (General)	**Skill Enhancement Course (SEC)** Semester-VI **Course-I** History and Tourism in India	Unit 1: Recollecting cultural heritage of India from the Epics for a tourist	5
			Displaying India's heritage through art and architecture, particularly in South India – the culture of Indian History	5

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Curriculum Plan of **Sanchita Mondal** for **Even Semesters**

Department of History
Dumkal College

Name of Teacher	Year	Course	Content	No of Period
Sanchita Mondal	2nd sem (Hons)	**Course-III** Ancient India from the Maurya to Late Gupta period	**Unit-1:** The Maurya rule in Magadha	05
			Asoka's Dhamma and administration	04
			The policy of cultural conquest.	02
Sanchita Mondal	2nd sem (Hons)	**Course-IV** History of Early Medieval India	**Unit-2:** From centralized to decentralized India	02
			The Rajputs of North India	03
			Palas and Senas in Bengal	06
			Kingdoms of the South – The Pallavas, Rashtrakutas, Chalukyas and Cholas	08
Sanchita Mondal	4th sem (Hons)	**Course - VIII** History of Mughal India	**Unit-4:** Urban centres - morphology of cities	5
			Urban economy – crafts, technology and industry - imperial karkhanas	8
			Urban social structure, merchant communities, bankers, artisans, craftsmen and labourer	8
Sanchita Mondal	4th sem (Hons)	**Course - X** Rise of Modern Europe	**Unit-4:** The unity and disunity in Europe in 1815 - the Vienna Congress and	5
			Rise of Metternich	3
			Struggle between forces of continuity and change.	3
Sanchita Mondal	4th sem (Hons)	**Skill Enhancement Elective Course**	**Unit-1:** Different communication theories –	4

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		Course – II Studies in Electronic Communication System	communication in a globalized society and economy – aspects of electronic communication	5
Sanchita Mondal	4th sem (Gen)	**B.A. (General Program) in History & Also 4th sem (Hons GE)** **Course – 1V** History of Europe from the Fifteenth to the Twentieth Century	**Unit-3:** The French Revolution; society, economy, and polity	4
			Philosophers and the ideological revolution	2
			The Napoleonic era	8
			The Vienna Settlement and the Metternich system	4
			Revolutions of 1830 and 1848	6
			Birth of the united nation	2
			Unification of Germany and Italy as big nation states	6
			Karl Marx and the socialist challenge in Europe	4
Sanchita Mondal	6th sem (Hons)	**Course – XIV** Trends in World Politics from the First to the Second World War	**Unit-4:** The World after 1945 - theories of the Cold War and the division of Europe	6
			The emergence of the American and Soviet spheres of influence –	4
			various military and economic alliances	4
			Regional conflicts in the bi-polar world, Vietnam, Korea, Cuba, the middle east and Afghanistan	10
Sanchita Mondal	6th sem (Hons)	**Discipline Specific Elective Course**	**Unit 4:** Foreign policy of Bangladesh – relations with India	4

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		Course - I History of Bangladesh from Liberation to the present day	Role of Bangladesh in the SAARC and ASEAN	4
Sanchita Mondal	6th sem (Hons)	**6th sem Hons GE** Course – II History of Medieval India	**Unit-1:** Northern India under the Delhi Sultanate - consolidation of the Sultanate from 1206 to 1286 AD	8
			The Khalji Revolution and the omnipotent state under the Khaljis	6
			The Tughluq period of reforms and counter reforms	6
			Decline of the Delhi Sultanate	4
			The successor states of Bijoynagar, Bahmani and Bengal - society, economy, art, architecture and literature	8

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Curriculum Plan of **Dipanwita Chowdhury** for **odd Semesters**

Department of History
Dumkal College

Name of Teacher	Year	Course	Content	No of Period
Dipanwita Chowdhury	1st sem (Hons)	**Course – I** History of Early India, from remote past to the end of the Vedic Polity	**Unit-1:** Historiography of early India	03
			historical interpretations	02
			imperialist vs nationalist school	02
			leftist vs liberal school	02
			secular vs religious school	02
			The Vedic literature	02
Dipanwita Chowdhury	1st sem GE (Hons)	**Generic Elective** Course – I Human Rights in India	**Unit-3:** History of human right movements in India – intensity and impact.	06
Dipanwita Chowdhury	1st sem GE (Hons)	**Generic Elective** Course – II History of Indian Environment	**Unit-1:** Concepts and theories of environment and ecology developed in India, idealist, materialist, non-materialist and post-materialist philosophies.	05
Dipanwita Chowdhury	3rd sem (Hons)	**Course - VI** Rise of the Modern West	**Unit-4:** Europe from Thirty Years' War to Seven Years' War	07
			Rise of early nation states, Spain, France, England and Russia	07

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Dipanwita Chowdhury	(3rd sem Hons)	Skill Enhancement Elective Course **Course – I** Understanding Heritage, Art and architecture of India	**Unit-1:** Defining heritage	01
			An overview of cultural and built heritage of India	02
			Notions of art and craft	02
Dipanwita Chowdhury	3rd sem (Hons)	**Skill Enhancement Elective Course** **Course – II** Sports and Society in India in Historical Perspective	**Unit-2:** Ideas of sports from ancient and medieval texts of India	03
			Sociology of pre-colonial Indian sports – race, religion, caste and gender.	04
Dipanwita Chowdhury	3rd sem (Hons) G E	Generic Elective **Course – V** Regional History of Bengal – Nadia and Murshidabad	**Unit-4:** History of Art, Architecture and culture of Murshidabad.	05
Dipanwita Chowdhury	5th sem (Hons)	**Course – XII** History of Modern India from Renaissance to Independence	**Unit-4:** Colonial policy of divide and rule - religious polarisation of the nationalist leaders	03
			Demand for Pakistan and partition of 1947	02
			The refugee questions	01
			Struggle for new developmental economy	02
			Democracy and security in the bi-polar world.	03

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Dipanwita Chowdhury	5th sem (Hons)	**DSE Course – I** History of China from Tradition to Revolution	**Unit-3:** The People's response – from Taiping to Boxer	04
			Self –strengthening movement and reforms 1860 -1898 and 1901-1908	04
			Revolution of 1911	02
			From nationalism to comprador-ship	01
			Sun Yat Sen to Yuan-Shi-Kai - Warlordism since 1916	02
			Revolt of the Chinese working class	02
			The May Fourth Movement	02
Dipanwita Chowdhury	5th sem (Hons)	**DSE Course – II** History of Japan from Meiji Restoration to the Second World War	**Unit-1:** Tokugawa Baku-Han system of Japan– its nature	02
			crisis encounter with the west	01
			Meiji restoration - processes of modernization – social, military, political and economic.	04
Dipanwita Chowdhury	**1st sem (General)** Note: Also 1st sem Hons GE as per BOS guidelines	**B.A. (General Program) in History Course – 1** History of India from the Earliest times to the Early Medieval Period	**Unit-4:** From centralized to decentralized India	02
			The Rajputs of North India	02
			Palas and Senas in Bengal	03
			Kingdoms of the South – The Pallavas, Rashtrakutas, Chalukyas and Cholas	04
			Changes in Polity, Society, Economy, Religion and Culture - towards transition	04

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Curriculum Plan of **Jayanta Kar** for **odd Semesters**

Department of History

Dumkal College

Name of Teacher	Year	Course	Content	No of Period
Jayanta Kar	1st sem (Hons)	**Course – I** History of Early India, from remote past to the end of the Vedic Polity	**Unit-2:** Evolution from palaeolithic to neolithic cultures	04
			chalcolithic societies from Baluchistan to Gujrat	03
			growth and decline of pre-state non-iron urban culture	02
			The Harappan Civilization	05
			problem of the Indus script	02
			Journey from proto-historic to historic India.	02
Jayanta Kar	1st sem (Hons)	**Course- II** Social Formation and Cultural pattern of the Ancient and early Medieval World	**Unit-4:** Societies in Central Islamic Lands	02
			Spread of Islam	03
			The Ummah	02
			Caliphate State	04
			Shariah	02
			Sufi culture	02
Jayanta Kar	1st sem GE (Hons)	**Generic Elective** Course – I Human Rights in India	**Unit-2:** International Conventions and Charters on human rights	01
			Constitution of India and provisions for protection of human rights legislation	01
			Landmark court judgments on human rights in India	02

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Jayanta Kar	1st sem GE (Hons)	**Generic Elective** Course – II History of Indian Environment	**Unit-3:** The colonial impact, structural changes in land and environment of India jangalmahals and jalmahals spread of railway network environmental degradation and problems of public health.	05
Jayanta Kar	3rd sem (Hons)	**Course – V** The Delhi Sultanate in Retrospect	**Unit-1:** The successor states of Vijayanagar, Bahmani and Bengal	04
			Society and economy of Vijayanagar, Bahmani and Bengal	03
			Art, architecture and literature of Vijayanagar, Bahmani and Bengal	03
			Industry and urbanization of Sultanate India	04
			Trade and currency of Sultanate India	04
Jayanta Kar	3rd sem (Hons)	**Course - VI** Rise of the Modern West	**Unit-1:** Structural features of European feudalism	04
			The Crusades and the 14th century crisis of feudalism	04
			Decline of feudalism in western Europe but its survival in eastern Europe.	03
			The counter Reformation.	03
			Rise of early nation states, Spain, France, England and Russia	07
Jayanta Kar	3rd sem (Hons)	**Course – VII** Europe in Transition	**Unit-1:** Geographical explorations and overseas empires of Portugal and Spain	06
			Shift of economic balance from the Mediterranean to the Atlantic Ocean	02
			Commercial and price revolution	03

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Jayanta Kar	3rd sem (Hons)	Skill Enhancement Elective Course **Course – I** Understanding Heritage, Art and architecture of India	**Unit-2:** Pre-colonial Indian Art and Architecture – early illustrated manuscripts and mural painting traditions	04
			Early medieval sculpture, style and iconography	03
			Numismatic art	02
			Miniature painting, Mughal, Rajasthani and Pahari	02
			Early Indian architecture, stupa, cave and temple	02
			the Mughals -Indo-Persian architecture, fort, palace and mosque	02
Jayanta Kar	3rd sem (Hons)	**Skill Enhancement Elective Course Course – II** Sports and Society in India in Historical Perspective	**Unit-3:** Colonization of Indian sports in the 19th and 20th centuries	02
			Imposition of European sports on Indian society	03
			Commercialization of sports	02
			Impact on mind and body.	02
			Colonial settlement and socio-economic changes	02
			partition of India and birth of the present Nadia district.	02
Jayanta Kar	3rd sem (Hons) G E	Generic Elective **Course – V** Regional History of Bengal – Nadia and Murshidabad	**Unit-3:** Rise and fall of the Nawabi state in Murshidabad – the colonial confrontation –	03
			the new society and economy – growth of small towns.	03

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Jayanta Kar	**3rd sem** (Programme) & also 3rd sem GE for hons as per university BOS for History	**Course – III** History of Modern India till Independence	**Unit-1:** Expansion and Consolidation of British Rule with special reference to Bengal, Maharashtra, Mysore, Punjab and Awadh	04
			Colonial state and development of its administration	02
			Orientalism and Utilitarianism –	02
			Land revenue settlements and results thereof.	02
			Colonisation of education	01
			The women's question	02
Jayanta Kar	5th sem (Hons)	**Course - XI** History of Modern India from the beginning of colonial rule to the Great Revolt	**Unit-4:** Nature of colonial exploitation	02
			Drain of wealth & Famines in India	04
			monetization and entitlement debate	01
			Resistance from the tribes and peasants till the Revolt of 1857	04
			Analysing the Revolt and its aftermath.	02
Jayanta Kar	5th sem (Hons)	**Course – XII** History of Modern India from Renaissance to Independence	**Unit-3:** Interpreting Indian nationalism – messianic and developmental	02
			Different phases of the nationalist struggle	02
			Politics of association and politics of union	01
			Different political parties and their ideologies	02
			Role of Gandhi, Tagore, Subhas Bose, Nehru and Jinnah –	04
			Workers' and peasants' movements	03
Jayanta Kar	5th sem (Hons)	**DSE Course – I** History of China from Tradition to Revolution	**Unit-1:** Traditional China – Sino-centrism - society - social groups and classes	03
			Confucian value system	02
			Closed Chinese economy	01
			The Canton trades	02
			From nationalism to comprador-ship	01
			Sun Yat Sen to Yuan-Shi-Kai - Warlordism since 1916	02
			Revolt of the Chinese working class	02
			The May Fourth Movement	02

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Jayanta Kar	5th sem (Hons)	**DSE Course – II** History of Japan from Meiji Restoration to the Second World War	**Unit-3:** Growth of militarism in Japan	02
			And her imperialist projects	01
			Sino -Japanese relations	01
			Anglo-Japanese alliance	01
			Russo-Japanese war	02
			World War I and after	02
			The Manchurian crisis.	02
Jayanta Kar	5th sem (Hons)	**DSE Course – III** Issues of the Contemporary World	**Unit-2**: Crisis in the socialist block – theory and practice	02
			Impact of the rise of China as a new socialist state	01
			The Sino-soviet rift	01
			And tensions within the east European Soviet Bloc: Hungary, Czechoslovakia, and Poland	03
			Glasnost- Perestroika and collapse of Soviet socialism	02
			End of the cold war and German reunification	02
Jayanta Kar	**1st sem (General)** Note: Also 1st sem Hons GE as per BoS guidelines	**B.A. (General Program) in History Course – 1** History of India from the Earliest times to the Early Medieval Period	**Unit-2:** The Maurya rule in Magadha	03
			Asoka's Dhamma and administration	02
			The post Maurya India of the Kushanas, Satavahanas and Tamil powers	04
			Splits in Jainism and Buddhism	02
			Vaishnavism, Saivism	02
			Palas and Senas in Bengal	03
			Kingdoms of the South – The Pallavas, Rashtrakutas, Chalukyas and Cholas	04
			Changes in Polity, Society, Economy, Religion and Culture - towards transition	04

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Curriculum Plan of **Kartik Chandra Das** for **odd Semesters**
Department of History
Dumkal College

Name of Teacher	Year	Course	Content	No of Period
Kartik Chandra Das	1st sem (Hons)	**Course- II** Social Formation and Cultural pattern of the Ancient and early Medieval World	**Unit-3:** The Polis and slave society of ancient Greece	04
			Rise of ancient Rome	03
			Decline of the Roman Empire	03
			Agrarian economy and trade	02
			The Church and the question of religion	02
Kartik Chandra Das	1st sem GE (Hons)	**Generic Elective** Course – I Human Rights in India	**Unit-4:** Women's rights in India	01
			The question of women's empowerment	01
			Women's access to resources of the country	02
			Violence against women	02
			Protective laws	01
			Protests and movements	02
Kartik Chandra Das	1st sem GE (Hons)	**Generic Elective** Course – II History of Indian Environment	**Unit-2:** Indigenous knowledge system animal ethics social formation and collective management of rivers, forests and hills in pre-colonial India.	05

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Kartik Chandra Das	3rd sem (Hons)	**Course – V** The Delhi Sultanate in Retrospect	**Unit-3:** Economy of Sultanate India	02
			Changes in land revenue administration of Sultanate India	03
			New agrarian relation of Sultanate India	03
			Industry and urbanization of Sultanate India	04
			Trade and currency of Sultanate India	04
Kartik Chandra Das	3rd sem (Hons)	**Course - VI** Rise of the Modern West	**Unit-3:** Reformation – origin, course and results	06
			Progress of the movement from Luther to Calvin	06
			The counter Reformation.	03
Kartik Chandra Das	3rd sem (Hons)	**Course – VII** Europe in Transition	**Unit-3:** American War of Independence	03
			Birth of new democratic politics	02
Kartik Chandra Das	3rd sem (Hons)	Skill Enhancement Elective Course **Course – I** Understanding Heritage, Art and architecture of India	**Unit-3:** The colonial period – western influences on Indian Art and architecture	03
			Changes in the post-colonial period	03

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Kartik Chandra Das	**3rd sem** (Programme) & also 3rd sem GE for hons	**Course – III** History of Modern India till Independence	**Unit-2:** Exploitation and resistance	01
			De-peasantization and de-industrialization	02
			Drain of wealth	01
			Famines in India	01
			Resistance from the tribes and peasants till the Revolt of 1857	03
			Analysing the revolt and its aftermath	02
			Colonial policy of further exploitation through railways and industrial network.	02
Kartik Chandra Das	5th sem (Hons)	**Course - XI** History of Modern India from the beginning of colonial rule to the Great Revolt	**Unit-2:** Expansion and Consolidation of British Rule with special reference to Bengal,	03
			Maharashtra, Mysore, Punjab and Awadh	05
			Colonial state and its ideology - rule of law,	01
			Orientalism,	02
			Utilitarianism	02
Kartik Chandra Das	5th sem (Hons)	**Course – XII** History of Modern India from Renaissance to Independence	**Unit-1:** The cultural revolution of the nineteenth century	02
			Critique of Young Bengal Movement	01
			Bengal Renaissance, social and religious reforms	03
			Colonisation of education	02
			The women's question	02
			Different political parties and their ideologies	02
			Role of Gandhi, Tagore, Subhas Bose, Nehru and Jinnah –	04
			Workers' and peasants' movements	03

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Kartik Chandra Das	5th sem (Hons)	**DSE Course – II** History of Japan from Meiji Restoration to the Second World War	**Unit-2:** Popular and democratic movements	01
			Satsuma rebellion	01
			Popular rights movement	01
			Meiji constitution.	04
Kartik Chandra Das	5th sem (Hons)	**DSE Course – III** Issues of the Contemporary World	**Unit-4:** From Bi-polarism to Uni-polarism - globalization and its impact on culture and society	03
			Information revolution and its impact of the present-day world	02
Kartik Chandra Das	**1st sem (General)** Note: Also 1st sem Hons GE as per BOS guidelines	**B.A. (General Program) in History Course – 1** History of India from the Earliest times to the Early Medieval Period	**Unit-3:** Age of the Guptas	03
			Consolidation of Magadhan empire	03
			Debates on golden age	02
			Brahminical revival and growth of feudalism	03
			Decline of the Gupta power and beginning of political decentralization of India; Assessing Harshavardhana as the last great emperor	04

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Curriculum Plan of **Manas Kumar Das** for **Even Semesters**

Department of History
Dumkal College

Name of Teacher	Year	Course	Content	No of Period
Manas Kumar Das	2nd sem (Hons)	**Course-III** Ancient India from the Maurya to Late Gupta period	**Unit-2:** The post-Maurya India of the Kushanas	04
			Satavahanas and Tamil powers, Chera, Chola and Pandya	06
			New trends in economy and society – peasantization of tribes and changes in the caste system	03
			spread of megalithic culture	03
			splits in Jainism and Buddhism	04
			Vaishnavism, Saivism and Tantricism	06
Manas Kumar Das	2nd sem (Hons)	**Course-IV** History of Early Medieval India	**Unit-4:** Northern India under the Delhi Sultanate - the Turkish invasions from 997 to 1206 AD	04
			Consolidation of the Sultanate from 1206 to 1286 AD	08
			The Khalji Revolution and the omnipotent state under the Khaljis	06
			The Tughluq period of reforms and counter reforms	05
			Decline of the Delhi Sultanate	03
Manas Kumar Das	2nd sem (Hons GE) & 2nd sem (Gen)	**B.A. (General Program) in History & Also 2nd sem (Hons GE) Course – II** History of Medieval India	**Unit – 4:** Mughal India in retrospect - state and religion	6
			Evolution of the administrative system– mansab and jagir	6
			Management of land and agriculture	5
			Features of urban economy, trade and industry	6
			Society and culture – religion of the masses - language, music and literature; art and architecture.	10

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Manas Kumar Das	4th sem (Hons)	**Course - VIII** History of Mughal India	**Unit-2:** Making of the Mughal State from Akbar to Aurangzeb	12
			State and religion	5
			Management of land and agriculture	6
			Evolution of the administrative system - mansab and jagir	6
			The Mughal ruling classes - nobility and zamindars	6
			The peasants and village community	6
Manas Kumar Das	4th sem (Hons)	**Course – IX** History of Late Medieval India	**Unit-2:** Regional polity – the Marathas under Shivaji and the Peshwas	8
			The Sikh challenge	3
Manas Kumar Das	4th sem (Hons)	**Course - X** Rise of Modern Europe	**Unit-2:** The eighteenth-century background to the French Revolution - society, economy, and polity;	8
			The philosophers and the ideological revolution.	4
Manas Kumar Das	4th sem (Hons)	**Skill Enhancement Elective Course** (For both Honours and General) **Course – I** The Bengal Music	**Unit-4:** Modern Bengali Music – post-colonial western influences –	4
			middle class romanticism and transformation of Bengali music –	3
			leftist movements and new forms of music – media and music – Bengali music in theatre and film –	4
			globalization and changes in musical forms – rock and band music	4
Manas Kumar Das	4th sem (Hons)	**Skill Enhancement Elective Course Course – II** Studies in Electronic Communication System	**Unit-4:** Internet - brief history, internet today - protocols and standards -	5
			reference models: OSI reference model, TCP/IP reference model, their comparative study	5
Manas Kumar Das	4th sem (Gen)	**B.A. (General Program) in History** & **Also 4th sem** (Hons GE)	Unit-1: Renaissance and Reformation - socio-economic roots	6
			Secularism and humanism	6

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		Course – IV (History of Europe from the Fifteenth to the Twentieth Century)	Art, architecture, science and literature	8
			The printing revolution	3
Manas Kumar Das	6th sem (Hons)	**Course – XIII** Modern Europe: From Nationalism to Socialism	**Unit-2:** The economic revolutions, consolidation of capitalism	4
			Formation of big national states in Germany and Italy	6
			Imperial advances before and after Bismarck	4
			Developments in eastern Europe	4
Manas Kumar Das	6th sem (Hons)	**Course – XIV** Trends in World Politics from the First to the Second World War	**Unit-2:** Roots of European imperialism and the World Wars as the total war	5
			Impact of war on European mind	2
			Peace settlement of 1919 and search for the collective security	4
			The League of Nations	3
Manas Kumar Das	6th sem (Hons)	**Discipline Specific Elective Course** Course - I History of Bangladesh from Liberation to the present day	**Unit 2:** Political transformation in East Pakistan	3
			Emergence of linguistic nationalism since 1952	3
			Resistance against Pakistani militarism	4
			Rise of Sheikh Mujibur Rahaman as the new mass leader	4
			Awami League Movement, 1966 to 1970	5
			Bangladesh liberation movement of 1971 – birth of Bangladesh in 1972	5
Manas Kumar Das	6th sem (Hons)	**Discipline Specific Elective Course** Course – III History of Women in India	**Unit-4:** Emerging new woman in post-colonial India	2
			Women's organizations and fight against their marginalization	3

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			Women in Indian literature and performing art	3
Manas Kumar Das	6th sem (Hons)	**6th sem Hons GE** Course – II History of Medieval India	**Unit –3:** Agrarian crisis and the decline of the Mughal Empire	4
			Regional polity – the Marathas under Shivaji and the Peshwas	6
			The Sikh challenge	2
			Emergence of successor states – Bengal, Awadh, Mysore and Hyderabad	8
Manas Kumar Das			**Unit III:** The wonder that was medieval India – Delhi, Agra, Ajmer, Ahmedabad, Daulatabad, Junagarh, Lucknow, Chittor, Jaipur, Jodhpur and Jaisalmer	12

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Curriculum Plan of **Manas Kumar Das** for **Odd Semesters**

Department of History
Dumkal College

Name of Teacher	Year	Course	Content	No of Period
Manas Kumar Das	1st sem (Hons)	**Course – I** History of Early India, from remote past to the end of the Vedic Polity	**Unit-3:** Legacy of the Harappan Culture	02
			The Aryan penetration and the Anglo-Oriental debate	03
			Beginning of iron age and settled agriculture - patterns of settlement and cultural changes	05
			Emergence of caste society, organized religion and state territoriality	05
			The Vedic literature	02
Manas Kumar Das	1st sem (Hons)	**Course- II** Social Formation and Cultural pattern of the Ancient and early Medieval World	**Unit-2:** Bronze Civilizations of Egypt	04
			Mesopotamia	04
			China	03
			Eastern Mediterranean lands.	03
			Sufi culture	02
Manas Kumar Das	1st sem GE (Hons)	**Generic Elective** Course – I Human Rights in India	**Unit-1:** Basic concepts and theories of human rights	01
			Social structure and the question of human rights in India, gender, caste, class and religion	03
			State and human rights, politics and economic policies.	02

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Manas Kumar Das	1st sem GE (Hons)	**Generic Elective** Course – II History of Indian Environment	**Unit-4:** Political economy of environment in postcolonial India industry and pollution Development vs. environment debate Various environmental movements.	05
Manas Kumar Das	3rd sem (Hons)	**Course – V** The Delhi Sultanate in Retrospect	**Unit-2:** Delhi on the eve of the Mughal ascent - Timur's invasion –	02
			The Sayyids and Lodis	02
			Babur's adventure	02
			Babur's central Asian connection	01
			Humayun's misfortune	01
			Sher Shah Sur and Afghan rule in India	03
			Development of bhakti and Sufi philosophy	04
			Language, literature, art and architecture	04
Manas Kumar Das	3rd sem (Hons)	**Course - VI** Rise of the Modern West	**Unit-2:** Socio-economic roots of Renaissance - spread of new social ideas	03
			Secularism and Humanism of Renaissance	04
			Art, architecture, science and literature during Renaissance	05
			The printing revolution	02

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Manas Kumar Das	3rd sem (Hons)	Skill Enhancement Elective Course **Course – I** Understanding Heritage, Art and architecture of India	**Unit-4:** The Bengal School of art and architecture – Birbhum, Bankura and Bishnupur Gharana	03
			Art Movements – Santiniketan style - Progressive Artists' Group	03
			Major artists and their works	03
			Popular art forms – folk art traditions	02
Manas Kumar Das	3rd sem (Hons)	**Skill Enhancement Elective Course** **Course – II** Sports and Society in India in Historical Perspective	**Unit-4:** Sports in post-colonial India	03
			sports in education	02
			Sports and economy	02
			Sports and politics	02
			Sports and diplomacy	02
			Effects of globalization on Indian sports	02
Manas Kumar Das	3rd sem (Hons) G E	Generic Elective **Course – V** Regional History of Bengal – Nadia and Murshidabad	**Unit-2:** The society – the Chaitanya Movement and revolution in culture and literature	02
			The rich tradition of indigenous education	02
			Minor religious sects and folk culture of Nadia.	02
Manas Kumar Das	**3rd sem** (Programme) & also 3rd sem GE for hons	**Course – III** History of Modern India till Independence	**Unit-4:** Interpreting Indian nationalism	02
			Swadeshi movement and different phases of the nationalist struggle	02
			Role of Gandhi, Tagore, Subhas Bose, Nehru and Jinnah	04
			Workers' and peasants' movements	02
			Religious polarisation of national politics	02
			Partition and independence (1947)	02

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Manas Kumar Das	5th sem (Hons)	**Course - XI** History of Modern India from the beginning of colonial rule to the Great Revolt	**Unit-1:** Understanding Modern Indian History	02
			Historiography, concepts, terminologies, approaches.	07
			peasants and landless labourers	01
			Detribalization and the environmental question	02
			De-industrialization,	03
			Rural credit and indebtedness	02
Manas Kumar Das	5th sem (Hons)	**Course – XII** History of Modern India from Renaissance to Independence	**Unit-2:** Re-industrialisation of India following the spread of railway network	02
			Colonial fiscal policy and the balance of Indian trade	02
			Rise and growth of the Indian capitalist and working class.	02
Manas Kumar Das	5th sem (Hons)	**DSE Course – I** History of China from Tradition to Revolution	**Unit-2:** Confronting the foreigners - Opium Wars	02
			Treaties with imperialist powers	01
			Foreigners' struggle for concessions in China	02
			China as an 'informal colony'	01
			Increasing western pressure - the open-door policy	02
			Transformation of China from a feudal society to a semi-colonial and semi-feudal society.	02
Manas Kumar Das	5th sem (Hons)	**DSE Course – II** History of Japan from Meiji Restoration to the Second World War	**Unit-4:** Rise of political parties in Japan and their failure to sustain democratic system	03
			Japan and the two World Wars	04

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Manas Kumar Das	5th sem (Hons)	**DSE** **Course – III** Issues of the Contemporary World	**Unit-3:** Oil politics and the Arabian world: Israel, Palestine, Iran and Iraq	04
			Nuclear diplomacy in the twentieth century world	04
Manas Kumar Das	**1st sem (General)** Note: Also 1st sem Hons GE as per BOS guidelines	**B.A. (General Program) in History** **Course – 1** History of India from the Earliest times to the Early Medieval Period	**Unit-1:** Sources and interpretation	02
			Broad survey of paleolithic, mesolithic and neolithic cultures	03
			The Harappan Civilisation	03
			Journey from the Vedic state to the 16 Mahajanapadas	02
			From the age of the Vedas to the age of Jainism and Buddhism.	04

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Curriculum Plan of **Sanchita Mondal** for **Odd Semesters**

Department of History
Dumkal College

Name of Teacher	Year	Course	Content	No of Period
Sanchita Mondal	1st sem (Hons)	**Course – I** History of Early India, from remote past to the end of the Vedic Polity	**Unit-4:** The non-Vedic political economy of the 16 Mahajanapadas	03
			Spread of protestant religions – Ajivikism, Jainism and Buddhism	05
			Commercial and urban growth of India	03
			Rise of Magadha as an imperial power.	04
Sanchita Mondal	1st sem (Hons)	**Course- II** Social Formation and Cultural pattern of the Ancient and early Medieval World	**Unit-1:** Pre-historic and proto-historic cultures beyond India	03
			Beginning of agriculture and animal husbandry	03
			Searches into the history of Africa	03
			The Aztec Civilization	03
			The Inca Society	03
Sanchita Mondal	3rd sem (Hons)	**Course – V** The Delhi Sultanate in Retrospect	**Unit-4:** Ideas of state and kingship	02
			Moves from theocracy to secular administration	03
			Development of bhakti and Sufi philosophy	04
			Language, literature, art and architecture	04
			The printing revolution	02

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DUMKAL COLLEGE

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(Govt. Aided, Affiliated to the: University of Kalyani Included under section 2(f) & 12 (B) of UGC Act.)

Sanchita Mondal	3rd sem (Hons)	**Course – VII** Europe in Transition	**Unit-4:** From the age of Enlightenment to the Age of Liberalism	02
			From feudalism to capitalism	02
			The transition debates.	03
Sanchita Mondal	3rd sem (Hons)	Skill Enhancement Elective Course **Course – II** Sports and Society in India in Historical Perspective	**Unit-1:** Concepts and theories – Sports and History	03
			Greek Philosophy of Sports – Greek and Roman tradition of Sports	04
			The Olympics	02
Sanchita Mondal	3rd sem (Hons) G E	Generic Elective **Course – V** Regional History of Bengal – Nadia and Murshidabad	**Unit-1:** Nadia in the post-Gupta period – as a Pargana in medieval India	03
			Colonial settlement and socio-economic changes	02
			partition of India and birth of the present Nadia district.	02
			Land revenue settlements and results thereof.	02
Sanchita Mondal	**3rd sem** (Programme) & also 3rd sem GE for hons	**Course – III** History of Modern India till Independence	**Unit-3:** The cultural revolution of the nineteenth century	02
			Critique of Young Bengal Movement	02
			Bengal Renaissance, social and religious reforms	02
			Colonisation of education	01
			The women's question	02

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Sanchita Mondal	5th sem (Hons)	**Course - XI** History of Modern India from the beginning of colonial rule to the Great Revolt	**Unit-3:** Rural Economy and Society	01
			Land revenue settlements	01
			Agrarian structure and…	01
			Transformation debate	02
			Commercialization of agriculture	01
			Rural stratification thesis	01
			peasants and landless labourers	01
			Detribalization and the environmental question	02
			De-industrialization,	03
			Rural credit and indebtedness	02
Sanchita Mondal	5th sem (Hons)	**DSE Course – I** History of China from Tradition to Revolution	**Unit-4:** Development of Chinese industrial economy and growth of the Chinese proletariat	04
			Spread of communism among the proletariat in between the world wars - Chiang Kai Shek	02
			Kuomintang and the united front - break with the front	02
			The mature phase of Chinese communist movement under Mao Tse Tung - the Long March and the Communist Revolution of China.	04
Sanchita Mondal	5th sem (Hons)	**DSE Course – III** Issues of the Contemporary World	**Unit-1:** De–colonization of Asia and Africa	02
			Emergence of the Third World	02
			Struggle for survival in Asia	02
			And apartheid in Africa.	03

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DUMKAL COLLEGE ★ DUMKAL, MURSHIDABAD ★

Principal
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Dumkal, Murshidabad

Department of English

Lesson Plan

Name of the Teacher: Abida Sultana

Year: 2018

Part: II

Paper: III

Sections	Topic	Topics of Discussion	Number of Classes
History	Prose	1) Essays: religious and historical 2) Counsel literature, satire 3) Fiction, translation	3
Drama	“Macbeth”. William Shakespeare.	1) Introduction to tragedy 2) Shakespearean drama 3) Renaissance spirit	20
Prose	"Of Unity in Religion". Francis Bacon.	1) The value of unity 2) Tolerance and Moderation 3) Practical wisdom	2
Prose	"Of Plantations". Francis Bacon.	1) Purpose of plantation 2) Choice of location 3) Governance and order	2

Year: 2018

Part: II

Paper: IV

Sections	Topic	Topics of Discussion	Number of Classes
History	Prose	1) Satire 2) Periodical Essay	4
Novel	“Gulliver's Travels (Bks. I & II)”. Jonathan Swift.	1) Satirical novel 2) A voyage to Lilliput 3) A voyage to Brobdingnag	15
Essay	“On Idleness" [Idler31]. Samuel Johnson.	1) The Nature of Idleness 2) Causes of Idleness 3) Effect of Idleness	2

Year: 2018

Part: III

Paper: V

Sections	Topic	Topics of Discussion	Number of Classes
History	Poetry	1) Lyric 2) Narrative	6
Poetry	“Ode to A Nightingale". John Keats	1) Transience and Immortality 2) Natureand Art 3) Morality and death 4) Escape and reality	3
Poetry	“Eve of St Agnes". John Keats	1) Fantasy and reality 2) Ritual and Superstition 3) Escape and transformation	5
Poetry	“Excerpt from Don Juan” Stanzas 22-29; I1.169 232. George Gordon Byron	1) Satire and humour 2) Picaresque structure 3) Heroic couplet and ottavarima 4) Social Critique	3

Year: 2018

Part: III

Paper: VI

Sections	Topic	Topics of Discussion	Number of Classes
History	Prose	1) Novel 2) Essay	4
Poetry	“Ulysses". Tenyson	1) Dramatic Monologue 2) Victorian spirit 3) Spirit of Heroism and Leadership 4) Yearning for Immortality and Legacy:	3
Poetry	“My Last Duchess". Robert Browning	1) Dramatic Monologue 2) Character of the Duke 3) Themes of Power and Control 4) Art and Aesthetics	3
Poetry	“God's Grandeur”. Gerard Manley Hopkins	1) Sonnet 2) Celebration of God’s Presence 3) The Glory of Creation: 4) Renewal and Redemption 5) Innovative Language and Form 6) Environmental and Spiritual Themes	2
Drama	“Arms and the Man” George Bernard Shaw.	1) Satirical Exploration of War and Romance 2) Class and Social	20

		Commentary 3) Themes of Identity and Honor 4) Humor and Language	

Year: 2018

Part: III

Paper: VII

Sections	Topic	Topics of Discussion	Number of Classes
History	1) Brief Historical Outline 2) Brief socio-cultural history	1) First World War 2) Second World War	5
Poetry	“Second Coming". W. B. Yeats	1) Apocalyptic Imagery 2) Historical Context 3) Cycle of History 4) Spiritual and Mystical Themes 5) Language and Structure	3
Poetry	“Hollow Men". T. S. Eliot	1) Epigraph and Opening Lines 2) Fragmented Structure: 3) Allusions and References 4) Theme of Spiritual Emptiness 5) Ambiguity and Interpretation	3
Poetry	“Bagpipe Music". Louis Macneice	1) Whimsical and satirical piece 2) Contrast between Tradition and Modernity 3) Themes of Identity and Cultural	2

		Stereotypes	

Year: 2018

Semester: 1st

Course Code/ Unit	Topic	Topics of Discussion	Number of Classes
ENGH-H-CC-T-1/B	Sudraka. "Mricchkatika".	1) Brief Introduction of classical Sanskrit Drama 2) Brief Introduction of author and his works 3) Character analysis	10
ENGH-H-CC-T-2/A	Horace. "Epistle I".	1) Introduction 2) Textual Analysis	10
ENGH-H-CC-T-2/B	Homer. "The Iliad".	1) Epic: Introduction. 2) Concept of honor 3) Heroism and the main characters	10

Year: 2019

Part: III

Paper: V

Sections	Topic	Topics of Discussion	Number of Classes
History	Drama	1) Tragedy a) Classical Tragedy b) Tragedy in the Elizabethan Period c) Modern Tragedy d) Tragicomedy 2) Comedy a) Comedy of Humors b) Romantic Comedy c) Comedy of Manners d) Farce	2
Prose	"Going on a Journey"-William Hazlitt.	1) Joy of Solitude 2) Escape from Routine 3) Reflection and Introspection 4) Connection with Nature 5) Sense of Discovery	3
Prose	"The Literature Of Knowledge And The CA Literature Of Power". Thomas De Quincey.	1) Informative Function 2) Didactic Purpose 3) Transient Impact 4) Aesthetic and Emotional Impact 5) Enduring Influence 6) Transformative Nature	4
Novel	"Northanger Abbey." Jane Austen.	1) Parody of Gothic Novels 2) Catherine Morland	15

		3) Reality vs. Imagination 4) Coming of Age 5) Meta-Fictional Elements	

Year: 2019

Part: III

Paper: VI

Sections	Topic	Topics of Discussion	Number of Classes
History	Poetry	1) Epic Poetry 2) The Ode 3) The Sonnet a) Italian Sonnet b) English Sonnet c) Spenserian Sonnet 4) Mock-Epic	3
Novel	"David Copperfield." Charles Dickers.	1) Bildungsroman 2) Autobiographical Elements 3) Character Development 4) Social Class and Mobility 5) Resilience and Perseverance 6) Social Critique 7) Redemption and Forgiveness 8) Virtue and vice	20

Year: 2019

Part: III

Paper: VII

Sections	Topic	Topics of Discussion	Number of Classes
History	Drama		3
Prose	"The Ox". H.E Bates.	1) Themes of hardship, dignity, and sacrifice in rural England 2) Dignity in Labor	4
Prose	"The Fly". Katherine Mansfield.	1) Grief and Loss 2) Power and Control 3) Resilience and Futility	2
Prose	"The Englishman's House". Evelyn Waugh.	1) Theme of Home and Identity 2) Satire and Humor 3) Englishman Archetype 4) Tradition and Modernity 5) Anecdotal	3
Drama	"Look Back in Anger". John Osborne.	1) Kitchen sink drama 2) Anger and Disillusionment 3) Angry Young Man 4) Alienation 5) Class conflict 6) Critique of the Establishment 7) The Bear and	20

		Squirrel Game	

Year: 2019

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/A	IlangoAdigal. " The Book of Banci "	1) Introduction to Epic and Tamil Epic 2) Themes of the poem 3) Feministic perspective	15
ENGH-H-CC-T-1/B	Sudraka. "Mricchkatika".	1) Brief Introduction of classical Sanskrit Drama 2) Brief Introduction of author and his works 3) Character analysis	10
ENGH-H-CC-T-2/A	Plautus. "Pot of Gold".	1) Folklore and mythology 2) Introduction to the Author and his Age 3) Textual Analysis	15

Year: 2020

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/B	Kalidasa. “AbhijnanaShakuntalam”.	1) History of Indian Classical Drama 2) Rasa Theory 3) Textual Analysis	15
ENGH-H-CC-T-2/A	Plautus. “Pot of Gold”.	1) Folklore and mythology 2) Introduction to the Author and his Age 3) Textual Analysis	15

Year: 2020

Semester: 2nd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-3/ A	Salman Rushdie. "The Free Radio"	1) Symbolism of Free Radio 2) Satirical commentary 3) Cultural context	7
ENGH-H-CC-T-3/A	Nissim Ezekiel. "Enterprise"	1) India writing in English 2) Title of the poem 3) Textual Analysis	3
ENGH-H-CC-T-3/A	Jayanta Mahapatra. "Dawn at Puri"	1) Introduction to the Author 2) Textual Analysis	3
ENGH-H-CC-T-4/A	FransisBacon "Of Empire"	1) Short Introduction on Essay 2) Textual Analysis	5

Year: 2020

Semester: 3rd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-5/A	Walt Whitman. "Passage to India"	1) Spirituality and Transcendence 2) Philosophical Reflection	3
ENGH-H-CC-T-5/A	Adrienne Rich. "Power"	1) Concept of Power 2) Feminist Perspective 3) Textual Analysis	3
ENGH-H-CC-T-5/A	Allen Ginsberg. "An Eastern Ballad"	1) Spirituality 2) Self discovery	5
ENGH-H-CC-T-6/B	Lewis Carroll. "Through the Looking Glass".	1) World building and fantasy 2) Absurdity of language and logic 3) Textual Analysis	10
ENGH-H-CC-T-7/A	Alexander Pope. "The Rape of the Lock".	1) Mock Heroic Epic 2) Textual Analysis	7
ENGH-H-CC-T-7/A	John Webster. "The Duchess of Malfi".	1) Theatrical elements 2) Morality and Ethics 3) Reception and legacy	7

Year: 2020

Semester: 4th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-8/A	Thomas Gray. "Elegy Written in a Country Churchyard"	1) Introduction to Elegy 2) Romantic elements 3) Neo classical elements	5
ENGH-H-CC-T-9/A	John Keats. " Ode to a Nightingale", "Bright Star", "To Autumn"	1) Concept of beauty 2) Escape and immersion 3) Textual Analysis	5
ENGH-H-CC-T-10/B	Thomas Hardy. "Tess of the d'Urbervilles".	1) Concept of Fate 2) Social injustice 3) The struggle of the working class	5

Year: 2020

Semester: 5th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-11/A	Sylvia Plath. "Daddy", " Lady Lazarus "	1) Confessional poetry 2) Discussion on Sylvia Plath's life and her works	5
ENGH-H-CC-T-11/A	Katherine Mansfield. "Bliss"	1) Upper society in England 2) Feminist Perspective 3) Homosexuality	3
ENGH-H-CC-T-12/A	Wystan Hugh Auden. "Unknown Citizen"	1) Conformist society 2) Good citizen 3) Textual Analysis	3
ENGH-H-CC-T-12/B	Joseph Conrad. "Heart of Darkness".	1) Novella 2) Imperialism 3) Human darkness	4
ENGH-H-DSE-T-2/B	George Orwell. "Animal Farm".	1) Allegory 2) Political Allegory 3) Russian Revolution	5
ENGH-H-DSE-T-3/A	William Wordsworth. "Preface" to the Lyrical Ballads.	1) Language 2) Diction 3) Imagination 4) Role of the Poet 5) Purpose of Poetry	6
ENGH-H-DSE-T-3/B	S.T. Coleridge. "Biographia Literaria".	1) Autobiography and literary analysis 2) Primary and Secondary Imagination 3) Fancy and Imagination 4) Nature of Poetry	5

Year: 2021

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/B	Kalidasa. “AbhijnanaShakuntalam”.	1) History of Indian Classical Drama 2) Rasa Theory 3) Textual Analysis	15
ENGH-H-CC-T-2/A	Plautus. “Pot of Gold”.	1) Folklore and mythology 2) Introduction to the Author and his Age 3) Textual Analysis	15

Year: 2021

Semester: 2nd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-3/ A	Amitav Ghosh. " The Ghosts of Mrs Gandhi "	1) Historical context 2) Environmental concerns 3) Global Challenges 4) Civil Disobedience 5) Critique and Reflection	15
ENGH-H-CC-T-3/ A	Salman Rushdie. "The Free Radio"	1) Symbolism of Free Radio 2) Satirical commentary 3) Cultural context	7
ENGH-H-CC-T-3/B	Anita Desai. "In Custody".	1) Cultural conflict 2) Personal transformation 3) Relationships dynamic	10
ENGH-H-CC-T-4/A	Geoffrey Chaucer. "Wife of Bath"	1) Introduction to the Text 2) Textual Analysis 3) Feminist Perspective	7

Year: 2021

Semester: 3rd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-5/A	Adrienne Rich. "Power"	1) Concept of Power 2) Feminist Perspective 3) Textual Analysis	3
ENGH-H-CC-T-5/A	Abraham Lincoln. "Gettysburg Address"	1) Slavery system in America 2) Introduction to the Text	3
ENGH-H-CC-T-6/B	Lewis Carroll. "Through the Looking Glass".	1) World building and fantasy 2) Absurdity of language and logic 3) Textual Analysis	10

Year: 2021

Semester: 4th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-8/B	William Congreve. "The Way of the World".	1) Introduction to the Text 2) Comedy of Manners 3) Restoration comedy	10
ENGH-H-CC-T-9/A	John Keats. " Ode to a Nightingale", "Bright Star", "To Autumn"	1) Concept of beauty 2) Escape and immersion 3) Textual Analysis	5
ENGH-H-CC-T-10/A	Christina Rossetti. "The Goblin Market".	1) Introduction of the Age 2) Victorian Morality 3) Themes of Temptations and desire	4
ENGH-H-CC-T-10/B	Charlotte Bronte. "Jane Eyre".	1) Discussion on Jane Eyre 2) Feminist Perspective 3) Textual Analysis	4

Year: 2021

Semester: 5th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-11/A	Sylvia Plath. "Daddy", " Lady Lazarus "	1) Confessional poetry 2) Discussion on Sylvia Plath's life and her works	5
ENGH-H-CC-T-11/A	Katherine Mansfield. "Bliss"	1) Upper-class society in England 2) Feminist Perspective 3) Homosexuality	3
ENGH-H-CC-T-12/A	Wystan Hugh Auden. "Unknown Citizen"	1) Conformist society 2) Good citizen 3) Textual Analysis	3
ENGH-H-CC-T-12/B	Joseph Conrad. "Heart of Darkness".	1) Novella 2) Imperialism 3) Human darkness	4
ENGH-H-DSE-T-2/B	George Orwell. "Animal Farm".	1) Allegory 2) Political Allegory 3) Russian Revolution	5
ENGH-H-DSE-T-3/A	William Wordsworth. "Preface" to the Lyrical Ballads.	1) Language 2) Diction 3) Imagination 4) Role of the Poet Purpose of Poetry	6
ENGH-H-DSE-T-3/B	S.T. Coleridge. "Biographia Literaria".	1) Autobiography and literary analysis 2) Primary and Secondary Imagination 3) Fancy and Imagination 4) Poetry and the Poet	5

Year: 2021

Semester: 6th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-13/B	Eugene Ionesco, "Rhinoceros"	1) Absurdity and Surrealism 2) Conformity and Mass Movement 3) Textual Analysis	10
ENGH-H-CC-T-13/B	Luigi Pirandello. "Six Characters in Search of an Author".	1) Meta-theatrical 2) Identity and reality 3) Theatrical illusion	10
ENGH-H-CC-T-14/B	Chinua Achebe. "Things Fall Apart".	1) Exploration of colonialism, 2) Cultural identity, and the complexities of human experience. 3) Textual Analysis	5
ENGH-H-DSE-T-4/B	Feminism: b. LuceIrigaray. "When the Goods Get Together"	1) Concept of Feminism 2) French Feminism 3) Freud's Phallocentric Theory 4) Women as Commodities 5) Homosexuality	5
ENGH-H-DSE-T-5/A	DibyenduPalit, "Alam's Own House".	1) Introduction 2) Family dynamics 3) Cultural context	4
ENGH-H-DSE-T-5/A	Manik Bandyopadhyay, "The Final Solution".	1) Introduction 2) Quest for Identity 3) Textual Analysis	7

Year: 2022

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-2/A	Plautus. “Pot of Gold”.	1) Folklore and mythology 2) Introduction to the Author and his Age 3) Textual Analysis	15

Year: 2022

Semester: 2nd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-3/ A	Salman Rushdie. "The Free Radio"	1) Symbolism of Free Radio 2) Satirical commentary 3) Cultural context	7
ENGH-H-CC-T-3/A	Nissim Ezekiel. "Enterprise"	1) India writing in English 2) Title of the poem 3) Textual Analysis	3
ENGH-H-CC-T-3/A	Jayanta Mahapatra. "Dawn at Puri"	1) Introduction to the Author 2) Textual Analysis	3
ENGH-H-CC-T-4/A	Francis Bacon. "Of Empire"	1) Short Introduction on Essay 2) Textual Analysis	5

Year: 2022

Semester: 3rd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-5/A	Walt Whitman. "Passage to India".	1) Spirituality and Transcendence 3) Philosophical Reflection	3
ENGH-H-CC-T-5/A	Adrienne Rich. "Power".	1) Concept of Power 2) Feminist Perspective 3) Textual Analysis	3
ENGH-H-CC-T-5/A	Allen Ginsberg. "An Eastern Ballad"	1) Spirituality 2) Self discovery	5
ENGH-H-CC-T-6/B	Lewis Carroll. "Through the Looking Glass".	1) World building and fantasy 2) Absurdity of language and logic 3) Textual Analysis	10
ENGH-H-CC-T-7/A	John Webster. "The Duchess of Malfi".	1) Theatrical elements 2) Morality and Ethics 3) Reception and legacy	7

Year: 2022

Semester: 4th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-8/A	Samuel Johnson. " London"	1) Introduction 2) Samuel Johnson's writing and his contribution 3) Textual Analysis 4) Critical Analysis	4
ENGH-H-CC-T-8/A	Eliza Heywood. "Fantomina".	1) Introduction to the Text 2) Feminist Approach 3) Critical Analysis	7
ENGH-H-CC-T-9/B	George Gordon Byron. "Childe Harold's Pilgrimage"	1) Byronic hero 2) Travelogue and exploration 3) Theme of Alienation and Exile	5
ENGH-H-CC-T-9/B	Mary Shelley. "Frankenstein".	1) Gothic fiction 2) The monster and human 3) Theme of Alienation and hubris	5
ENGH-H-CC-T-10/B	Thomas Hardy. "Tess of the d'Urbervilles".	1) Concept of Fate 2) Social injustice 3) The struggle of the working class	5

Year: 2022

Semester: 5th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-11/A	Maya Angelou. "Caged Bird"	1) Introduction 2) Autobiographical work 3) Metaphorical imagery	3
ENGH-H-CC-T-11/A	Mahashweta Devi. "Draupadi"	1) Epic 2) Mahabharat 3) Caste 4) Gender 5) Power	4
ENGH-H-CC-T-12/A	William Butler Yeats. "Byzantium", "Sailing to Byzantium"	1) Background history of Ireland 2) Cultural context 3) Christian Civilization	5
ENGH-H-CC-T-12/B	James Joyce. "A potrait of the Artist as a Young Man".	1) Coming of Age 2) Stream of consciousness 3) Textual Analysis	7
ENGH-H-DSE-T-2/A	Ted Hughes. "Hawk Roosting " and " Crow's Fall".	1) Perspective of the Hawk 2) Natural instinct 3) Control and Mastery 4) Nature and Natural order	6
ENGH-H-DSE-T-3/A	William Wordsworth. "Preface" to the Lyrical Ballads.	1) Language 2) Diction 3) Imagination 4) Role of the Poet 5) Purpose of Poetry	6
ENGH-H-DSE-T-3/B	S.T. Coleridge. "Biographia Literaria".	1) Autobiography and literary analysis 2) Primary and Secondary Imagination 3) Fancy and Imagination 4) Poetry and the Poet	5

Year: 2022

Semester: 6th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-13/B	Eugene Ionesco, “Rhinoceros” .	1) Absurdity and Surrealism 2) Conformity and Mass Movement 3) Textual Analysis	10
ENGH-H-CC-T-13/B	Luigi Pirandello. “Six Characters in Search of an Author”.	1) Meta-theatrical 2) Identity and reality 3) Theatrical illusion	10
ENGH-H-CC-T-14/A	David Malouf. “Revolving Days” , “Wild lemons”.	1) Introduction 2) Australian history 3) Textual Analysis	3
ENGH-H-CC-T-14/A	Mamang Dai. “Small Towns and the River”, “The Voice of the Mountain”.	1) Cultural exploration 2) Sense of place 3) Mythology and folklore	4
ENGH-H-DSE-T-4/B	Feminism: b. Luce Irigaray. "When the Goods Get Together".	1) Concept of Feminism 2) French Feminism 3) Freud’s Phallocentric Theory 4) Women as Commodities 5) Homosexuality	5
ENGH-H-DSE-T-5/A	Sa’adat Hasan Manto, “Toba Tek Singh”.	1) Partition 2) Insanity and Absurdity 3) Textual Analysis	5
ENGH-H-DSE-T-5/A	Lalithambika Antharajanam. "A Leaf in the Storm".	1) Historical context 2) Feminist Perspective 3) Cultural and Religious context	5

Year: 2023

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/B	Sudraka. “Mricchkatika”.	1) Brief Introduction of classical Sanskrit Drama 2) Brief Introduction of author and his works 3) Character analysis	10
ENGH-H-CC-T-2/A	Plautus. “Pot of Gold”.	1) Folklore and mythology 2) Introduction to the Author and his Age 3) Textual Analysis	15

Year: 2023

Semester: 2nd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-3/ A	Shashi Deshpande. "The Intrusion"	1) Introduction to the Author 2) Textual Analysis 3) Feminist Perspective	7
ENGH-H-CC-T-3/A	Kamala Das. "Introduction"	1) Introduction to the Text 2) Confessional poetry 3) Feminist Perspective	3
ENGH-H-CC-T-3/A	JayantaMahapatra. "Dawn at Puri".	1) Introduction to the Author 2) Textual Analysis	3
ENGH-H-CC-T-4/A	Johne Donne. "The Sunne Rising "and "Valediction Forbidding".	1) Brief Introduction to Metaphysical poet 2) Characteristics of Metaphysical poem 3) Textual Interpretation	7

Year: 2023

Semester: 3rd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-5/A	Adrienne Rich. "Power".	1) Concept of Power 2) Feminist Perspective 3) Textual Analysis	3
ENGH-H-CC-T-5/A	Abraham Lincoln. "Gettysburg Address".	1) Slavery system in America 2) Introduction to the Text	3
ENGH-H-CC-T-6/B	Lewis Carroll. "Through the Looking Glass".	1) World building and fantasy 2) Absurdity of language and logic 3) Textual Analysis	10

Year: 2023

Semester: 4th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-8/A	Thomas Gray. "Elegy Written in a Country Churchyard".	1) Introduction to Elegy 2) Romantic elements 3) Neo classical elements	5
ENGH-H-CC-T-9/A	William Blake. "The Lamb", "The Chimney Sweeper", "The Tyger".	1) Introduction of the Era 2) Symbolism used in the poem 3) Textual Analysis 4) Critical Appreciation	7
ENGH-H-CC-T-9/A	Robert Burns. " A Bard's Epitaph" and " Scots WhaHae".	1) Historical context 2) Scottish Nationalism 3) Textual Analysis	4
ENGH-H-CC-T-9/A	William Wordsworth. "Tintern Abbey".	1) The poet's relationships with nature 2) Memory and reflection 3) The passage of time	5
ENGH-H-CC-T-10/A	Alfred Tennyson. "Ulysses".	1) Quest for Adventure 2) Spirit of heroism 3) Yearning for Glory	3
ENGH-H-CC-T-10/A	Robert Browning. "My Last Duchess".	1) Introduction to dramatic Monologue 2) Characterization 3) Theme of Power and control	3

Year: 2023

Semester: 5th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-11/A	Maya Angelou. "Caged Bird".	1) Introduction 2) Autobiographical work 3) Metaphorical imagery	3
ENGH-H-CC-T-11/A	Mahashweta Devi. "Draupadi".	1) Epic 2) Mahabharat 3) Caste 4) Gender 5) Power	4
ENGH-H-CC-T-12/A	Dovid Herbert Lawrence. "Odour of Chrysanthemums".	1) Theme of Isolation 2) Family dynamics 3) Complexities of human relationship	4
ENGH-H-CC-T-12/A	Virginia Woolf. " Mark on the Wall".	1) Complexities of Perception and Consciousness 2) Stream of consciousness	4
ENGH-H-CC-T-12/A	W. Somerset Maugham. "Rain".	1) Themes of morality, hypocrisy and cultural clashes 2) Colonialism	5
ENGH-H-DSE-T-2/A	Phillip Larkin. "Whitsun Weddings" and "Church Going"	1) Modernism 2) Cultural context 3) Textual Analysis	7
ENGH-H-DSE-T-2/B	John Osborne. "Look back in Anger".	1) Post-Modern Era 2) Kitchen sink drama 3) Class difference	6
ENGH-H-DSE-T-3/A	William Wordsworth. "Preface" to the Lyrical Ballads.	1) Language 2) Diction 3) Imagination 4) Role of the Poet Purpose of Poetry	6
ENGH-H-DSE-T-3/B	S.T. Coleridge. "Biographia Literaria".	1) Literary Autobiography 2) Primary and Secondary Imagination 3) Fancy and Imagination	5

Year: 2023

Semester: 6th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-13/A	Henrik Ibsen. “Ghosts”.	1) Psychological realism 2) Social hypocrisy 3) The Ghost of the Past	10
ENGH-H-CC-T-14/B	Chinua Achebe. “Things Fall Apart”.	1) Exploration of colonialism, 2) Cultural identity, and the complexities of human experience. 3) Textual Analysis	5
ENGH-H-DSE-T-4/B	Feminism: b. LuceIrigaray. "When the Goods Get Together".	1) Concept of Feminism 2) French Feminism 3) Freud’s Phallocentric Theory 4) Women as Commodities 5) Homosexuality	5
ENGH-H-DSE-T-5/A	Sa’adat Hasan Manto, “Toba Tek Singh”.	1) Partition 2) Insanity and Absurdity 3) Textual Analysis	5
ENGH-H-DSE-T-5/A	Lalithambika Antharajanam. "A Leaf in the Storm".	1) Historical context 2) Feminist Perspective 3) Cultural and Religious context	5

Department of English

Lesson Plan

Name of the Teacher: Farha Khatun

Year: 2018

Part: II

Paper: III

Section	Topic	Topic of Discussion	Number of Classes
History	Poetry	Sonnet, lyric Long poem Metaphysical poetry	3
Drama	“Doctor Faustus”. Christopher Marlowe	1) Tragedy 2) Faustus’ Ambition and Hubris 3) The Pact with Lucifer 4) Themes of Sin and Redemption 5) Tragic Hero 6) Structure and Style	15
Poetry	“The Easter Wings". George Herbert.	1) Visual Form 2) Religious Themes: The poem explores themes of sin, redemption, and spiritual renewal, 3) Contrition and Praise	3
Prose	“Extract from A Supplication for the Beggars” [Ch. IV]. Simon Fish.	1) Social Critique 2) Call for Reform 3) Historical Context	2

		4) Legacy	

Year: 2018

Part: II

Paper: IV

Section	Topic	Topic of Discussion	Number of Classes
History	Drama	1) Heroic Tragedy 2) Restoration Comedy 3) Anti-Sentimental Comedy	5
Drama	“Way of the World”. William Congreve.	1) Comedy of Manners 2) Satire and Social Critique 3) Intricate Plot 4) Dialogue and Wit 5) Themes of Love and Marriage	15
Essay	“Great Fire". Samuel Pepys	1) Eyewitness Report 2) Description of Destruction 3) Efforts to Control the Fire 4) Historical Significance	3

Year: 2018

Part: III

Paper: V

Section	Topic	Topic of Discussion	Number of Classes
History	Prose	1) Novel 2) Essay	6
Prose	“Dream Children: A Reverie", Charles Lamb	1) Essay 2) Themes of Loss and Longing 3) Imaginary Children 4) Autobiographical Elements	4
Prose	“Chimney Sweepers". Charles Lamb	1) Occupation and Hardships 2) Fear and Challenges 3) Generosity and Loss 4) Unique Voices	4
Prose	“Christ's Hospital Five-and-Thirty Years Ago". Charles Lamb	1) Privileges and Loneliness 2) Food and Nurses 3) Harsh Discipline 4) Autobiographical Insights	5

Year: 2018

Part: III

Paper: VI

Section	Topic	Topic of Discussion	Number of Classes
History	1) Brief historical outline 2) Brief socio-cultural history	1) Reform Acts 2) Women's Suffrage 3) Empire 4) Condition of the Working Class 5) Science and Religion 6) Leisure and Amusement	10
Drama	"Riders to the Sea". John Millington Synge.	1) Fate and Destiny 2) Nature's Power 3) Loss and Grief 4) Language and Style	15

Year: 2018

Part: III

Paper: VII

Section	Topic	Topic of Discussion	Number of Classes
History	Prose	1) Novel 2) Essay	5
Poetry	“Digging". Seamus Heaney.	1) Theme of Identity 2) Connection to Nature 3) Family and Tradition	2
Poetry	“Hawk Roosting". Ted Hughes.	1) Perspective and Voice 2) Power and Control 3) Nature and Instinct	2
Prose	"The Kiss". Angela Carter.	1) Desire and Temptation 2) Identity and Transformation 3) Power Dynamics	3

Year: 2018

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/B	Kalidasa. "AbhijnanaShakuntalam".	1) History of Indian Classical Drama 2) Rasa Theory 3) Textual Analysis	15
ENGH-H-CC-T-2/A	Plautus. "Pot of Gold".	1) 1)Folklore and mythology 2) Introduction to the Author and his Age 3) Textual Analysis	15

Year: 2019

Part: III

Paper: V

Sections	Topic	Topics of Discussion	Number of Classes
History	Poetry	1) Lyric 2) Narrative	6
Poetry	“Ode to A Nightingale". John Keats.	1) Transience and Immortality 2) Nature and Art 3) Morality and death 4) Escape and reality	3
Poetry	“Eve of St Agnes". John Keats	1) Fantasy and reality 2) Ritual and 3) Superstition 4) Escape and transformation	5
Poetry	“Excerpt from Don Juan” Stanzas 22-29; I1.169 232. George Gordon Byron.	1) Satire and humour 2) Picaresque structure 3) Heroic couplet and ottavarima 4) Social Critique	3

Year: 2019

Part: III

Paper: VI

Sections	Topic	Topics of Discussion	Number of Classes
History	Prose	1) Novel 2) Essay	4
Poetry	“Ulysses". Tenyson	1) Dramatic Monologue 2) Victorian spirit 3) Spirit of Heroism and Leadership 4) Yearning for Immortality and Legacy:	3
Poetry	“My Last Duchess". Robert Browning.	1) Dramatic Monologue 2) Character of the Duke 3) Themes of Power and Control 4) Art and Aesthetics	3
Poetry	“God's Grandeur”. Gerard Manley Hopkins.	1) Sonnet 2) Celebration of God’s Presence 3) The Glory of Creation 4) Renewal and Redemption 5) Innovative Language and Form 6) Environmental and Spiritual Themes	2
Drama	“Arms and the Man” George Bernard Shaw.	1) Satirical Exploration of War and Romance	20

		2) Class and Social Commentary 3) Themes of Identity and Honor 4) Humor and Language	

Year: 2019

Part: III

Paper: VII

Sections	Topic	Topics of Discussion	Number of Classes
History	1) Brief Historical Outline 2) Brief socio-cultural history	1) First World War 2) Second World War	5
Poetry	“Second Coming". W. B. Yeats.	1) Apocalyptic Imagery 2) Historical Context 3) Cycle of History 4) Spiritual and Mystical Themes 5) Language and Structure	3
Poetry	“Hollow Men". T. S. Eliot	1) Epigraph and Opening Lines 2) Fragmented Structure: 3) Allusions and References 4) Theme of Spiritual Emptiness 5) Ambiguity and Interpretation	3
Poetry	“Bagpipe Music". Louis Macneice.	1) Whimsical and satirical piece 2) Contrast between Tradition and Modernity 3) Themes of Identity and	2

		Cultural Stereotypes	

Year: 2019

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/B	Kalidasa. "AbhijnanaShakuntalam".	1) History of Indian Classical Drama 2) Rasa Theory 3) Textual Analysis	15
ENGH-H-CC-T-2/A	Ovid. Selections from "Metamorphoses".	1) Theme of transformation 2) Mythological stories 3) Human emotion and relations 4) Textual Analysis	20

Year: 2020

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/B	Sudraka. " Mricchkatika".	1) Brief Introduction of classical Sanskrit Drama 2) Brief Introduction of author and his works 3) Character analysis	10
ENGH-H-CC-T-2/A	Horace. "Epistle I".	1) Introduction 2) Textual Analysis	10
ENGH-H-CC-T-2/B	Homer. "The Iliad".	1) Epic: Introduction. 2) Concept of honor of the major 3) Heroism and the main characters	10

Year: 2020

Semester: 2nd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-3/ A	Shashi Deshpande. "The Intrusion".	1) Introduction to the Author 2) Textual Analysis 3) Feminist Perspective	7
ENGH-H-CC-T-3/A	Kamala Das. "Introduction".	1) Introduction to the Text 2) Confessional poetry 3) Feminist Perspective	3
ENGH-H-CC-T-3/B	Anita Desai. "In Custody".	1) Cultural conflict 2) Personal transformation 3) Relationships dynamic	10
ENGH-H-CC-T-4/A	Johne Donne. " The Sunne Rising "and "Valediction Forbidding".	1) Brief Introduction to Metaphysical poet 2) Characteristics of Metaphysical poem 3) Textual Interpretation	7

Year: 2020

Semester: 3rd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-5/A	Martin Luther King. "I Have a Dream"	1) Equality and brotherhood 2) Introduction to the Text	3
ENGH-H-CC-T-5/B	Toni Morrison. "Beloved".	1) History of Slavery 2) Textual Analysis	3
ENGH-H-CC-T-6/B	Agatha Christie. "The Murder of Roger Ackroyd".	1) Narrative Innovation 2) Psychological depth 3) Complex character 4) Textual Analysis	5
ENGH-H-CC-T-7/A	John Milton. "Paradise Lost" Bk1.	1) The characterization of Satan 2) The nature of Evil 3) The role of God 4) The Epic Hero	10

Year: 2020

Semester: 4th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-8/B	William Congreve. "The Way of the World".	1) Introduction to the Text 2) Comedy of Manners 3) Restoration comedy	10
ENGH-H-CC-T-9/A	William Blake. "The Lamb", "The Chimney Sweeper", "The Tyger".	1) Introduction of the Era 2) Symbolism used in the poem 3) Textual Analysis 4) Critical Appreciation	7
ENGH-H-CC-T-9/A	Robert Burns. "A Bard's Epitaph" and " Scots WhaHae".	1) Historical context 2) Scottish Nationalism 3) Textual Analysis	4
ENGH-H-CC-T-9/A	William Wordsworth. "Tintern Abbey".	1) The poet's relationships with nature 2) Memory and reflection 3) The passage of time	5
ENGH-H-CC-T-10/A	Alfred Tennyson. "Ulysses".	1) Quest for Adventure 2) Spirit of heroism 3) Yearning for Glory	3
ENGH-H-CC-T-10/A	Robert Browning. "My Last Duchess".	1) Introduction to dramatic Monologue 2) Characterization 3) Theme of Power and control	3

Year: 2020

Semester: 5th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-11/A	Maya Angelou. "Caged Bird"	1) Introduction 2) Autobiographical work 3) Metaphorical imagery	3
ENGH-H-CC-T-11/A	Mahashweta Devi. "Draupadi".	1) Epic 2) Mahabharata 3) Caste 4) Gender 5) Power	4
ENGH-H-CC-T-12/A	William Butler Yeats. "Byzantium", "Sailing to Byzantium".	1) Background history of Ireland 2) Cultural context 3) Christian Civilization	5
ENGH-H-CC-T-12/B	James Joyce. "A Potrait of the Artist as a Young Man".	1) Coming of Age 2) Stream of consciousness 3) Textual Analysis	7
ENGH-H-DSE-T-2/A	Ted Hughes. " Hawk Roosting " and " Crow's Fall".	1) Perspective of the Hawk 2) Natural instinct 3) Control and Mastery 4) Nature and Natural order	6
ENGH-H-DSE-T-3/A	Virginia Woolf. "Modern Fiction".	1) Modernism 2) Virginia Woolf's charges against the materialists 3) Fiction according to Woolf 4) The Spiritualists	4
ENGH-H-DSE-T-3/A	T. S. Eliot: "Tradition and the Individual Talent".	1) The idea of Tradition 2) Historical Sense 3) Theory of Impersonality	4

Year: 2021

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/B	Sudraka. "Mricchkatika".	1) Brief Introduction of classical Sanskrit Drama 2) Brief Introduction of author and his works 3) Character analysis	10
ENGH-H-CC-T-2/A	Horace. "Epistle I".	1) Introduction 2) Textual Analysis	10
ENGH-H-CC-T-2/B	Homer. "The Iliad".	1) Epic: Introduction. 2) Concept of honor of the major 3) Heroism and the main characters	10

Year: 2021

Semester: 2nd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-3/ A	Shashi Deshpande. "The Intrusion".	1) Introduction to the Author 2) Textual Analysis 3) Feminist Perspective	7
ENGH-H-CC-T-3/A	Kamala Das. "Introduction".	1) Introduction to the Text 2) Confessional poetry 3) Feminist Perspective	3
ENGH-H-CC-T-3/A	Jayanta Mahapatra. "Dawn at Puri".	1) Introduction to the Author 2) Textual Analysis	3
ENGH-H-CC-T-4/A	Johne Donne. "The Sunne Rising "and "Valediction Forbidding".	1) Brief Introduction to Metaphysical poet 2) Characteristics of Metaphysical poem 3) Textual Interpretation	7

Year: 2021

Semester: 3rd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-5/A	Walt Whitman. "Passage to India".	1) Spirituality and Transcendence 2) Philosophical Reflection	3
ENGH-H-CC-T-5/A	Allen Ginsberg. "An Eastern Ballad".	1) Spirituality 2) Self discovery	5
ENGH-H-CC-T-6/B	Agatha Christie. "The Murder of Roger Ackroyd".	1) Narrative Innovation 2) Psychological depth 3) Complex character 4) Textual Analysis	5
ENGH-H-CC-T-7/A	Alexander Pope. "The Rape of the Lock".	1) Mock Heroic Epic 2) Textual Analysis	7

Year: 2021

Semester: 4th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-8/A	Thomas Gray. "Elegy Written in a Country Churchyard".	1) Introduction to Elegy 2) Romantic elements 3) Neo classical elements	5
ENGH-H-CC-T-9	Percy Bysshe Shelley. "Ode to the West Wind".	1) Romanticism 2) Introduction to Ode 3) Power of Nature Prophetic Vision	3
ENGH-H-CC-T-9/A	Samuel Taylor Coleridge. "khubla Khan", "Dejection: An Ode".	1) Introduction 2) Imagination and creative process 3) The limitation of human memory	5
ENGH-H-CC-T-10/B	Thomas Hardy. "Tess of the d'Urbervilles".	1) Concept of Fate 2) Social injustice 3) The struggle of the working class	5

Year: 2021

Semester: 5th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-11/A	Maya Angelou. "Caged Bird".	1) Introduction 2) Autobiographical work 3) Metaphorical imagery	3
ENGH-H-CC-T-11/A	Mahashweta Devi. "Draupadi".	1) Epic 2) Mahabharata 3) Caste 4) Gender 5) Power	4
ENGH-H-CC-T-12/A	William Butler Yeats. "Byzantium", "Sailing to Byzantium".	1) Background history of Ireland 2) Cultural context 3) Christian Civilization	5
ENGH-H-CC-T-12/B	James Joyce. "A Portrait of the Artist as a Young Man".	1) Coming of Age 2) Stream of consciousness 3) Textual Analysis	7
ENGH-H-DSE-T-2/A	Ted Hughes. "Hawk Roosting" and " Crow's Fall".	1) Perspective of the Hawk 2) Natural instinct 3) Control and Mastery 4) Nature and Natural order	6
ENGH-H-DSE-T-3/A	Virginia Woolf. "Modern Fiction".	1) Modernism 2) Virginia Woolf's charges against the materialists 3) Fiction according to Woolf 4) The Spiritualists	4
ENGH-H-DSE-T-3/A	T. S. Eliot: "Tradition and the Individual Talent".	1) The idea of Tradition 2) Historical Sense 3) Theory of Impersonality	4

Year: 2021

Semester: 6th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-13/A	Anton Chekov. “The Seagull”.	1) Subtext and Psychological depth 2) Art and Creativity 3) Textual Analysis	10
ENGH-H-CC-T-13/B	Bertrolt Brecht. “The Good Person of Szechwan”.	1) Epic theatre 2) Dual Identity 3) Redemption and Sacrifice	10
ENGH-H-CC-T-14/A	David Malouf. “Revolving Days”, “Wild lemons”.	1) Introduction 2) Australian history 3) Textual Analysis	3
ENGH-H-CC-T-14/A	Mamang Dai. “Small Towns and the River”, “The Voice of the Mountain”.	1) Cultural exploration 2) Sense of place 3) Mythology and folklore	4
ENGH-H-DSE-T-4/B	Poststructuralism: a. Jacques Derrida. "Structure, Sign and Play in the Discourse of the Human Science”.	1) Background study of Poststructuralism 2) Structure 3) The Centre 4) Sign 5) Bricolage 6) The Bricoleur	7
ENGH-H-DSE-T-4/B	Poststructuralism: b. Michel Foucault. “Truth and Power”.	1) Discussion on Michel Foucault 2) Truth 3) Power	5
ENGH-H-DSE-T-5/A	Sa’adat Hasan Manto. “Toba Tek Singh”.	1) Partition 2) Insanity and Absurdity 3) Textual	5

		Analysis	
ENGH-H-DSE-T-5/A	Lalithambika Antharajanam. "A Leaf in the Storm".	1) Historical context 2) Feminist Perspective 3) Cultural and Religious context	5

Year: 2022

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/A	IlangoAdigal. "The Book of Banci".	1) Introduction to Epic and Tamil Epic 2) Themes of the poem 3) Feministic perspective	15
ENGH-H-CC-T-1/B	Sudraka. "Mricchkatika".	1) Brief Introduction of classical Sanskrit Drama 2) Brief Introduction of author and his works 3) Character analysis	10
ENGH-H-CC-T-2/A	Horace. "Epistle I".	1) Introduction 2) Textual Analysis	10
ENGH-H-CC-T-2/B	Homer. "The Iliad".	1) Epic: Introduction 2) Concept of honor of the major 3) Heroism and the main characters	10

Year: 2022

Semester: 2nd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-3/ A	Amitav Ghosh. "The Ghosts of Mrs. Gandhi".	1) Historical context 2) Environmental concerns 3) Global Challenges 4) Civil Disobedience 5) Critique and Reflection	15
ENGH-H-CC-T-3/B	Girish Karnad. "Hayavadana".	1) Introduction to the Text 2) Mythology, folklore 3) Theme of. Identity, desire	10
ENGH-H-CC-T-3/B	Anita Desai. "In Custody".	1) Cultural conflict 2) Personal transformation 3) Relationships dynamic	10
ENGH-H-CC-T-4/A	Geoffrey Chaucer. "Wife of Bath".	1) Introduction to the Text 2) Textual Analysis 3) Feminist Perspective	7

Year: 2022

Semester: 3rd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-5/A	Martin Luther King. "I Have a Dream".	1) Equality and brotherhood 2) Introduction to the Text	3
ENGH-H-CC-T-5/B	Toni Morrison. "Beloved".	1) History of Slavery 2) Textual Analysis	3
ENGH-H-CC-T-6/B	Agatha Christie. "The Murder of Roger Ackroyd".	1) Narrative Innovation 2) Psychological depth 3) Complex character 4) Textual Analysis	5
ENGH-H-CC-T-7/A	John Milton. "Paradise Lost". Bk1.	1) The characterization of Satan 2) The nature of Evil 3) The role of God 4) The Epic Hero	10

Year: 2022

Semester: 4th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-8/B	Jonathan Swift. "Gulliver's Travels".	1) Satirical Comedy 2) Moral aspects 3) Critical Appreciation	7
ENGH-H-CC-T-9/A	William Blake. "The Lamb", "The Chimney Sweeper", "The Tyger".	1) Introduction of the Era 2) Symbolism used in the poem 3) Textual Analysis 4) Critical Appreciation	7
ENGH-H-CC-T-9/A	Robert Burns. "A Bard's Epitaph" and "Scots WhaHae".	1) Historical context 2) Scottish Nationalism 3) Textual Analysis	4
ENGH-H-CC-T-9/A	William Wordsworth. "Tintern Abbey".	1) The poet's relationships with nature 2) Memory and reflection 3) The passage of time	5
ENGH-H-CC-T-10/A	Christina Rossetti. "The Goblin Market".	1) Introduction of the Age 2) Victorian Morality 3) Themes of Temptations and desire	4
ENGH-H-CC-T-10/B	Charlotte Bronte. "Jane Eyre".	1) Discussion on Jane Eyre 2) Feminist Perspective 3) Textual Analysis	4

Year: 2022

Semester: 5th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-11/A	Sylvia Plath. "Daddy", " Lady Lazarus ".	1) Confessional poetry 2) Discussion on Sylvia Plath's life and her works	5
ENGH-H-CC-T-11/A	Katherine Mansfield. "Bliss".	1) Upper society in England 2) Feminist Perspective 3) Homosexuality	3
ENGH-H-CC-T-12/A	Wystan Hugh Auden. "Unknown Citizen".	1) Conformist society 2) Good citizen 3) Textual Analysis	3
ENGH-H-CC-T-12/B	Joseph Conrad. "Heart of Darkness".	1) Novella 2) Imperialism 3) Human darkness	4
ENGH-H-DSE-T-2/B	George Orwell. "Animal Farm".	1) Allegory 2) Political Allegory 3) Russian Revolution	5
ENGH-H-DSE-T-3/A	Virginia Woolf. "Modern Fiction".	1) Modernism 2) Virginia Woolf's charges against the materialists 3) Fiction according to Woolf 4) The Spiritualists	4
ENGH-H-DSE-T-3/A	T. S. Eliot: "Tradition and the Individual Talent".	1) The idea of Tradition 2) Historical Sense 3) Theory of Impersonality	4

Year: 2022

Semester: 6th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-13/A	Anton Chekov. "The Seagull".	1) Subtext and Psychological depth 2) Art and Creativity 3) Textual Analysis	10
ENGH-H-CC-T-13/B	Bertrolt Brecht. "The Good Person of Szechwan".	1) Epic theatre 2) Dual Identity 3) Redemption and Sacrifice	10
ENGH-H-CC-T-14/B	Chinua Achebe. "Things Fall Apart".	1) Exploration of colonialism, 2) Cultural identity, and the complexities of human experience. 3) Textual Analysis	5
ENGH-H-DSE-T-4/B	Poststructuralism: a. Jacques Derrida. "Structure, Sign and Play in the Discourse of the Human Science".	1) Background study of Poststructuralism 2) Structure 3) The Centre 4) Sign 5) Bricolage 6) The Bricoleur	7
ENGH-H-DSE-T-4/B	Poststructuralism: b. Michel Foucault. "Truth and Power".	1) Discussion on Michel Foucault 2) Truth 3) Power	5
ENGH-H-DSE-T-5/A	DibyenduPalit, "Alam's Own House".	1) Introduction 2) Family dynamics 3) Cultural context	4
ENGH-H-DSE-T-5/A	Manik Bandyopadhyay.	1) Introduction 2) Quest for	7

	“The Final Solution”.	Identity 3) Textual Analysis	

Year: 2023

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/A	IlangoAdigal. “The Book of Banci”.	1) Introduction to Epic and Tamil Epic 2) Themes of the poem 3) Feministic perspective	15
ENGH-H-CC-T-2/A	Horace. “Epistle I”.	1) Introduction 2) Textual Analysis	10
ENGH-H-CC-T-2/B	Homer. “The Iliad”.	1) Epic: Introduction 2) Concept of honor 3) Heroism and the main characters	10

Year: 2023

Semester: 2nd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-3/ A	Salman Rushdie. "The Free Radio".	1) Symbolism of Free Radio 2) Satirical commentary 3) Cultural context	7
ENGH-H-CC-T-3/A	Nissim Ezekiel. "Enterprise".	1) India writing in English 2) Title of the poem 3) Textual Analysis	3
ENGH-H-CC-T-3/B	Anita Desai. "In Custody".	1) Cultural conflict 2) Personal transformation 3) Relationships dynamic	10
ENGH-H-CC-T-4/A	Fransis Bacon. "Of Empire".	1) Short Introduction on Essay 2) Textual Analysis	5

Year: 2023

Semester: 3rd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-5/A	Walt Whitman. "Passage to India".	1) Spirituality and Transcendence 2) Philosophical Reflection	3
ENGH-H-CC-T-5/A	Allen Ginsberg. "An Eastern Ballad".	1) Spirituality 2) Self discovery	5
ENGH-H-CC-T-6/B	Agatha Christie. "The Murder of Roger Ackroyd".	1) Narrative Innovation 2) Psychological depth 3) Complex character 4) Textual Analysis	5
ENGH-H-CC-T-7/A	Alexander Pope. "The Rape of the Lock".	1) Mock Heroic Epic 2) Textual Analysis	7

Year: 2023

Semester: 4th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-8/B	William Congreve. "The Way of the World".	1) Introduction to the Text 2) Comedy of Manners 3) Restoration comedy	10
ENGH-H-CC-T-9	Percy Bysshe Shelley. "Ode to the West Wind".	1) Introduction to Ode 2) The power of Nature 3) Prophetic Vision	3
ENGH-H-CC-T-9/A	Samuel Taylor Coleridge. "Kubla Khan", "Dejection: An Ode".	1) Introduction 2) Imagination and creative process 3) The limitation of human memory	5
ENGH-H-CC-T-10/B	Thomas Hardy. "Tess of the d'Urbervilles".	1) Concept of Fate 2) Social injustice 3) The struggle of the working class	5

Year: 2023

Semester: 5th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-11/A	Rassundari Debi. "Amar Jiban".	1) Bengali literature 2) Feminist Perspective 3) Textual Analysis	5
ENGH-H-CC-T-11/B	Alice Walker. "The Color Purple".	1) Introduction 2) Feminist Perspective 3) Homosexuality	6
ENGH-H-CC-T-12/A	Wystan Hugh Auden. "Unknown Citizen".	1) Conformist society 2) Good citizen 3) Textual Analysis	3
ENGH-H-CC-T-12/B	Joseph Conrad. "Heart of Darkness".	1) Novella 2) Imperialism 3) Human darkness	4
ENGH-H-DSE-T-2/B	George Orwell. "Animal Farm".	1) Allegory 2) Political Allegory 3) Russian Revolution	5
ENGH-H-DSE-T-3/A	Virginia Woolf. "Modern Fiction".	1) Modernism 2) Virginia Woolf's charges against the materialists 3) Fiction according to Woolf 4) The Spiritualists	4
ENGH-H-DSE-T-3/A	T. S. Eliot: "Tradition and the Individual Talent".	1) The idea of Tradition 2) Historical Sense 3) Theory of Impersonality	4

Year: 2023

Semester: 6th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-13/A	Samuel Beckett. "Waiting for Godot".	1) Existential themes 2) Absurdity 3) Textual Analysis	10
ENGH-H-CC-T-14/A	David Malouf. "Revolving Days" , "Wild lemons".	1) Introduction 2) Australian history 3) Textual Analysis	3
ENGH-H-CC-T-14/A	Mamang Dai. "Small Towns and the River", "The Voice of the Mountain".	1) Cultural exploration 2) Sense of place 3) Mythology and folklore	4
ENGH-H-DSE-T-4/B	Poststructuralism: a. Jacques Derrida. "Structure, Sign and Play in the Discourse of the Human Science".	1) Background study of Poststructuralism 2) Structure 3) The Centre 4) Sign 5) Bricolage 6) The Bricoleur	7
ENGH-H-DSE-T-4/B	Poststructuralism: B.Michel Foucault. "Truth and Power".	1) Discussion on Michel Foucault 2) Truth 3) Power	5
ENGH-H-DSE-T-5/A	Dibyendu Palit, "Alam's Own House".	1) Introduction 2) Family dynamics 3) Cultural context	4
ENGH-H-DSE-T-5/A	Manik Bandyopadhyay, "The Final Solution".	1) Introduction 2) Quest for Identity 3) Textual Analysis	7

Department of English

Lesson Plan

Name of the Teacher: Masadul Islam

Year: 2018

Part: II

Paper: III

Section	Topic	Topics of Discussion	Number of Classes
History	Brief Socio-cultural history and history of ideas	1) Humanism, Homocentric Worldview, Renaissance 2) Reformation, Growth of Puritanism 3) Place of Women	3
Drama	"Shoemaker's Holiday". Thomas Dekker.	1) Disguise and Identity 2) Social Mobility and Class 3) Love and Marriage 4) Symbolism and Motifs	15
Poetry	"The Good-Morrow". John Donne.	1) Metaphysical poem 2) Love and Unity 3) Awakening and Enlightenment 4) Reality and Perception 5) Sonnet-Like Structure	2
Poetry	"Lycidas". John Milton.	1) Pastoral Elegy 2) Elegy for Edward	5

		King 3) Verse and Rhyme 4) Death and Loss 5) Mythological References	

Year: 2018

Part: II

Paper: IV

Section	Topic	Topics of Discussion	Number of Classes
History	Poetry	1) Mock epic 2) Metaphysical poetry 3) Pre-Romantics	5
Poetry	"Elegy Written in a Country Churchyard". Thomas Gray.	1) Elegy 2) Reflective and melancholic poem that contemplates death, mortality, and the lives of ordinary people. 3) Churchyard Setting 4) Legacy and Remembrance	3
Essay	"Some Reflections Upon Marriage". Mary Astell.	1) Feminist thought that critiques the institution of marriage and its impact on women's lives. 2) Critique of Marriage, Marriage as a Social Contract 3) Education and Intellectual Equality 4) Advocacy for Reform	3

Year: 2018

Part: III

Paper: V

Section	Topic	Topics of Discussion	Number of Classes
History	1) Brief historical outline 2) Brief Socio-cultural history	1) French Revolution 2) Napoleanic wars 3) Cult of Imagination in other arts	6
Poetry	"This Lime-Tree Bower My Prsion". S.T. Coleridge.	1) Imagination and Nature 2) Reconciliation with Confinement 3) Isolation and Reflection 4) Contentment and Reconciliation 5) Lyrical Ode 6) Blank Verse	3
Poetry	"Kubla Khan". S.T. Coleridge	1) Fragmentary Nature 2) Romantic Ideals 3) Allusion and Myth 4) Mysterious and Enigmatic	2
Poetry	"Ode to the West Wind". P.B. Shelley.	1) Ode 2) West Wind: Represents natural power and transformation. 3) Autumn and Winter: Symbolize decay and renewal.	3

Year: 2018

Part: III

Paper: VI

Section	Topic	Topics of Discussion	Number of Classes
History	Drama	1) Comedy 2) Tragedy 3) Tragic-comedy	2
Poetry	“In the Bleak Midwinter”. Christina Rossetti.	1) Nativity 2) Humanity and Humility 3) Personal Devotion	2
Prose	“Lilies of Queen’s Garden”. John Ruskin.	1) Art and Nature 2) Moral and Aesthetic Value 3) Critique of Industrialization 4) Symbolism of lilies	3

Year: 2018

Part: III

Paper: VII

Section	Topic	Topics of Discussion	Number of Classes
History	Poetry	1) Lyric 2) The Epic 3) The Ode 4) The Sonnet	2
Poetry	"Musee des Beaux Arts". W.H. Auden.	1) Indifference to Suffering 2) Art and Reality 3) Historical and Mythological Contexts	2
Poetry	"Fern Hill". Dylan Thomas.	1) Nostalgia and Innocence 2) Themes of Time and Transience 3) Mythical Quality	2
Poetry	"The Whitsun Weddings". Philip Larkin.	1) Observation of Ordinary Life 2) Contrast Between Public and Private Lives 3) Themes of Social Conformity	3
Novel	"England England". Julian Barnes.	1) Satire and Parody 2) The Concept of England, England 3) Themes of Authenticity and Artificiality 4) Critique of Modern Society	20

Year: 2018

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/A	Ilango Adigal. "The Book of Banci".	1) Introduction to Epic and Tamil Epic 2) Themes of the poem 3) Feministic perspective	15
ENGH-H-CC-T-2/A	Ovid. Selections from "Metamorphoses".	1) Theme of transformation 2) Mythological stories 3) Human emotion and relations 4) Textual Analysis	20

Year: 2019

Part: III

Paper: V

Section	Topic	Topic of Discussion	Number of Classes
Poetry	“The Lamb" and “The Tyger”. William Blake.	1) British Romantic poetry 2) Songs of Innocence and Songs of Experience 3) Duality and Contrast 4) Exploration of the Divine 5) The Role of Imagination	4
Poetry	“After Blenheim” Robert Southey.	1) The Cost of War on Ordinary People 2) Irony and Disillusionment 3) The Futility of War 4) The Loss of Innocence 5) Propaganda and Manipulation	2
Poetry	“Recollections of Early Child hood" William Wordsworth.	1) Loss of Innocence and the Power of Childhood Perception 2) Nature as a Source of Spiritual Connection 3) Memory and	5

		the Power of Imagination	
Novel	“Frankenstein” Mary Shelley.	1) Gothic Fiction 2) The Dangers of Science and Ambition 3) Nature vs. Nurture 4) Prejudice and Social Rejection 5) Fate vs. Free Will	15

Year: 2019

Part: III

Paper: VI

Section	Topic	Topic of Discussion	Number of Classes
Poetry	"The Picture Gallery at Penhurst". Elizabeth Barrett Browning.	1) The Power of Family Legacy 2) The Interplay of Past and Present 3) The Search for Identity 4) Mortality and the Inevitability of Change 5) The Power of Art and Memory	2
Poetry	"Self-interrogation" Emily Bronte.	1) Self-Scrutiny and Existential Doubt 2) The Passage of Time and Mortality 3) The Search for Personal Fulfillment 4) The Power of Choice and Free Will	2
Poetry	"To Marguerite". Matthew Arnold.	1) Isolation and Longing 2) The Power of Memory 3) The Passage of Time 4) The Elusive Nature of Love	2
Prose	"Subjection of Women". [Extract	1) Gender Inequality as	3

	from Chapter II.] John Stuart Mill.	Injustice 2) Equality of Rights and Opportunities 3) The Artificiality of Gender Roles 4) Women's Potential and Autonomy 5) The Harm of Legal Subordination	
Prose	“Letter from Barrackpore." Extract from Letters from India. Emily Eden.	1) Colonial Observation and Perception 2) The Disconnect Between Colonizer and Colonized 3) Social Commentary and Satire 4) The Allure and Mystery of India	3

Year: 2019

Part: III

Paper: VII

Section	Topic	Topic of Discussion	Number of Classes
Prose	“Two Cheers for Democracy”. E. M. Forster.	1) Critique of Totalitarianism 2) The Value of Individualism 3) The Limits of Democracy 4) The Importance of Culture and Art	3
Prose	“The Mark on the Wall". Virginia Woolf.	1) Modernist Fiction 2) Nature and Civilization 3) War 4) Self and the Other 5) Time and Memory	3
Prose	“Araby". James Joyce.	1) Coming of Age 2) Religion and Catholicism 3) Escapism and the Exotic	3

Year: 2019

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/B	"The Book of the Assembly Hall", "The Temptation of Karna".	1) Introduction 2) Textual Analysis	10
ENGH-H-CC-T-2/A	Horace. "Epistle I".	1) Introduction 2) Textual Analysis	10
ENGH-H-CC-T-2/B	Homer. "The Iliad".	1) Epic: Introduction. 2) Concept of honour of the major 3) Heroism and the main characters	10

Year: 2020

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/A	Vyasa. "The Dicing" and "The sequel to Dicing".	1) Historical and Cultural Background of Indian society 2) Textual Analysis 3) Critical Appreciation	15
ENGH-H-CC-T-1/B	"The Book of the Assembly Hall" "The Temptation of Karna".	3) Introduction 4) Textual Analysis	10
ENGH-H-CC-T-2/B	Sophocles. "Oedipus the king"	1) History of Classical Greece 2) Aristotle & Greek Tragedy 3) The Text 4) Translation & 'The Unities 5) Critical Aspects	15

Year: 2020

Semester: 2nd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-3/ A	Amitav Ghosh. "The Ghosts of Mrs Gandhi".	1) Historical context 2) Environmental concerns 3) Global Challenges 4) Civil Disobedience 5) Critique and Reflection	15
ENGH-H-CC-T-3/A	Arun kolatkar. "The Bus".	1) Introduction to the Text 2) Textual Analysis	3
ENGH-H-CC-T-3/B	Girish Karnad. "Hayavadana".	1) Introduction to the Text 2) Mythology, folklore 3) Theme of. Identity, desire	10
ENGH-H-CC-T-4/A	Geoffrey Chaucer. "Wife of Bath".	1) Introduction to the Text 2) Textual Analysis 3) Feminist Perspective	7

Year: 2020

Semester: 3rd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-5/A	Anne Bradstreet. "The prologue".	1) Introduction to the Text 2) Textual Analysis	3
ENGH-H-CC-T-5/A	Abraham Lincoln. "Gettysburg Address".	1) Slavery system in America 2) Introduction to the Text	3
ENGH-H-CC-T-6/A	Shyam Selvadurai. "Funny Boy".	1) Coming of Age and Identity 2) Ethnic Conflict 3) Loss of Innocence	7

Year: 2020

Semester: 4th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-8/A	Samuel Johnson. "London".	1) Introduction 2) Samuel Johnson's writing and his contribution 3) Textual Analysis 4) Critical Analysis	4
ENGH-H-CC-T-8/A	Eliza Heywood. "Fantomina".	1) Introduction to the Text 2) Feminist Approach 3) Critical Analysis	7
ENGH-H-CC-T-9	Percy Bysshe Shelley. "Ode to the West Wind".	1) Romanticism 2) Introduction to Ode 3) Power of Nature 4) Prophetic Vision	3
ENGH-H-CC-T-9/A	Samuel Taylor Coleridge. "khubla Khan", "Dejection: An Ode".	1) Introduction 2) Imagination and creative process 3) The limitation of human memory	5
ENGH-H-CC-T-10/B	Charles Dickens. "Hard Times".	1) Victorian aspects 2) Characterization 3) Critical Analysis	5

Year: 2020

Semester: 5th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-11/A	Rassundari Debi. "Amar Jiban".	1) Bengali literature 2) Feminist Perspective 3) Textual Analysis	5
ENGH-H-CC-T-11/B	Alice Walker. "The Color Purple".	1) Introduction 2) Feminist Perspective 3) Homosexuality	6
ENGH-H-CC-T-12/A	Thomas Stearns Eliot. "The Love Song of J. Alfred Prufrock", "Preludes", "Hollow Men".	1) Alienation 2) Urban Decay 3) Struggle for Self – Expression	6
ENGH-H-CC-T-12/B	John Millington Synge. "Riders to the Sea".	1) Irish literary revival 2) Textual Analysis 3) Critical Analysis	4
ENGH-H-DSE-T-2/A	Phillip Larkin. "Whitsun Weddings" and "Church Going".	1) Modernism 2) Cultural context 3) Textual Analysis	7
ENGH-H-DSE-T-2/B	John Osborne. "Look back in Anger".	1) Post-Modern Era 2) Kitchen sink drama 3) Class difference	6
ENGH-H-DSE-T-3/B	Cleanth Brooks. "The Heresy of Paraphrase".	1) Cleanth Brooks 2) Introduction 3) Textual Analysis	5

Year: 2021

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/A	Vyasa. “The Dicing”and “The sequel to Dicing”.	1) Historical and Cultural Background of Indian society 2) Textual Analysis 3) Critical Appreciation	15
ENGH-H-CC-T-1/B	“The Book of the Assembly Hall” “The Temptation of Karna”.	1) Introduction 2) Textual Analysis	10
ENGH-H-CC-T-2/B	Sophocles. “Oedipus the king”.	1) History of Classical Greece 2) Aristotle & Greek Traged 3) The Text 4) Translation & 'The Unities 5) Critical Aspects	15

Year: 2021

Semester: 2nd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-3/A	Toru Dutt. “Our Casuarina Tree”.	1) Themes and context of Indian English literature 2) Textual Analysis 3) Critical Appreciation	3
ENGH-H-CC-T-3/A	Arun kolatkar. “The Bus”.	1) Introduction to the Text 2) Textual Analysis	3
ENGH-H-CC-T-4/A	Edmund Spencer. “One day I wrote her name”.	1) Introduction to Spenserian sonnet 2) Textual Analysis	3

Year: 2021

Semester: 3rd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-5/A	Edgar Allan Poe. "The Purloined Letter".	1) Background history of American literature 2) Introduction to the Text 3) Textual Analysis	5
ENGH-H-CC-T-5/A	Anne Bradstreet. "The prologue"	1) Introduction to the Text 2) Textual Analysis	3
ENGH-H-CC-T-5/B	Tennessee Williams. "The Glass Menegerie".	1) Gender roles 2) Escapism 3) familial responsibility 4) and unfulfilled desire.	10
ENGH-H-CC-T-6/A	Durgabai Vyam and Subhash Vyam. "Bhimayana".	1) Caste Discrimination 2) Social justice	5
ENGH-H-CC-T-7/A	John Webster. "The Duchess of Malfi".	1) Theatrical elements 2) Morality and Ethics 3) Reception and legacy	7
ENGH-H-CC-T-7/A	Aphra Behn. "The Rover".	1) Introduction 2) Detail analysis of the text	5

Year: 2021

Semester: 4th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-8/A	Samuel Johnson. "London".	1) Introduction 2) Samuel Johnson's writing and his contribution 3) Textual Analysis 4) Critical Analysis	4
ENGH-H-CC-T-8/A	Eliza Heywood. "Fantomina".	1) Introduction to the Text 2) Feminist Approach 3) Critical Analysis	7
ENGH-H-CC-T-9/B	George Gordon Byron. "Childe Harold's Pilgrimage".	1) Byronic hero 2) Travelogue and exploration 3) Theme of Alienation and Exile	5
ENGH-H-CC-T-9/B	Mary Shelley. "Frankenstein".	1) Gothic fiction 2) The monster and human 3) Theme of Alienation and hubris	5
ENGH-H-CC-T-10/B	Charles Dickens. "Hard Times".	1) Victorian aspects 2) Characterization 3) Critical Analysis	5

Year: 2021

Semester: 5th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-11/A	Emily Dickinson. "I cannot live with you", "I'm 'wife'-I've finished that".	1) Introduction to the poem 2) Feminist Perspective 3) Critical Analysis	3
ENGH-H-CC-T-11/B	Mary Wollstonecraft. " A Vindication of the Rights of Woman".	1) Feminism 2) Waves of Feminism 3) Rights of woman	7
ENGH-H-CC-T-12/A	Dovid Herbert Lawrence. "Odour of Chrysanthemums".	1) Theme of Isolation 2) Family dynamics 3) Complexities of human relationship	4
ENGH-H-CC-T-12/A	Virginia Woolf. "Mark on the Wall".	1) Complexities of Perception and Consciousness 2) Stream of consciousness	4
ENGH-H-CC-T-12/A	W. Somerset Maugham. "Rain".	1) Themes of morality, hypocrisy and cultural clashes 2) Colonialism	5
ENGH-H-DSE-T-2/A	Seamus Heaney. "Digging" and "Casualty".	1) Irish Identity 2) Violence and loss 3) Textual Analysis	7
ENGH-H-DSE-T-2/A	Carol Anne Duffy. "Text" and "Stealing".	1) Theme of Isolation 2) Existential angst 3) Textual Analysis	4
ENGH-H-DSE-T-3/B	Cleanth Brooks. "The Heresy of Paraphrase".	1) Cleanth Brooks 2) Introduction 3) Textual Analysis	5

Year: 2021

Semester: 6th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-13/A	Samuel Beckett. "Waiting for Godot".	1) Existential themes 2) Absurdity 3) Textual Analysis	10
ENGH-H-CC-T-14/A	Pablo Neruda. "Tonight I Can Write ", " The Way Spain Was".	1) Universality of human experience 2) Textual Analysis 3) Critical Appreciation	4
ENGH-H-CC-T-14/A	Derek Walcott. "A Far Cry from Africa ", "Names".	1) Colonialism 2) Complexities of identity 3) Textual Analysis	5
ENGH-H-DSE-T-4/A	Marxism: a. Antonio Gramosci. "The Formation of the Intellectuals" and "Hegemony (Civil Society) and Separation of Powers".	1) Introduction to Marxism 2) Organic Intellectuals 3) Traditional Intellectuals 4) Role within Superstructures	7
ENGH-H-DSE-T-4/B	Marxism: b. Louis Althusser. "Ideology and Ideological State Apparatuses".	1) Ideological State Apparatuses(ISA) 2) Repressive State Apparatuses 3) Function of ISAs	5
ENGH-H-DSE-T-5/A	Faiz Ahmad Faiz. "For Your Lanes, My Country".	1) Political context 2) Resistance and hope 3) Textual Analysis	5
ENGH-H-DSE-T-5/B	Intizar Husain, "Basti".	1) Themes of identity, displacement, and the partition of India.	5

		2) Textual Analysis	

Year: 2022

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/B	Kalidasa. “Abhijnana Shakuntalam”.	1) History of Indian Classical Drama 2) Rasa Theory 3) Textual Analysis	15
ENGH-H-CC-T-1/B	“The Book of the Assembly Hall” “The Temptation of Karna”	1) Introduction 2) Textual Analysis	10
ENGH-H-CC-T-2/B	Sophocles. “Oedipus the king”.	1) History of Classical Greece 2) Aristotle & Greek Tragedy 3) The Text 4) Translation & 'The Unities 5) Critical Aspects	15

Year: 2022

Semester: 2nd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-3/A	Toru Dutt."Our Casuarina Tree".	1) Themes and context of Indian English literature 2) Textual Analysis 3) Critical Appreciation	3
ENGH-H-CC-T-3/A	Arun kolatkar. "The Bus".	1) Introduction to the Text 2) Textual Analysis	3
ENGH-H-CC-T-4/A	Edmund Spencer. "One day I wrote her name".	1) Introduction to Spenserian sonnet 2) Textual Analysis	3

Year: 2022

Semester: 3rd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-5/A	Edgar Allan Poe. "The Purloined Letter".	1) Background history of American literature 2) Introduction to the Text 3) Textual Analysis	5
ENGH-H-CC-T-5/A	Anne Bradstreet. "The prologue".	1) Introduction to the Text 2) Textual Analysis	3
ENGH-H-CC-T-5/B	Tennessee Williams. "The Glass Menegerie".	1) Gender roles 2) Escapism 3) Familial responsibility and unfulfilled desire.	10
ENGH-H-CC-T-6/A	Durgaba iVyam and Subhash Vyam. "Bhimayana".	1) Caste Discrimination 2) Social justice	5
ENGH-H-CC-T-7/A	Alexander Pope. " The Rape of the Lock".	1) Mock Heroic Epic 2) Textual Analysis	7

Year: 2022

Semester: 4th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-8/B	William Congreve. "The Way of the World".	1) Introduction to the Text 2) Comedy of Manners 3) Restoration comedy	10
ENGH-H-CC-T-9/A	John Keats. "Ode to a Nightingale", "Bright Star", "To Autumn"	1) Concept of beauty 2) Escape and immersion 3) Textual Analysis	5
ENGH-H-CC-T-10/B	Charles Dickens. "Hard Times".	1) Victorian aspects 2) Characterization 3) Critical Analysis	5

Year: 2022

Semester: 5th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-11/A	Emily Dickinson. "I cannot live with you", "I'm 'wife'-I've finished that".	1) Introduction to the poem 2) Feminist Perspective 3) Critical Analysis	3
ENGH-H-CC-T-11/B	Mary Wollstonecraft. "A Vindication of the Rights of Woman".	1) Feminism 2) Waves of Feminism 3) Rights of woman	7
ENGH-H-CC-T-12/A	Dovid Herbert Lawrence. "Odour of Chrysanthemums".	1) Theme of Isolation 2) Family dynamics 3) Complexities of human relationship	4
ENGH-H-CC-T-12/A	Virginia Woolf. " Mark on the Wall"	1) Complexities of Perception and Consciousness 2) Stream of consciousness	4
ENGH-H-CC-T-12/A	W. Somerset Maugham. "Rain"	1) Themes of morality, hypocrisy and cultural clashes 2) Colonialism	5
ENGH-H-DSE-T-2/A	Seamus Heaney. "Digging" and " Casualty"	1) Irish Identity 2) Violence and loss 3) Textual Analysis	7
ENGH-H-DSE-T-2/A	Carol Anne Duffy. "Text" and "Stealing"	1) Theme of Isolation 2) Existential angst 3) Textual Analysis	4
ENGH-H-DSE-T-3/B	Cleanth Brooks. "The Heresy of Paraphrase"	1) Cleanth Brooks 2) Introduction 3) Textual Analysis	5

Year: 2022

Semester: 6th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-13/A	Henrik Ibsen. "Ghosts".	1) Psychological realism 2) Social hypocrisy 3) The Ghost of the Past	10
ENGH-H-CC-T-14/A	Pablo Neruda. "Tonight I Can Write ", "The Way Spain Was".	1) Universality of human experience 2) Textual Analysis 3) Critical Appreciation	4
ENGH-H-CC-T-14/A	Derek Walcott. "A Far Cry from Africa ", "Names"	1) Colonialism 2) Complexities of identity 3) Textual Analysis	5
ENGH-H-DSE-T-4/A	Marxism: a. Antonio Gramosci. "The Formation of the Intellectuals" and "Hegemony (Civil Society) and Separation of Powers".	1) Introduction to Marxism 2) Organic Intellectuals 3) Traditional Intellectuals 4) Role within Superstructures	7
ENGH-H-DSE-T-4/B	Marxism: b. Louis Althusser. "Ideology and Ideological State Apparatuses".	1) Ideological State Apparatuses (ISA) 2) Repressive State Apparatuses 3) Function of ISAs	5
ENGH-H-DSE-T-5/A	Faiz Ahmad Faiz. "For Your Lanes, My Country".	1) Political context 2) Resistance and hope 3) Textual Analysis	5
ENGH-H-DSE-T-5/B	Amitav Ghosh. "The Shadow Lines".	1) Historical facts 2) Complexities of Border	7

		3) Textual Analysis	

Year: 2023

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/B	Kalidasa. " Abhijnana Shakuntalam".	1) History of Indian Classical Drama 2) Rasa Theory 3) Textual Analysis	15
ENGH-H-CC-T-1/B	"The Book of the Assembly Hall" "The Temptation of Karna".	1) Introduction 2) Textual Analysis	10
ENGH-H-CC-T-2/B	Sophocles. "Oedipus the king"	1) History of Classical Greece 2) Aristotle & Greek Tragedy 3) The Text 4) Translation & 'The Unities 5) Critical Aspects	15

Year: 2023

Semester: 2nd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-3/A	Toru Dutt. “Our Casauarina Tree”.	1) Themes and context of Indian English literature 2) Textual Analysis 3) Critical Appreciation	3
ENGH-H-CC-T-3/A	Arun kolatkar. “The Bus”.	1) Introduction to the Text 2) Textual Analysis	3
ENGH-H-CC-T-4/A	Edmund Spencer. “One day I wrote her name”.	1) Introduction to Spenserian sonnet 2) Textual Analysis	3

Year: 2023

Semester: 3rd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-5/A	Edgar Allan Poe. "The Purloined Letter".	1) Background history of American literature 2) Introduction to the Text 3) Textual Analysis	5
ENGH-H-CC-T-5/A	Anne Bradstreet. "The prologue".	1) Introduction to the Text 2) Textual Analysis	3
ENGH-H-CC-T-5/B	Tennessee Williams. "The Glass Menegerie".	1) Gender roles 2) Escapism 3) Familial responsibility and unfulfilled desire.	10
ENGH-H-CC-T-6/A	Durgabai Vyam and Subhash Vyam. "Bhimayana".	1) Caste Discrimination 2) Social justice	5
ENGH-H-CC-T-7/A	John Webster. "The Duchess of Malfi".	1) Theatrical elements 2) Morality and Ethics 3) Reception and legacy	7
ENGH-H-CC-T-7/A	Aphra Behn. "The Rover".	1) Introduction 2) Detail analysis of the text	5

Year: 2023

Semester: 4th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-8/A	Samuel Johnson. "London".	1) Introduction 2) Samuel Johnson's writing and his contribution 3) Textual Analysis 4) Critical Analysis	4
ENGH-H-CC-T-8/A	Eliza Heywood. "Fantomina".	1) Introduction to the Text 2) Feminist Approach 3) Critical Analysis	7
ENGH-H-CC-T-9/A	John Keats. "Ode to a Nightingale", "Bright Star", "To Autumn".	1) Concept of beauty 2) Escape and immersion 3) Textual Analysis	5
ENGH-H-CC-T-10/B	Charles Dickens. "Hard Times".	1) Victorian aspects 2) Characterization 3) Critical Analysis	5

Year: 2023

Semester: 5th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-11/A	Emily Dickinson. "I cannot live with you", "I'm 'wife'-I've finished that".	1) Introduction to the poem 2) Feminist Perspective 3) Critical Analysis	3
ENGH-H-CC-T-11/B	Mary Wollstonecraft. " A Vindication of the Rights of Woman".	1) Feminism 2) Waves of Feminism 3) Rights of woman	7
ENGH-H-CC-T-12/A	William Butler Yeats. "Byzantium", "Sailing to Byzantium".	1) Background history of Ireland 2) Cultural context 3) Christian Civilization	5
ENGH-H-CC-T-12/B	James Joyce. "A potrait of the Artist as a Young Man".	1) Coming of Age 2) Stream of consciousness 3) Textual Analysis	7
ENGH-H-DSE-T-2/A	Seamus Heaney. "Digging" and "Casualty".	1) Irish Identity 2) Violence and loss 3) Textual Analysis	7
ENGH-H-DSE-T-2/A	Carol Anne Duffy. "Text" and "Stealing".	1) Theme of Isolation 2) Existential angst 3) Textual Analysis	4
ENGH-H-DSE-T-3/B	Cleanth Brooks. "The Heresy of Paraphrase".	1) Cleanth Brooks 2) Introduction 3) Textual Analysis	5

Year: 2023

Semester: 6th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-13/B	Eugene Ionesco, "Rhinoceros".	1) Absurdity and Surrealism 2) Conformity and Mass Movement 3) Textual Analysis	10
ENGH-H-CC-T-13/B	Luigi Pirandello. "Six Characters in Search of an Author".	1) Meta-theatrical 2) Identity and reality 3) Theatrical illusion	10
ENGH-H-CC-T-14/A	Bessie Head. "The Collector of Treasures".	1) Gender roles and Power 2) Social Hierarchy 3) Cultural context	5
ENGH-H-CC-T-14/A	Ama Ata Aidoo. "The Girl Who Can".	1) Postcolonial Themes 2) Gender dynamics 3) Textual Analysis	5
ENGH-H-CC-T-14/A	Grace Ogot. "The Green Leaves".	1) Cultural context 2) Tradition vs Modernity 3) Textual Analysis	7
ENGH-H-DSE-T-4/A	Marxism: a. Antonio Gramosci. "The Formation of the Intellectuals" and "Hegemony (Civil Society) and Separation of Powers".	1) Introduction to Marxism 2) Organic Intellectuals 3) Traditional Intellectuals 4) Role within Superstructures	7
ENGH-H-DSE-T-4/B	Marxism: b. Louis Althusser. "Ideology and Ideological State Apparatuses".	1) Ideological State Apparatuses (ISA) 2) Repressive State Apparatuses	5

		3) Function of ISAs	
ENGH-H-DSE-T-5/A	Faiz Ahmad Faiz. "For Your Lanes, My Country".	1) Political context 2) Resistance and hope 3) Textual Analysis	5
ENGH-H-DSE-T-5/B	Amitav Ghosh. “The Shadow Lines”.	1) Historical facts 2) Complexities of Border 3) Textual Analysis	7

Department of English

Lesson Plan

Name of the Teacher: Manas Ranjan Chaudhuri

Year: 2018

Part: II

Paper: III

Section	Topic	Topic of Discussion	Number of Classes
History	1) Brief Historical Outline of the Jacobean Age	1) Tudors, Absolutist Monarchy & the Birth of the Nation State 2) Jacobean Age and Divine Kíngship 3) Nascent Capitalism, Rise of the Middling Sort of Men 4) Early Phase of Colonialism, Discoveries and their Impact	4
Poetry	“Forget not yet". Thomas Wyatt.	1) Forsaken love 2) Passage of time 3) Constancy and faithfulness	1
Poetry	“To His Love (ii) [One day I wrote her name	1) The Power of the Beloved	1

	upon strand']". Edmund Spenser.	2) The Importance of the Lover's Response 3) The Intertwining of Love and Poetry	
Poetry	"Loving in truth". Philip Sidney.	1) The Sonnet 2) Truthful Love vs. Deceptive Desire 3) The Power of Poetry 4) The Struggle for Recognition	1

Year: 2018

Part: II

Paper: IV

Section	Topic	Topic of Discussion	Number of Classes
History	1) Brief historical outline of the Restoration Period 2) Brief socio-cultural history	1) Civil War, Commonwealth Restoration 2) Glorious Revolution 3) Rise of the Press and book trade 4) Neoclassicism and Enlightenment 5) Rise of the merchant class	8
Drama	"She Stoops to Conquer". William Goldsmith.	1) Anti-sentimental comedy 2) Class and Social Status 3) Love and Courtship 4) Appearances vs. Reality	15

Year: 2018

Part: III

Paper: V

Section	Topic	Topic of Discussion	Number of Classes
Poetry	"The Lamb" and "The Tyger" William Blake.	1) British Romantic poetry 2) Songs of Innocence and Songs of Experience 3) Duality and Contrast 4) Exploration of the Divine 5) The Role of Imagination	4
Poetry	"After Blenheim". Robert Southey.	1) The Cost of War on Ordinary People 2) Irony and Disillusionment 3) The Futility of War 4) The Loss of Innocence 5) Propaganda and Manipulation	2
Poetry	"Recollections of Early Child hood". William Wordsworth.	1) Loss of Innocence and the Power of Childhood Perception 2) Nature as a Source of Spiritual Connection 3) Memory and	5

		the Power of Imagination	
Novel	“Frankenstein”. Mary Shelley.	1) Gothic Fiction 2) The Dangers of Science and Ambition 3) Nature vs. Nurture 4) Prejudice and Social Rejection 5) Fate vs. Free Will	15

Year: 2018

Part: III

Paper: VI

Section	Topic	Topic of Discussion	Number of Classes
Poetry	"The Picture Gallery at Penhurst". Elizabeth Barrett Browning.	1) The Power of Family Legacy 2) The Interplay of Past and Present 3) The Search for Identity 4) Mortality and the Inevitability of Change 5) The Power of Art and Memory	2
Poetry	"Self-interrogation" Emily Bronte.	1) Self-Scrutiny and Existential Doubt 2) The Passage of Time and Mortality 3) The Search for Personal Fulfillment 4) The Power of Choice and Free Will	2
Poetry	"To Marguerite". Matthew Arnold.	1) Isolation and Longing 2) The Power of Memory 3) The Passage of Time 4) The Elusive Nature of Love	2
Prose	"Subjection of Women". [Extract from Chapter	1) Gender Inequality as	3

	II.] John Stuart Mill.	Injustice 2) Equality of Rights and Opportunities 3) The Artificiality of Gender Roles 4) Women's Potential and Autonomy 5) The Harm of Legal Subordination	
Prose	"Letter from Barrackpore". Extract from Letters from India. 1872. Emily Eden.	1) Colonial Observation and Perception 2) The Disconnect Between Colonizer and Colonized 3) Social Commentary and Satire 4) The Allure and Mystery of India	3

Year: 2018

Part: III

Paper: VII

Section	Topic	Topic of Discussion	Number of Classes
Prose	“Two Cheers for Democracy” (1951). E. M. Forster.	1) Critique of Totalitarianism 2) The Value of Individualism 3) The Limits of Democracy 4) The Importance of Culture and Art	3
Prose	“The Mark on the Wall". Virginia Woolf.	1) Modernist Fiction 2) Nature and Civilization 3) War 4) Self and the Other 5) Time and Memory	3
Prose	“Araby". James Joyce.	1) Coming of Age 2) Religion and Catholicism 3) Escapism and the Exotic	3

Year: 2018

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/A	Vyasa. "The Dicing"and "The sequel to Dicing".	1) Historical and Cultural Background of Indian society 2) Textual Analysis 3) Critical Appreciation	15
ENGH-H-CC-T-1/B	"The Book of the Assembly Hall". "The Temptation of Karna".	1) Introduction 2) Textual Analysis	10
ENGH-H-CC-T-2/B	Sophocles. "Oedipus the king".	1) History of Classical Greece 2) Aristotle & Greek Tragedy 3) The Text 4) Translation & 'The Unities 5) Critical Aspects	15

Year: 2019

Part: III

Paper: V

Section	Topic	Topics of Discussion	Number of Classes
History	1) Brief historical outline 2) Brief Socio-cultural history	1) French Revolution 2) Napoleanic wars 3) Cult of Imagination in other arts	6
Poetry	"This Lime-Tree Bower My Prsion". S.T. Coleridge.	1) Imagination and Nature 2) Reconciliation with Confinement 3) Isolation and Reflection 4) Contentment and Reconciliation 5) Lyrical Ode 6) Blank Verse	3
Poetry	"Kubla Khan". S.T. Coleridge.	1) Fragmentary Nature 2) Romantic Ideals 3) Allusion and Myth 4) Mysterious and Enigmatic	2
Poetry	"Ode to the West Wind". P.B. Shelley.	1) Ode 2) West Wind: Represents natural power and transformation. 3) Autumn and Winter: Symbols of decay and renewal.	3

Year: 2019

Part: III

Paper: VI

Section	Topic	Topics of Discussion	Number of Classes
History	Drama	1) Comedy 2) Tragedy 3) Tragic-comedy	2
Poetry	“In the Bleak Midwinter”. Christina Rossetti.	1) Nativity 2) Humanity and Humility 3) Personal Devotion	2
Prose	“Lilies of Queen’s Garden”. John Ruskin.	1) Art and Nature 2) Moral and Aesthetic Value 3) Critique of Industrialization 4) Symbolism of lilles	3

Year: 2019

Part: III

Paper: VII

Section	Topic	Topics of Discussion	Number of Classes
History	Poetry	1) Lyric 2) The Epic 3) The Ode 4) The Sonnet	2
Poetry	"Musee des Beaux Arts". W.H. Auden.	1) Indifference to Suffering 2) Art and Reality 3) Historical and Mythological Contexts	2
Poetry	"Fern Hill". Dylan Thomas.	1) Nostalgia and Innocence 2) Themes of Time and Transience 3) Mythical Quality	2
Poetry	"The Whitsun Weddings". Philip Larkin.	1) Observation of Ordinary Life 2) Contrast Between Public and Private Lives 3) Themes of Social Conformity	3
Novel	"England England". Julian Barnes.	1) Satire and Parody 2) The Concept of England, England 3) Themes of Authenticity and Artificiality 4) Critique of Modern Society	20

Year: 2019

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/A	Vyasa. “The Dicing”and “The sequel to Dicing”.	4) Historical and Cultural Background of Indian society 5) Textual Analysis 6) Critical Appreciation	15
ENGH-H-CC-T-2/B	Sophocles. “Oedipus the king”.	6) History of Classical Greece 7) Aristotle & Greek Tragedy 8) The Text 9) Translation & 'The Unities 10) Critical Aspects	15

Year: 2020

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/A	Ilango Adigal. "The Book of Banci".	1) Introduction to Epic and Tamil Epic 2) Themes of the poem 3) Feministic perspective	15
ENGH-H-CC-T-2/A	Ovid. Selections from "Metamorphoses".	1) Theme of transformation 2) Mythological stories 3) Human emotion and relations 4) Textual Analysis	20

Year: 2020

Semester: 2nd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-3/A	Robin S. Ngangom. "The Strange Affair of Robin S. Ngangom", "A Poem for Mother".	1) Manipur conflict 2) Cultural contexts 3) Textual Analysis 4) Critical Appreciation	5
ENGH-H-CC-T-3/A	Toru Dutt. "Our Casuarina Tree".	1) Themes and context of Indian English literature 2) Textual Analysis 3) Critical Appreciation	3
ENGH-H-CC-T-4/A	Edmund Spencer. "One day I wrote her name".	1) Introduction to Spenserian sonnet 2) Textual Analysis	3

Year: 2020

Semester: 3rd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-5/A	Edgar Allan Poe. "The Purloined Letter"	1) Background history of American literature 2) Introduction to the Text 3) Textual Analysis	5
ENGH-H-CC-T-5/B	Tennessee Williams. "The Glass Menegerie".	1) Gender roles 2) Escapism 3) familial responsibility 4) and unfulfilled desire.	10
ENGH-H-CC-T-6/A	Durgabai Vyam and Subhash Vyam. "Bhimayana".	1) Caste Discrimination 2) Social justice	5
ENGH-H-CC-T-7/A	Aphra Behn. "The Rover".	1) Introduction 2) Detail analysis of the text	5

Year: 2020

Semester: 4th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-8/B	Jonathan Swift. "Gulliver's Travels".	1) Satirical Comedy 2) Moral aspects 3) Critical Appreciation	7
ENGH-H-CC-T-9/B	George Gordon Byron. "Childe Harold's Pilgrimage".	1) Byronic hero 2) Travelogue and exploration 3) Theme of Alienation and Exile	5
ENGH-H-CC-T-9/B	Mary Shelley. "Frankenstein".	1) Gothic fiction 2) The monster and human 3) Theme of Alienation and hubris	5
ENGH-H-CC-T-10/A	Christina Rossetti. "The Goblin Market".	1) Introduction of the Age 2) Victorian Morality 3) Themes of Temptations and desire	4
ENGH-H-CC-T-10/B	Charlotte Bronte. "Jane Eyre".	1) Discussion on Jane Eyre 2) Feminist Perspective 3) Textual Analysis	4

Year: 2020

Semester: 5th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-11/A	Emily Dickinson. "I cannot live with you", "I'm 'wife'-I've finished that".	1) Introduction to the poem 2) Feminist Perspective 3) Critical Analysis	3
ENGH-H-CC-T-11/B	Mary Wollstonecraft. "A Vindication of the Rights of Woman".	1) Feminism 2) Waves of Feminism 3) Rights of woman	7
ENGH-H-CC-T-12/A	Dovid Herbert Lawrence. "Odour of Chrysanthemums".	1) Theme of Isolation 2) Family dynamics 3) Complexities of human relationship	4
ENGH-H-CC-T-12/A	Virginia Woolf. "Mark on the Wall".	1) Complexities of Perception and Consciousness 2) Stream of consciousness	4
ENGH-H-CC-T-12/A	W. Somerset Maugham. "Rain"	1) Themes of morality, hypocrisy and cultural clashes 2) Colonialism	5
ENGH-H-DSE-T-2/A	Seamus Heaney. "Digging" and " Casualty".	1) Irish Identity 2) Violence and loss 3) Textual Analysis	7
ENGH-H-DSE-T-2/A	Carol Anne Duffy. "Text" and "Stealing".	1) Theme of Isolation 2) Existential angst 3) Textual Analysis	4
ENGH-H-DSE-T-3/B	I.A. Richards. "Principles of Literary Criticism".	1) Methods of analysing literature	7

		2) Close Reading 3) Textual Analysis	

Year: 2021

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/A	Ilango Adigal. "The Book of Banci".	1) Introduction to Epic and Tamil Epic 2) Themes of the poem 3) Feministic perspective	15
ENGH-H-CC-T-2/A	Ovid. Selections from "Metamorphoses".	1) Theme of transformation 2) Mythological stories 3) Human emotion and relations 4) Textual Analysis	20

Year: 2021

Semester: 2nd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-3/A	Robin S. Ngangom. "The Strange Affair of Robin S. Ngangom ", "A Poem for Mother".	1) Manipur conflict 2) Cultural contexts 3) Textual Analysis 4) Critical Appreciation	5
ENGH-H-CC-T-3/A	Nissim Ezekiel. "Enterprise".	1) India writing in English 2) Title of the poem 3) Textual Analysis	3
ENGH-H-CC-T-3/B	Girish Karnad. "Hayavadana".	1) Introduction to the Text 2) Mythology, folklore 3) Theme of. Identity, desire	10
ENGH-H-CC-T-4/A	Fransis Bacon. "Of Empire".	1) Short Introduction on Essay 2) Textual Analysis	5

Year: 2021

Semester: 3rd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-5/A	Martin Luther King. "I Have a Dream".	1) Equality and brotherhood 2) Introduction to the Text	3
ENGH-H-CC-T-5/B	Toni Morrison. "Beloved".	1) History of Slavery 2) Textual Analysis	3
ENGH-H-CC-T-6/A	Shyam Selvadurai. "Funny Boy".	1) Coming of Age and Identity 2) Ethnic Conflict 3) Loss of Innocence	7
ENGH-H-CC-T-7/A	John Milton. "Paradise Lost". Bk1.	1) The characterization of Satan 2) The nature of Evil 3) The role of God 4) The Epic Hero	10

Year: 2021

Semester: 4th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-8/B	Jonathan Swift. "Gulliver's Travels".	1) Satirical Comedy 2) Moral aspects 3) Critical Appreciation	7
ENGH-H-CC-T-9/A	William Blake. "The Lamb", "The Chimney Sweeper", "The Tyger".	1) Introduction of the Era 2) Symbolism used in the poem 3) Textual Analysis 4) Critical Appreciation	7
ENGH-H-CC-T-9/A	Robert Burns. "A Bard's Epitaph" and " Scots WhaHae".	1) Historical context 2) Scottish Nationalism 3) Textual Analysis	4
ENGH-H-CC-T-9/A	William Wordsworth. "Tintern Abbey".	1) The poet's relationships with nature 2) Memory and reflection 3) The passage of time	5
ENGH-H-CC-T-10/A	Alfred Tennyson. "Ulysses".	1) Quest for Adventure 2) Spirit of heroism 3) Yearning for Glory	3
ENGH-H-CC-T-10/A	Robert Browning. "My Last Duchess".	1) Introduction to dramatic Monologue 2) Characterization 3) Theme of Power and control	3

Year: 2021

Semester: 5th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-11/A	Rassundari Debi. "Amar Jiban".	1) Bengali literature 2) Feminist Perspective 3) Textual Analysis	5
ENGH-H-CC-T-11/B	Alice Walker. "The Color Purple".	1) Introduction 2) Feminist Perspective 3) Homosexuality	6
ENGH-H-CC-T-12/A	Thomas Stearns Eliot. "The Love Song of J. Alfred Prufrock", "Preludes", "Hollow Men".	1) Alienation 2) Urban Decay 3) Struggle for Self – Expression	6
ENGH-H-CC-T-12/B	John Millington Synge. "Riders to the Sea".	1) Irish literary revival 2) Textual Analysis 3) Critical Analysis	4
ENGH-H-DSE-T-2/A	Phillip Larkin. "Whitsun Weddings" and "Church Going".	1) Modernism 2) Cultural context 3) Textual Analysis	7
ENGH-H-DSE-T-2/B	John Osborne. "Look back in Anger".	1) Post-Modern Era 2) Kitchen sink drama 3) Class difference	6
ENGH-H-DSE-T-3/B	I.A. Richards. "Principles of Literary Criticism".	1) Methods of analysing literature 2) Close Reading 3) Textual Analysis	7

Year: 2021

Semester: 6th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-13/A	Henrik Ibsen. "Ghosts".	1) Psychological realism 2) Social hypocrisy 3) The Ghost of the Past	10
ENGH-H-CC-T-14/A	Bessie Head. "The Collector of Treasures".	1) Gender roles and Power 2) Social Hierarchy 3) Cultural context	5
ENGH-H-CC-T-14/A	Ama Ata Aidoo. "The Girl Who Can".	1) Postcolonial Themes 2) Gender dynamics 3) Textual Analysis	5
ENGH-H-CC-T-14/A	Grace Ogot. "The Green Leaves".	1) Cultural context 2) Tradition vs Modernity 3) Textual Analysis	7
ENGH-H-DSE-T-4/A	Postcolonial Studies: a. Mahatma Gandhi. "Passive Resistance" and "Education".	1) Colonialism 2) Post-Colonialism 3) Gandhi's idea of history 4) Gandhi's idea of passive resistance 5) Gandhi's thoughts on western education 6) Gandhi's concepts of education	5
ENGH-H-DSE-T-4/A	Postcolonial Studies: b. Edward Said. "The Scope of Orientalism".	1) Post-Colonialism 2) The East and the West 3) Textual Analysis	5
ENGH-H-DSE-T-4/A	Postcolonial Studies:	1) Nationalism	5

	c. Aijaz Ahmad. "Indian Literature: Notes towards the Definition of a Category".	2) Language and Culture 3) Textual Analysis	
ENGH-H-DSE-T-5/A	Gulzar. "Toba Tek Singh".	1) Introduction 2) Textual Analysis 3) Critical Analysis	5
ENGH-H-DSE-T-5/B	Intizar Husain. "Basti".	1) Themes of identity, displacement, and the partition of India. 2) Textual Analysis	5

Year: 2022

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/A	Vyasa. "The Dicing"and "The sequel to Dicing"'	1) Historical and Cultural Background of Indian society 2) Textual Analysis 3) Critical Appreciation	15
ENGH-H-CC-T-2/A	Ovid. Selections from "Metamorphoses".	1) Theme of transformation 2) Mythological stories 3) Human emotion and relations 4) Textual Analysis	20

Year: 2022

Semester: 2nd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-3/ A	Shashi Deshpande. "The Intrusion".	1) Introduction to the Author 2) Textual Analysis 3) Feminist Perspective	7
ENGH-H-CC-T-3/A	Kamala Das. "Introduction".	1) Introduction to the Text 2) Confessional poetry 3) Feminist Perspective	3
ENGH-H-CC-T-3/A	Robin S. Ngangom. "The Strange Affair of Robin S. Ngangom ", "A Poem for Mother".	1) Manipur conflict 2) Cultural contexts 3) Textual Analysis 4) Critical Appreciation	5
ENGH-H-CC-T-4/A	Johne Donne. "The Sunne Rising "and "Valediction Forbidding".	1) Brief Introduction to Metaphysical poet 2) Characteristics of Metaphysical poem 3) Textual Interpretation	7

Year: 2022

Semester: 3rd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-5/A	Abraham Lincoln. "Gettysburg Address".	1) Slavery system in America 2) Introduction to the Text	3
ENGH-H-CC-T-6/A	Shyam Selvadurai. "Funny Boy".	1) Coming of Age and Identity 2) Ethnic Conflict 3) Loss of Innocence	7
ENGH-H-CC-T-7/A	Aphra Behn. "The Rover".	1) Introduction 2) Detail analysis of the text	5

Year: 2022

Semester: 4th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-8/A	Thomas Gray. "Elegy Written in a Country Churchyard".	1) Introduction to Elegy 2) Romantic elements 3) Neo classical elements	5
ENGH-H-CC-T-9	Percy Bysshe Shelley. "Ode to the West Wind".	1) Romanticism 2) Introduction to Ode 3) Power of Nature 4) Prophetic Vision	3
ENGH-H-CC-T-9/A	Samuel Taylor Coleridge. "khubla Khan", "Dejection: An Ode".	1) Introduction 2) Imagination and creative process 3) The limitation of human memory	5
ENGH-H-CC-T-10/A	Alfred Tennyson. "Ulysses".	1) Quest for Adventure 2) Spirit of heroism 3) Yearning for Glory	3
ENGH-H-CC-T-10/A	Robert Browning. "My Last Duchess".	1) Introduction to dramatic Monologue 2) Characterization 3) Theme of Power and control	3

Year: 2022

Semester: 5th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-11/A	Rassundari Debi. "Amar Jiban".	1) Bengali literature 2) Feminist Perspective 3) Textual Analysis	5
ENGH-H-CC-T-11/B	Alice Walker. "The Color Purple".	1) Introduction 2) Feminist Perspective 3) Homosexuality	6
ENGH-H-CC-T-12/A	Thomas Stearns Eliot. "The Love Song of J. Alfred Prufrock", "Preludes", "Hollow Men".	1) Alienation 2) Urban Decay 3) Struggle for Self – Expression	6
ENGH-H-CC-T-12/B	John Millington Synge. "Riders to the Sea".	1) Irish literary revival 2) Textual Analysis 3) Critical Analysis	4
ENGH-H-DSE-T-2/A	Phillip Larkin. "Whitsun Weddings" and "Church Going".	1) Modernism 2) Cultural context 3) Textual Analysis	7
ENGH-H-DSE-T-2/B	John Osborne. "Look back in Anger".	1) Post-Modern Era 2) Kitchen sink drama 3) Class difference	6
ENGH-H-DSE-T-3/B	Cleanth Brooks. "The Heresy of Paraphrase".	1) Cleanth Brooks 2) Introduction 3) Textual Analysis	5

Year: 2022

Semester: 6th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-13/A	Samuel Beckett. "Waiting for Godot".	1) Existential themes 2) Absurdity 3) Textual Analysis	10
ENGH-H-CC-T-14/A	Bessie Head. "The Collector of Treasures".	1) Gender roles and Power 2) Social Hierarchy 3) Cultural context	5
ENGH-H-CC-T-14/A	Ama Ata Aidoo. "The Girl Who Can".	1) Postcolonial Themes 2) Gender dynamics 3) Textual Analysis	5
ENGH-H-CC-T-14/A	Grace Ogot. "The Green Leaves".	1) Cultural context 2) Tradition vs Modernity 3) Textual Analysis	7
ENGH-H-DSE-T-4/A	Postcolonial Studies: a. Mahatma Gandhi. "Passive Resistance" and "Education".	1) Colonialism 2) Post-Colonialism 3) Gandhi's idea of history 4) Gandhi's idea of passive resistance 5) Gandhi's thoughts on western education 6) Gandhi's concepts of education	5
ENGH-H-DSE-T-4/A	Postcolonial Studies: b. Edward Said. "The Scope of Orientalism."	1) Post-Colonialism 2) The East and the West 3) Textual Analysis	5
ENGH-H-DSE-T-4/A	Postcolonial Studies: c. Aijaz Ahmad.	1) Nationalism 2) Language and	5

	"Indian Literature: Notes towards the Definition of a Category".	Culture 3) Textual Analysis	
ENGH-H-DSE-T-5/A	Gulzar. "Toba Tek Singh".	1) Introduction 2) Textual Analysis 3) Critical Analysis	5
ENGH-H-DSE-T-5/B	Intizar Husain. "Basti".	1) Themes of identity, displacement, and the partition of India. 2) Textual Analysis	5

Year: 2023

Semester: 1st

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-1/A	Vyasa. "The Dicing"and "The sequel to Dicing".	1) Historical and Cultural Background of Indian society 2) Textual Analysis 3) Critical Appreciation	15
ENGH-H-CC-T-2/A	Ovid. Selections from "Metamorphoses".	1) Theme of transformation 2) Mythological stories 3) Human emotion and relations 4) Textual Analysis	20

Year: 2023

Semester: 2nd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-3/ A	Amitav Ghosh. "The Ghosts of Mrs Gandhi".	1) Historical context 2) Environmental concerns 3) Global Challenges 4) Civil Disobedience 5) Critique and Reflection	15
ENGH-H-CC-T-3/A	Robin S. Ngangom. "The Strange Affair of Robin S. Ngangom", "A Poem for Mother".	1) Manipur conflict 2) Cultural contexts 3) Textual Analysis 4) Critical Appreciation	5
ENGH-H-CC-T-3/B	Girish Karnad. "Hayavadana".	1) Introduction to the Text 2) Mythology, folklore 3) Theme of. Identity, desire	10
ENGH-H-CC-T-4/A	Geoffrey Chaucer. "Wife of Bath".	1) Introduction to the Text 2) Textual Analysis 3) Feminist Perspective	7

Year: 2023

Semester: 3rd

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-5/A	Martin Luther King. "I Have a Dream".	1) Equality and brotherhood 2) Introduction to the Text	3
ENGH-H-CC-T-5/B	Toni Morrison. "Beloved".	1) History of Slavery 2) Textual Analysis	3
ENGH-H-CC-T-6/A	Shyam Selvadurai. "Funny Boy".	1) Coming of Age and Identity 2) Ethnic Conflict 3) Loss of Innocence	7
ENGH-H-CC-T-7/A	John Milton. "Paradise Lost". Bk1.	1) The characterization of Satan 2) The nature of Evil 3) The role of God 4) The Epic Hero	10

Year: 2023

Semester: 4th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-8/B	Jonathan Swift. "Gulliver's Travels".	1) Satirical Comedy 2) Moral aspects 3) Critical Appreciation	7
ENGH-H-CC-T-9/B	George Gordon Byron. "Childe Harold's Pilgrimage".	1) Byronic hero 2) Travelogue and exploration 3) Theme of Alienation and Exile	5
ENGH-H-CC-T-9/B	Mary Shelley. "Frankenstein".	1) Gothic fiction 2) The monster and human 3) Theme of Alienation and hubris	5
ENGH-H-CC-T-10/A	Christina Rossetti. "The Goblin Market".	1) Introduction of the Age 2) Victorian Morality 3) Themes of Temptations and desire	4
ENGH-H-CC-T-10/B	Charlotte Bronte. "Jane Eyre".	1) Discussion on Jane Eyre 2) Feminist Perspective 3) Textual Analysis	4

Year: 2023

Semester: 5th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-11/A	Sylvia Plath. "Daddy", " Lady Lazarus".	1) Confessional poetry 2) Discussion on Sylvia Plath's life and her works	5
ENGH-H-CC-T-11/A	Katherine Mansfield. "Bliss"	1) Upper society in England 2) Feminist Perspective 3) Homosexuality	3
ENGH-H-CC-T-12/A	Thomas Stearns Eliot. "The Love Song of J. Alfred Prufrock", "Preludes", "Hollow Men".	1) Alienation 2) Urban Decay 3) Struggle for Self – Expression	6
ENGH-H-CC-T-12/B	John Millington Synge. "Riders to the Sea".	1) Irish literary revival 2) Textual Analysis 3) Critical Analysis	4
ENGH-H-DSE-T-2/A	Ted Hughes. "Hawk Roosting " and " Crow's Fall".	1) Perspective of the Hawk 2) Natural instinct 3) Control and Mastery 4) Nature and Natural order	6
ENGH-H-DSE-T-3/B	Cleanth Brooks. "The Heresy of Paraphrase".	1) Cleanth Brooks 2) Introduction 3) Textual Analysis	5

Year: 2023

Semester: 6th

Course code/ Unit	Topic	Topics of discussion	Number of classes
ENGH-H-CC-T-13/A	Anton Chekov. "The Seagull".	1) Subtext and Psychological depth 2) Art and Creativity 3) Textual Analysis	10
ENGH-H-CC-T-13/B	Bertrolt Brecht. "The Good Person of Szechwan".	1) Epic theatre 2) Dual Identity 3) Redemption and Sacrifice	10
ENGH-H-CC-T-13/B	Eugene Ionesco, "Rhinoceros" .	1) Absurdity and Surrealism 2) Conformity and Mass Movement 3) Textual Analysis	10
ENGH-H-CC-T-13/B	Luigi Pirandello. "Six Characters in Search of an Author".	1) Meta-theatrical 2) Identity and reality 3) Theatrical illusion	10
ENGH-H-CC-T-14/A	Pablo Neruda. "Tonight I Can Write ", " The Way Spain Was".	1) Universality of human experience 2) Textual Analysis 3) Critical Appreciation	4
ENGH-H-CC-T-14/A	Derek Walcott. "A Far Cry from Africa ", "Names".	1) Colonialism 2) Complexities of identity 3) Textual Analysis	5
ENGH-H-DSE-T-4/A	Postcolonial Studies: a. Mahatma Gandhi. "Passive Resistance" and "Education".	1) Colonialism 2) Post-Colonialism 3) Gandhi's idea of history 4) Gandhi's idea of passive	5

		resistance 5) Gandhi's thoughts on western education 6) Gandhi's concepts of education	
ENGH-H-DSE-T-4/A	Postcolonial Studies: b. Edward Said. "The Scope of Orientalism."	1) Post-Colonialism 2) The East and the West 3) Textual Analysis	5
ENGH-H-DSE-T-4/A	Postcolonial Studies: c. Aijaz Ahmad. "Indian Literature: Notes towards the Definition of a Category".	1) Nationalism 2) Language and Culture 3) Textual Analysis	5
ENGH-H-DSE-T-5/A	Gulzar. "Toba Tek Singh".	1) Introduction 2) Textual Analysis 3) Critical Analysis	5
ENGH-H-DSE-T-5/B	Intizar Husain. "Basti".	1) Themes of identity, displacement, and the partition of India. 2) Textual Analysis	5

Department of English

Lesson Plan

Name of the Teacher: Shahabuddin Ahammed

Year: 2018

Part: II

Paper: III

Sections	Topic	Topics of Discussion	Number of Classes
History	Drama	1) Comedy: romantic, pastoral and citizen comedy 2) Tragedy: revenge tragedy, classical tragedy, tragic-comedy 3) Problem plays	7
Poetry	"Sonnet 116" (Let me not to the marriage'). William Shakespeare	1) Theme of Love 2) Definition of Love 3) Timelessness 4) Final Assertion	3
Poetry	"Sonnet 130". William Shakespeare.	1) Comparison with Natural and Cultural Norms 2) Acknowledgment of Imperfections 3) Declaration of Love	3
Poetry	"The Sunne Rising". John Donne.	1) Metaphysical poem 2) Conceit of Love 3) Defiance of Time and Space 4) Humor and Wit	3
Prose	Extract from "A Faithful Admonition to the Professor of God's Truth in	1) Context of Persecution 2) Call to Faithfulness 3) Covenantal	2

	England”. John Knox.	Language 4) Defense of Protestant Doctrine	

Year: 2018

Part: II

Paper: IV

Sections	Topic	Topics of Discussion	Number of Classes
Poetry	"The Retreat". Henry Vaughan.	1) Metaphysical Themes 2) Reflection on Childhood Innocence 3) Yearning for Spiritual Purity 4) Desire for Redemption	2
Poetry	"To His Coy Mistress". Andrew Marvell.	1) Carpe Diem Theme 2) Flattery and Persuasion 3) Sense of Urgency 4) Conclusion and Moral	2
Poetry	"The Rape of the Lock" Cantos I & II. Alexander Pope.	1) Mock-Heroic Style 2) The Feminine Perspective 3) Heroic Couplet 4) Social Commentary	12
Essay	"The Vision of Justice". Joseph Addison.	1) Description of Justice 2) Critique of Injustice 3) Context and Purpose	2
Essay	"Recollection of Childhood". Richard Steele.	1) Sentimental Reflection 2) Innocence and Joy 3) Family and	2

		Relationships	
Essay	“Beau Tibbs”. Oliver Goldsmith.	1) Fashionable and Pompous 2) Social Climber 3) Comic Relief 4) Symbol of Social Critique	2

Year: 2018

Part: III

Paper: V

Sections	Topic	Topics of Discussion	Number of Classes
History	Drama	1) Tragedy a) Classical Tragedy b) Tragedy in the Elizabethan Period c) Modern Tragedy d) Tragicomedy 2) Comedy a) Comedy of Humors b) Romantic Comedy c) Comedy of Manners d) Farce	2
Prose	“Going on a Journey" William Hazlitt.	1) Joy of Solitude 2) Escape from Routine 3) Reflection and Introspection 4) Connection with Nature 5) Sense of Discovery	3
Prose	“The Literature Of Knowledge And The CA Literature Of Power”. Thomas De Quincey.	1) Informative Function 2) Didactic Purpose 3) Transient Impact 4) Aesthetic and Emotional Impact 5) Enduring Influence 6) Transformative Nature	4
Novel	“Northanger Abbey.” Jane Austen.	1) Parody of Gothic Novels 2) Catherine Morland 3) Reality vs. Imagination	15

		4) Coming of Age 5) Meta-Fictional Elements	

Year: 2018

Part: III

Paper: VI

Sections	Topic	Topics of Discussion	Number of Classes
History	Poetry	1) Epic Poetry 2) The Ode 3) The Sonnet a) Italian Sonnet b) English Sonnet c) Spenserian Sonnet 4) Mock-Epic	3
Novel	"David Copperfield". Charles Dickers.	1) Bildungsroman 2) Autobiographical Elements 3) Character Development 4) Social Class and Mobility 5) Resilience and Perseverance 6) Social Critique 7) Redemption and Forgiveness 8) Virtue and vice	20

Year: 2018

Part: III

Paper: VII

Sections	Topic	Topics of Discussion	Number of Classes
History	Drama		3
Prose	"The Ox". H.E Bates.	1) Themes of hardship, dignity, and sacrifice in rural England 2) Dignity in Labor	4
Prose	"The Fly". Katherine Mansfield.	1) Grief and Loss 2) Power and Control 3) Resilience and Futility	2
Prose	"The Englishman's House". Evelyn Waugh.	1) Theme of Home and Identity 2) Satire and Humor 3) Englishman Archetype 4) Tradition and Modernity 5) Anecdotal	3
Drama	"Look Back in Anger". John Osborne.	1) Kitchen sink drama 2) Anger and Disillusionment 3) Angry Young Man 4) Alienation 5) Class conflict 6) Critique of the Establishment 7) The Bear and	20

		Squirrel Game	

Year: 2019

Part: II

Paper: V

Section	Topic	Topic of Discussion	Number of Classes
History	Prose	1) Novel 2) Essay	6
Prose	“Dream Children: A Reverie" Charles Lamb.	1) Essay 2) Themes of Loss and Longing 3) Imaginary Children 4) Autobiographical Elements	4
Prose	“Chimney Sweepers" Charles Lamb.	1) Occupation and Hardships 2) Fear and Challenges 3) Generosity and Loss 4) Unique Voices	4
Prose	“Christ's Hospital Five-and-Thirty Years Ago" . Charles Lamb.	1) Privileges and Loneliness 2) Food and Nurses 3) Harsh Discipline 4) Autobiographical Insights	5

Year: 2019

Part: III

Paper: VI

Section	Topic	Topic of Discussion	Number of Classes
History	1) Brief historical outline 2) Brief socio-cultural history	1) Reform Acts 2) Women's Suffrage 3) Empire 4) Condition of the Working Class 5) Science and Religion 6) Leisure and Amusement	10
Drama	"Riders to the Sea". John Millington Synge.	1) Fate and Destiny 2) Nature's Power 3) Loss and Grief 4) Language and Style	15

Year: 2019

Part: III

Paper: VII

Section	Topic	Topic of Discussion	Number of Classes
History	Prose	1) Novel 2) Essay	5
Poetry	“Digging". Seamus Heaney.	1) Theme of Identity 2) Connection to Nature 3) Family and Tradition	2
Poetry	“Hawk Roosting". Ted Hughes.	1) Perspective and Voice 2) Power and Control 3) Nature and Instinct	2
Prose	"The Kiss". Angela Carter.	1) Desire and Temptation 2) Identity and Transformation 3) Power Dynamics	3

Departmental Meeting

Meeting No: 7
Date of Meeting: 08-11-2016.
Venue: College Library.

Teachers Present:

1. Agnav Debnath.
2. Subhadip Bhowmik 08/11/2016
3. Chirayit Mondal 08/11/2016.
4. Safiul Islam Khan 08/11/2016

It is resolved that:

1. to improve the existing 'teaching-learning process' the teachers of the department will use ITC in the class room. They are requested to make 'Power Point' presentations for the important topics they teach respectively. It is also suggested that 'Teaching through web-cam' will be tried as another means of teaching to make the topics more understandable and it may involve the experienced teachers from the other Colleges in the district, if possible.

2. 'As 'Departmental Calendar' indicates, some seminars will be organised by the department possibly in the month of January, 2017.

3. The 'Departmental Time Table' will be prepared before the begining of the so that there will be no problem to commence classes classes on and from the first day of next Academic Year, i.e. 2017-18. Also Classes will be distributed in the same manner and number as it was done in the running 'Academic Year-2016-17'. However, minor changes may be allowed if necessary. so:

AD: I/I, IV/I, VII, and VIII papers.
SB: II/I, III/I, and V papers.
SIK: I/II, III/II, and VI/I papers.
CM: II/II, IV/II, and VI/II papers.

Notice:

A departmental meeting will be held on at 2.30 pm in the 'Library' to discuss the following agenda: All concerned are requested to be present in the meeting.

Agenda:

1. Preparation of 'departmental Academic Calendar'.
2. Preparation of the 'Lesson Plan'.
3. Organization of 'departmental seminars'.
4. Organization of 'Class Tests'
5. Miscellaneous.

Place: Domkal, MSB College,
Date: 03.07.2017.

Agrav Ghosh
H.O.D.
Political Science
Head of the Department
Dept of Political Science
Dumkal College, Murshidabad

Chiranjit Mondal 05.07.17

Subhadip Bhowmik 05/7/17

Departmental Meeting

Meeting No.: 8
Date of Meeting:
Venue of Meeting: Library

Teachers present:
1. [illegible]
2. Subhadip Bhowmik
3. Samirul Mondal.

It is resolved that:

1. A 'Departmental Academic Calendar' will be prepared for to run the teaching-learning process.
2. A Provisional 'Departmental Lesson Plan' will be prepared for the coming academic session (2017-18) and make it incorporated in the General Time Table of the College.
3. Departmental Seminar(s) will be organized by for the students in the month of March-2018 as mentioned in the academic calendar.
4. Department will arrange 'Internal Tests' for students (Honours + General) following CBCS format in every semester. And the answer scripts shall be evaluated in time within stipulated time.
5. Departmental teachers are requested to submit 'question Papers' of the above-said Tests well before the time of Tests, so that Tests shall be conducted smoothly.

Notice

A departmental meeting will be held on 05/07/2018 at 03.00 pm in 'Conference Room' to discuss the following agenda. All concerned teachers are requested to be present in the meeting.

Agenda:

1. Preparation of 'Departmental Academic Calender' as per CBCS.
2. Preparation of the 'Lesson Plan'.
3. Organization of 'Departmental Seminars'.
4. Organizations of 'Internal Tests' as per CBCS.
5. Miscellaneous.

Kumar Debnath.
H.O.D,
Political Science.

Head of the Department
Dept. of Political Science
Dumkal College, Murshidabad

Place: Dumkal College.
Date: 14.06.2018.

Departmental Meeting

Meeting No.: 9
Date of Meeting: 05/07/2018
Venue of Meeting: Conference Room

Members present:
1. Gopal Debnath
2. Sanjit Mondal.
3. Subhadip Bhowmik

After discussion resolved that:

1/ The 'Departmental Time Table' is prepared in keeping with the 'Master Time Table' of the College.

2/ 'Lesson Plans' following CBCS shall be prepared by the end of the next week.

3/ Department will organize a Seminar on a topic relevant and beneficial to the students in the month of December.

4/ All teachers are requested to submit Question Papers for the Internal Tests (CBCS) in time whenever the same will be decided to be held.

5/ All concerned are requested not to take leave without prior intimation of the College authority during the session.

Notice:

A departmental meeting will be held on 04th October, 2018 at 03.00 pm in the 'Conference Room' to discuss the following agenda. All concerned teachers are requested to be present in the meeting.

Agenda:

(1) Distribution of Courses among newly appointed teachers (also existing ones);

(2) Setting of Question Papers for 'Internal Tests' (CC1, CC2, GE and CC).

(3) Re-setting of the existing academic departmental 'Time Table'.

Place: Dumkal College
Date: 27/09/2018

[signature]
H.O.D., Political Science.
Head of the Department
Dept of Political Science
Dumkal College, Murshidabad

Hapejul Halsana 27.09.18

Srikanta Mondal 27.09.2018

Subhadip Bhowmik 27/09/18

Departmental Meeting.

Meeting No: 10
Date of Meeting: 04/10/2018
Venue of Meeting:

Teachers present:

1 Jagnar Ghosh 04/10/18
2 Subhajit Bhowmik 04/10/18
3 Samim Mondal 4/10/18
4 Hafejul Hussain 4/10/18
5 Srikanta Mondal 4.10.018

After much discussion, it is resolved that:

1. The distributions of Courses (as per new CBCS, 2018-19) and Syllabus (as per old K.U. Hons. and General) are as follows:

Teachers	First Year: CBCS, 2018-19				Second Year, KU: 2018-19		Third Year, KU: 2018-19		Total No. of Classes
	CC1	CC2	GE	CC	Hons.	Gen.	Hons.	Gen.	
AD	Unit: 01 & 02	Unit: 03	Unit: 01 & 02	Unit: NIL	Paper: IV/II	Paper: NIL	Paper: VII/I	Paper: NIL	16
SB	Unit: 03	Unit: 06	Unit: 03 (Parts)	Unit: NIL	Paper: III/I	Paper: II/II	Paper: VI/I & VIII/I	Paper: (Parts)	12
SLM	Unit: 04	Unit: 02	Unit: NIL	Unit: 02, 03, & 04.	Paper: III/I & III/II	Paper: III/I	Paper V/II	Paper: IV (Parts)	12
SNM	Unit: 06	Unit: 01 & 05	Unit: 03 (Parts)	Unit: 01,06	Paper: IV/I	Paper: II/I	Paper: V/I & VIII/II	Paper: NIL	12
HH	Unit: 05	Unit: 4	Unit: NIL	Unit: 04,05	Paper: III/II	Paper: III/II	Paper: VI/II & VII/II	Paper: NIL	12

2. Teachers will set *Question Papers, as instructed by H.O.D.*, (for Departmental / Internal Examinations) respectively for the Courses/ Papers/ Units they taught.

3. The existing *Departmental Time Table* for the academic secession 2018-19, which had been in operation since 02/07/2018, has duly been reset in order to incorporate the Classes of the newly appointed *'Guest Teachers'* (Three in number). The *'Revised Time Table'* will be effective on and from 09/10/2018. The H.O.D. is requested to take proper steps in this regard.

Notice

A departmental meeting will be held on 24th November 2018 at 2.30 pm in the 'Conference Room' to discuss the following agenda. All concerned teachers are requested to be present in the meeting positively.

Agenda:

(1) Distribution of courses (Hons + General) among teachers
(2) Setting and examining of question papers and viva-voce examinations.

Head of the Department

Srikanta Mondal
22.11.2018

Samiul Mondal
22.11.2018

Happiful Harsana
22.11.18

Subhadip Bhowmik
22/12/2018

Departmental Meeting.

Meeting No. 11
Date of Meeting: 29-11-2018
Venue of Meeting: Conference Room.

Teachers present:

(1) Agnar Sekhar. 29-11-18.
(2) Hafejul Helsana 29.11.18
(3) Samiul Mondal 29.11.18
(4) Subhadip Bhowmik 29/11/18

After much discussion, it is resolved that:

1. The distributions of Courses (as per new CBCS, 2018-19: CC3 & CC4) and Syllabus (as per old K.U. Hons. and General) are as follows:

Teachers	First Year: CBCS, 2018-19				Second Year, KU: 2018-19		Third Year, KU: 2018-19		Total No. of Classes
	CC3	CC4	GE	CC	Hons.	Gen.	Hons.	Gen.	
AD	Unit: 01 & 05 (Parts)	Unit: 01 & 06 (Parts)	Unit: 01 & 03	Unit: NIL	Paper: IV/II	Paper: NIL	Paper: VII/I	Paper: NIL	16
SB	Unit: Nil	Unit: 02 & 05	Unit: 02 (Parts)	Unit: NIL	Paper: III/I	Paper: II/II	Paper: VI/I & VIII/I	Paper: (Parts)	12
SLM	Unit: Nil	Unit: 03, 04 & 06 (Parts)	Unit: 02 (Parts)	Unit: 03 & 04.	Paper: III/I & III/II	Paper: III/I	Paper: V/II	Paper: IV (Parts)	12
SNM	Unit: 03 & 04.	Unit: Nil	Unit: 04 (Parts)	Unit: 06 & 07	Paper: IV/I	Paper: II/I	Paper: V/I & VIII/II	Paper: NIL	12
HH	Unit: 02 & 05 (Parts)	Unit: Nil	Unit: 04 (Parts)	Unit: 01, 02 & 05	Paper: III/II	Paper: III/II	Paper: VI/II & VII/II	Paper: NIL	12

2. Teachers will set *Question Papers, as instructed by H.O.D.*, (for Departmental / Internal Examinations) respectively for the Courses/ Papers/ Units they taught.
3. Teachers are requested to examine and submit the examined IATs Answer Scripts within 10 days from the date of IAT held.

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✉ dumkalcollege@gmail.com

Dumkal College, Basantapur

Dumkal * Murshidabad

Ref:_____ Date: 12/04/2019

Notice

A departmental meeting will be held on **02/05/2019** at 2.30pm in the ***Conference Room*** to discuss the agenda given below.

All teachers concerned are requested to be present in the said meeting.

Agenda:

1/ To finalize the topic, date, and the name of the 'Guest Speaker' of this Academic Session's (2018-19) Departmental Seminar.

2/ To chalk out the approximate expenditure for the said Seminar.

3/ To distribute work responsibilities among the faculties for organizing and conducting of the same.

4/ To fix the date of Second Internal Tests for CC3, CC4, GE and CC (Gen) students and distribution of setting of question papers.

5/ Miscellaneous.

(Arnav Debnath,
HOD, Political Science)

Head of the Department
Dept. of Political Science
Dumkal College, Murshidabad

Departmental Meeting

Meeting No.: 12
Date of Meeting: 02-05-2019
Venue of Meeting: Conference Room.

Members present:

1. Amar Debnath 02-05-'19
2. Samiul Mondal 02-05-2019
3. Subhadip Bhowmik 02/05/2019

After much discussion resolved that:

1. As there is no clear permission found from the authority as to organizing the 'Departmental Seminar' (2018-2019), the date of the seminar is postponed until of due permission received.
2. The 2nd Internal Tests for CC3, CC4, GE AND CC(GEN) students will be held on 13-05-2019.
3. The HOD will take 'Special Classes' of POL-GE-T-1 from 20-05-2019 to 22-05-2019, 12.30- 02.30pm every day on the request of the students.

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DUMKAL COLLEGE

P.O- Basantapur, P.S- Dumkal, Dist.- Murshidabad, West Bengal, Pin- 742406
(Govt. Aided, Affiliated to the: University of Kalyani Included under section 2(f) & 12 (B) of UGC Act)

Date: 02-07-2019

NOTICE

A departmental meeting will be held on 11-07-2019 at 01.30pm in the conference room to discuss the agenda given below.

All concerned are requested to be present in the said meeting.

Agenda:

1. Distribution of courses both CBCS and Old pattern.
2. Setting of question papers and fixing of dates of Internal Tests (CC 1, CC 2, CC 5, CC 6, CC7 and GE 1st and 3rd Semester).
3. Discussion about departmental seminar.
4. Preparation of departmental Time Table.
5. Miscellaneous.

HOD Political Science

Head of the Department
Dept. of Political Science
Dumkal College, Murshidabad

Departmental Meeting

Meeting No: 13.
Date of Meeting: 11-07-2019.
Venue of Meeting: Conference Room

Members present.

1. Gopal Debnath 11-07-19.
2. Subhadip Bhowmik 11/07/2019
3. Samiul Mondal 11-07-2019

After much discussion resolved that:

1. The distribution of courses (as per new CBCS 2018-2019) and old syllabus (UK) are as follows:

Teachers	CC1	CC2	GE	PCC	CC5	CC6	CC7	SEC 1A	HONS	Number of Classes
AD	Unit 1 & 2	Unit 3	Unit1 & 2	Nill	Unit 1, 2	Unit 1, 2	Unit 1	Nill	7 Paper	16
SB	Unit 3	Unit 6	Unit 3 (Part)	Nill	Unit 3	Unit 3,4	Unit 4	Unit 1,2	6 Paper	12
SLM	Unit 4	Unit 2	Nill	Unit 2, 3 & 4	Unit 6	Unit 5 & 6	Unit 5	Unit 3, 4 & 5	Nill	12
SNM	Unit 6	Unit 1 & 5	Unit 3(Parts)	Unit 1 & 6	Unit 5.	Unit 7	Unit 2	Nill	8th Paper	12
HH	Unit 5	Unit 4	Nill	Unit 4 & 5	Unit 4	Unit 8 & 9	Unit 3	Nill	5th Paper	12

2. Teachers will set question papers as per the instructions of the HOD for internal tests. It is also resolved that the Internal Tests for 1st and 3rd semesters will tentatively be taken in the months of September and December of this year respectively.
3. The departmental seminar which was postponed will be held in the month of December as the permission is now granted by the authority.
4. After much discussion it is decided that the topic of the coming Dept. Seminar will be 'Framing International Relations: A brief outline' and the guest speaker will be Dr Subhajit Ghosh, Assistant Professor of KN College.
5. The HOD is requested to prepare a 'Departmental Time Table' in keeping with the 'Master Time Table' of the College before the commencement of the classes.
6. Teachers are requested to examine and submit 'Answer scripts' of Internal Tests within 15 days from the date of examination held.
7. The answer scripts of Internal Tests shall be given to the students after tabulation as there is lack of space for preservation of the same.

Departmental Meeting

Meeting No. 14
Date of Meeting: 18-01-2020.
Venue of Meeting: Room 202.

Members present:
1. Gopal Debnath 18-01-'20.
2. Amar Sohail 18/1/20
3. Subhadip Bhowmik 18/01/2020
4. Samiul Mondal.

Date: 18-01-2020

This is a flash meeting as the Teachers have sudden opportunity to be together in person in the College today. But as no detailed discussion is possible due to Covid -19 protocol today, it is concurred that the teaching-learning activities such as Teaching, Question Setting (Internal), Evaluation of Answer Scripts (Internal and University) and Submission along with other regular activities will be done through online mode until further notification on the part of Government or College.

It is also resolved that a record the online meetings through Google Meet or Conference Call are to be kept for future use as far as possible.

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DUMKAL COLLEGE

P.O- Basantapur, P.S- Dumkal, Dist.- Murshidabad, West Bengal, Pin- 742406

(Govt. Aided, Affiliated to the: University of Kalyani Included under section 2(f) & 12 (B) of UGC Act.)

Date: 08-02-2022

NOTICE

This is for all concerned that a 'Departmental Meeting' will be held on **15-02-2022** in the **Conference Room** at **2.30 pm** to discuss the following agenda.

All concerned are requested to take note of it.

Agenda:

1. Distribution of curriculum;
2. Preparation of Dept. Time Table;
3. Submission of KU 1st Semester Examination Answer Scripts;
4. Internal Test;
5. Miscellaneous.

(H.O.D., Political Science)

Head of the Department
Dept. of Political Science
Dumkal College, Murshidabad

Departmental Meeting

No. of Meeting: 15.
Date of Meeting: 15-02-2022.
Venue of Meeting: Conference Room.

Members present:

1. [illegible]
2. Sushadip Bhowmik
3. Amir Sohail · 15/2/2022
4. Sumirul Mondal

After discussion resolved that:

1. Curriculum are distributed for February-June (2022) CBCS students as follows –

H-CC-3	H-CC-4	H-GE-2	H-CC-8	H-CC-9	H-CC-10	SEC-2	H-CC-13	H-CC-14	DSE-3-B
AD – 1,2,3 Units	SB-1, 2,3 Units	AD – 1,2 Units	AD-2,3,5 Units	SM-1,4,5Units	AS-1,2,3 Units	AD-1 Unit	AD – 1,5, 6 Units	SM-1,2 Units	AS – 1,2, Units
SM-4,5Units	AS-4,5,6 Unit	SM – 3Unit	SB – 1,4, 5 Units	AS-2,3Units	SB-5 Unit	SB – 3,4 Unit	SB – 2,3,4 Units	AS-3,5 Units	SM – 3 unit
					SM-4 unit	AS – 5 Unit		AD – 4 Unit	SB – 4 Unit
					AD – 6 unit	SM – 6 Unit			AD – 5 Unit

2. The 'Departmental Time Table' is prepared in keeping with the 'Master Time Table' of the College.
3. The Answer Scripts of 1st Semester KU Examination will be evaluated and tabulated as per the chart given below –

Name of the Teachers	Course
AD	CC1
SB	Program
SM	CC2
AS	GE

4. The 3rd Semester Internal Tests (CC and GE) will tentatively be taken by the last week of March. All teachers will submit Question Papers to SM. The Answer scripts should be examined and get tabulated within fifteen days after the Tests held.

5. It is also resolved the 'Seminar Library' of our Department will be reopened for the use of the students from the first week of April, 2022. Subhadip Bhowmick will be in-charge of this same. Students can borrow and return books as per their requirements only on Thursday of every week. A separate Log Book will be maintained for this purpose.

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DUMKAL COLLEGE

P.O- Basantapur, P.S- Dumkal, Dist.- Murshidabad, West Bengal, Pin- 742406
(Govt. Aided, Affiliated to the University of Kalyani included under section 2(f) & 12 (B) of UGC Act)

Date: 14-07-2022

NOTICE

This is for all concerned that a 'Departmental Meeting' will be held on **22-07-2022** in the **Conference Room** at **1.30 pm** to discuss the following agenda.

All concerned are requested to take note of it.

Agenda:

1. Distribution of curriculum;
2. Preparation of Dept. Time Table;
3. 5th Semester Marks uploading;
4. Internal Test;
5. Departmental Seminar;
6. Miscellaneous.

(H.O.D., Political Science)

Head of the Department
Dept. of Political Science
Dumkal College

Extraordinary Meeting

No. of Meeting: 16.
Date of Meeting: 22-7-2022.
Venue of Meeting: Conference Room

Members present:

1. Arnab Debnath
2. Subhadip Bhowmik 22/7/2022
3. Amir Sohail 22107/2022
4. Samim Mondal

After discussion resolved that:

1/ Curriculum are distributed for July-December (2022) CBCS students as follows –

CC-1	CC-2	GE	CC-5	CC-6	CC-7	GE	CC-11	CC-12	DSE1B	DSE2B
AD - 1,2,3 Units	SM – 1,2,3 Units	SB – 1,2 Units	AD	SM	AS	SB	AD	SM	SB	AS
AS – 4,5,6 Units	SB – 4,5,6 Units	SM – 3,4 Units								
		AS – 5,6 Units								

2/ The 'Departmental Time Table' is prepared in keeping with the 'Master Time Table' of the College. As the number of days increased from three to four for the SACTs, SB, SM and AS are requested to add another day of duty as per their convenience in the new Time Table.

4/ The 1st, 3rd and 5th Semesters' Internal Tests (CC and GE, DSE) will tentatively be taken by the last week of March. All teachers will submit Question Papers to SM. The Answer scripts should be examined and get tabulated within fifteen days after the Tests held.

5/ Departmental Seminars will tentatively be organized in the months of August and December this year.

6/ An 'Extension program' will tentatively be organized in the month of September. The theme, location, and course of action of the same will be scheduled later consulting with the IQAC Coordinator.

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Date: 02-01-2023

NOTICE

This is for all concerned that a 'Departmental Meeting' will be held on **10-01-2023** in the **Conference Room at 2.30 pm** to discuss the following agenda.

All concerned are requested to take note of it.

Agenda:

1. Distribution of curriculum;
2. Preparation of Dept. Time Table;
3. Internal Tests
4. Departmental preparation for next NAAC visit;
5. Miscellaneous.

Anjali Debnath

(H.O.D., Political Science)
Head of the Department
Dept. of Political Science
Dumkal College, Murshidabad

Departmental Meeting.

No. of Meeting: 17
Date of Meeting: 10-01-2023.
Venue of Meeting: Conference Room.

Members present:
1. [illegible signature]
2. Samirul Mondal.
3. Subhadip Bhaumik 11/01/2023
4. Amir Sohail 10/01/2023

After discussion resolved that:

1/ Curriculum are distributed for January-June (2023) CBCS students as follows –

2nd Semester			4th Semester				6th Semester		
H-CC-3	H-CC-4	H-GE-2	H-CC-8	H-CC-9	H-CC-10	SEC-2	H-CC-13	H-CC-14	DSE-3-B
AD – 1,2,3 Units	SB-1, 2,3 Units	AD – 1,2 Units	AD-2,3,5 Umits	SM-1,4,5Units	AS-1,2,3 Units	AD-1 Unit	AD – 1,5, 6 Units	SM-1,2 Units	AS – 1,2, Units
SM-4,5Units	AS-4,5,6 Unit	SM – 3Unit	SB – 1,4, 5 Units	AS-2,3Units	SB-5 Unit	SB – 3,4 Unit	SB – 2,3,4 Units	AS-3,5 Units	SM – 3 unit
					SM-4 unit	AS – 5 Unit		AD – 4 Unit	SB – 4 Unit
					AD – 6 unit	SM – 6 Unit			AD – 5 Unit

2/ The 'Departmental Time Table' is prepared in keeping with the 'Master Time Table' of the College.

3/ The 6th Semester Internal Tests (CC, DSE and Dissertation) will tentatively be taken by the month of May. All teachers will submit Question Papers to SM. The Answer scripts should be examined and get tabulated within fifteen days after the Tests held.

4/ Teachers are requested to cooperate with the H.O.D. in preparing documents for the next NAAC.

6/ It is resolved unanimously that two 'Extension programs' will tentatively be organized in this academic session as per convenience. The topics of campaigns and courses of action of the will be scheduled later consulting with the IQAC.

7/ A departmental Seminar on the World Environment Day will be organized along with the ENVS Department of our College jointly.

7/ All concerned teachers are requested to give lists of new books to the H.O.D. for submitting to the Librarian for purchase.

8/ 6th Semester Dissertation Paper Viva will be taken after the completion of the KU Final Examination.

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DUMKAL COLLEGE

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Date: 08-07-2023

NOTICE

This is for all concerned that a 'Departmental Meeting' will be held on **17-07-2023** in the **Conference Room** at **1.30 pm** to discuss the following agenda.

All concerned are requested to take note of it.

Agenda:

1. Distribution of curriculum;
2. Preparation of Dept. Time Table;
3. Internal Tests
4. Preparation of Question Bank for CBCS students
5. Organizing Departmental Seminars;
6. Miscellaneous.

Agnar Dasgupta

(H.O.D., Political Science)

Head of the Department
Dept. of Political Science
Dumkal College, Murshidabad

Departmental Meeting

Meeting Number: 18.
Date of Meeting: 17-07-'23.
Vanue of Meeting: Conference Room.

Members Present :-
① [illegible]
② Subhadip Bhaumik
③ Amir Sohail 17/07/2023
④ Samiul Mondal.

After discussion resolved that:

1/ Curriculum are distributed for July-December (2022) CBCS and NEP students as follows –

1st Semester (NEP)			3rd Semester				5th Semester			
MT-1	MI-T-	SEC-P-1	CC-5	CC-6	CC-7	GE	CC-11	CC-12	DSE-1B	DSE-2B
AD - 1,2,3,4 Units	SM – 1,2 Units	SB – 1 Units	AD	SM	SB	AD – 1, 3 Units	AD	SM	SB	AD – 1,6 Units
SB – 5 Unit	SB – 4,5 Units	SM – 2 Units				SB – 2,5 Units				SB – 2,3 Units
SNM-6 Unit	AD- 3,6 Units	AD – 3,4 Units				SM – 4, 6 Units				SM – 4,5 Units

2/ The 'Departmental Time Table' is prepared in keeping with the 'Master Time Table' of the College.

3/ The 1st, 3rd and 5th Semesters' Internal Tests (CC and GE, DSE) will tentatively be taken in the months between March and April. All teachers will submit Question Papers to SM. The Answer scripts should be examined and get tabulated within fifteen days after the Tests held.

4/ A Departmental Seminars will tentatively be organized in the month of December.

5/ Teachers are requested to cooperate with the H.O.D. in preparing documents for the NAAC, 2024. The progress of NAAC- related works will be evaluated from time to Time.

DUMKAL COLLEGE
DEPARTMENT OF PHILOSOPHY
DISTRIBUTION OF SYLLABUS OF PHILOSOPHY HONOURS AND GENERAL
SESSION: 2018-2019 (w.e.f: July)

Name of Teacher	Semester/ Year	Course Details	Content	No. of Lecture
SAMIUL ISLAM	1st Sem Hons	Course Code: PHIL-H-CC-T-01. Course Title: Outline of Indian Philosophy – 1	General Introduction	41
			Nyāya – Vaiśeṣika	
SABITA KHAN			Cārvāka	36
			Jainism	
OESMIN BANU			Buddhism	15
SAMIUL ISLAM		Course Code: PHIL-H-CC-T-02 Course Title: Outline of Western Philosophy – 1	Distinctive Features of Western Philosophy.	28
			Plato	
SABITA KHAN			Aristotle	31
			Descartes	
OESMIN BANU			Spinoza	35
			Leibniz	
SAMIUL ISLAM		Course Code: PHIL-H-GE-T-01 Course Title: Indian Philosophy	General Introduction	54
			Cārvāka	
			Jainism	
			Buddhism	
OESMIN BANU			Nyāya	41
			Vaiśeṣika	
			Advaita Metaphysics	
SAMIUL ISLAM	1st Sem Programme / General	Course Code: *PHIL-G-CC-T-01* Course Title: Indian Philosophy	General Introduction	54
			Cārvāka	
			Jainism	
			Buddhism	
OESMIN BANU			Nyāya	41
			Vaiśeṣika	
			Advaita Metaphysics	
OESMIN BANU	Part-II	Paper-III (Group-A: Psychology)	Psychology	50
			Methods of Psychology	
			Sensation and Perception	
			Psychological Processes	
			Learning	
			Attention	

	Philosophy (Hons)		Memory	
			Consciousness	
			Interactionism	
			Intelligence	
SABITA KHAN		Paper-III (Group-B: Social and Political Philosophy)	Nature & Scope of i) Social Philosophy ,ii) Political Philosophy	50
			Basic concepts : Society , Community , Association, Institutions, Family	
			Theories about the relations between Individual and Society	
			Social Change	
			Political Ideals	
			Gandhi's Concepts	
SAMIUL ISLAM		Paper-IV (Western Logic)	M.Copi & Karl Cohen: Introduction to Logic (11th Edition); Chapters: 5 – 14.4	100
OESMIN BANU	Part-II Philosophy (General)	Paper – II Group-A: Ethics (Indian & Western)	Indian Ethics	25
SABITA KHAN			Western Ethics	25
		Paper – II Group-B: Psychology	Sensation	50
			Perception	
			Memory	
			Consciousness	
			Learning	
			Intelligence	
SAMIUL ISLAM		Paper – III Logic	Indian and Western Logic	100
OESMIN BANU	Part-III	Paper – V Indian Logic & Epistemology	Tarkasaṃgrahaḥ with Dīpikā - Annambhatta From Sarvavyavahāra heturguṇaḥ buddhirjñānaṃ to smṛtirapi dvividha yathārtha ayathārthaśceti	100
SAMIUL ISLAM		Paper – VI Philosophical Analysis	John Hospers : An Introduction to Philosophical Analysis (First Indian Edition) Chapters -1,2,3,4,5,6,8	100
SABITA KHAN		Paper – VII Ethics	Eastern And Western	100

SAMIUL ISLAM	Philosophy (Hons)	Paper-VIII (Group -A: Philosophy of Religion)	1. Nature and Scope of Philosophy of Religion, Distinction between Religion & Comparative Religion 2. Origin of Religion: Anthropological Theories (Mānā, Totem & Taboo) 3. Religion, Dharma and Dhamma 4. Grounds of Belief in God - Cosmological, Teleological and Ontological arguments 5. Grounds of Disbelief in God - Sociological Theory and Freudian Theory, Cārvāka, Buddha and Jaina Views 6. The Problem of Evil	50
OESMIN BANU		Paper-VIII (Group -B: Vedānta)	Vedāntasāra	50
SAMIUL ISLAM	Part-III Philosophy (General)	Philosophy of Religion and Social and Political Philosophy	Group: A (Philosophy of Religion)	50
OESMIN BANU			Group: B (Social and Political Philosophy)	50

Islam 3.7.2018

Head of the Department
Dept. of Philosophy
Dumkal College, Murshidabad

DUMKAL COLLEGE

DEPARTMENT OF PHILOSOPHY

DISTRIBUTION OF SYLLABUS OF PHILOSOPHY HONOURS AND GENERAL

SESSION: 2018-2019 (w.e.f: Sept. 2018)

Name of Teacher	Semester/ Year	Course Details	Content	No. of Lecture
ABDUL ALIM SEIKH	1st Sem Hons	Course Code: PHIL-H-CC-T-01. Course Title: Outline of Indian Philosophy – 1	General Introduction	41
			Nyāya – Vaiśeṣika	
MIR ALAM KHAN			Cārvāka	36
			Jainism	
SOMASHREE GHOSH CHOWDHURY			Buddhism	15
ABDUL ALIM SEIKH		Course Code: PHIL-H-CC-T-02 Course Title: Outline of Western Philosophy – 1	Distinctive Features of Western Philosophy.	28
			Plato	
MIR ALAM KHAN			Aristotle	32
			Descartes	
SOMASHREE GHOSH CHOWDHURY			Spinoza	35
			Leibniz	
ABDUL ALIM SEIKH		Course Code: PHIL-H-GE-T-01 Course Title: Indian Philosophy	General Introduction	54
			Cārvāka	
			Jainism	
			Buddhism	
SOMASHREE GHOSH CHOWDHURY			Nyāya	41
			Vaiśeṣika	
			Advaita Metaphysics	
ABDUL ALIM SEIKH	1st Sem Programme / General	Course Code: PHIL-G-CC-T-01 Course Title: Indian Philosophy	General Introduction	54
			Cārvāka	
			Jainism	
			Buddhism	
SOMASHREE GHOSH CHOWDHURY			Nyāya	41
			Vaiśeṣika	
			Advaita Metaphysics	
		Paper-III	Psychology	
			Methods of Psychology	
			Sensation and Perception	

MIR ALAM KHAN	**Part-II Philosophy (Hons)**	(Group-A: Psychology)	Psychological Processes	50
			Learning	
			Attention	
			Memory	
			Consciousness	
			Interactionism	
			Intelligence	
MIR ALAM KHAN		**Paper-III** (Group-B: Social and Political Philosophy)	Nature & Scope of i) Social Philosophy ,ii) Political Philosophy	50
			Basic concepts : Society , Community , Association, Institutions, Family	
			Theories about the relations between Individual and Society	
			Social Change	
			Political Ideals	
			Gandhi's Concepts	
ABDUL ALIM SEIKH		**Paper-IV** (Western Logic)	M.Copi & Karl Cohen: Introduction to Logic (11th Edition); Chapters: 5 – 14.4	100
RABIUL HAQUE	**Part-II Philosophy (General)**	**Paper – II** Group: Ethics (Indian & Western)	Indian Ethics	25
			Western Ethics	25
MIR ALAM KHAN		**Paper – II** Group-B: Psychology	Sensation	50
			Perception	
			Memory	
			Consciousness	
			Learning	
			Intelligence	
RABIUL HAQUE		**Paper – III** Logic	Indian and Western Logic	100
ABDUL ALIM SEIKH		**Paper – V** Indian Logic & Epistemology	Tarkasaṃgrahaḥ with Dīpikā - Annambhatta From Sarvavyavahāra heturguṇaḥ buddhirjñānaṃ to smṛtirapi dvividha yathārtha ayathārthaśceti	100
MIR ALAM KHAN		**Paper – VI**	John Hospers : An Introduction to Philosophical Analysis	100

		Philosophical Analysis	(First Indian Edition) Chapters -1,2,3,4,5,6,8	
MIR ALAM KHAN	Part-III Philosophy (Hons)	Paper – VII (Ethics)	Eastern and Western	100
RABIUL HAQUE		Paper-VIII (Group -A: Philosophy of Religion)	1. Nature and Scope of Philosophy of Religion, Distinction between Religion & Comparative Religion 2. Origin of Religion: Anthropological Theories (Mānā, Totem & Taboo) 3. Religion, Dharma and Dhamma 4. Grounds of Belief in God - Cosmological, Teleological and Ontological arguments 5. Grounds of Disbelief in God - Sociological Theory and Freudian Theory, Cārvāka, Buddha and Jaina Views 6. The Problem of Evil	50
MIR ALAM KHAN		Paper-VIII (Group -B: Vedānta)	Vedāntasāra	50
SOMASHREE GHOSH CHOWDHURY	Part-III Philosophy (General)	Paper-IV Philosophy of Religion and Social and Political Philosophy	Group: A (Philosophy of Religion)	50
ABDUL ALIM SEIKH			Group: B (Social and Political Philosophy)	50

28/09/2018.

Head of the Department
Dept. of Philosophy
Dumka College, Murshidabad

Name of Teacher	Semester	Course Details	Content	No. of Lecture
ABDUL ALIM SEIKH	II	Course Code: PHIL-H-CC-T-03 Course Title: Outline of Indian Philosophy – 2	Sāṃkhya	42
			Yoga	
MIR ALAM KHAN	II		Pūrva Mīmāṁsā	18
SOMASHREE GHOSH CHOWDHURY	II		Advaita Vedānta	33
			Viśiṣṭādvaita Vedānta	
MIR ALAM KHAN	II	Course Code: PHIL-H-CC-T-04 Course Title: Outline of Western Philosophy – 2	Locke	65
			Berkeley	
			Hume	
SOMASHREE GHOSH CHOWDHURY	II		Kant	25
ABDUL ALIM SEIKH	II	Course Code: PHIL-H-GE-T-02 Course Title: Western Logic	General Introduction to Symbolic Logic	75
SOMASHREE GHOSH CHOWDHURY	II		Inductive Logic	21
ABDUL ALIM SEIKH	II	Course Code: PHIL-G-CC-T-02 Course Title: Western Logic	General Introduction to Symbolic Logic	75
SOMASHREE GHOSH CHOWDHURY	II		Inductive Logic	21

16/09/2018.

Head of the Department
Dept. of Philosophy
Bhimkal College, Murshidabad

Name of Teacher	Semester	Course Details	Content	No. of Lecture
SOMASHREE GHOSH CHOWDHURY	III	**Course Code:** PHIL-H-CC-T-05 **Course Title:** Indian Ethics	1. Introduction 2. Dharma 3. Puruṣārtha 4. Buddhist Ethics 5. Jaina Ethics 6. Yoga Ethics	96
MIR ALAM KHAN	III	**Course Code:** PHIL-H-CC-T-06 **Course Title:** Western Ethics	1. Nature and scope of Ethics 2. Teleological Ethics 3. Deontological Ethics 4. Practical Ethics 5. Virtue Ethics	96
ABDUL ALIM SEIKH	III	**Course Code:** PHIL-H-CC-T-07 **Course Title:** Indian Logic	Tarkasamgraha with Dīpikā – Annambhatta. Sarvavyavahara heturgunah buddhirjnanam to Nigrahasthanantaramiti nabina. (Upto Hetvabhāsa)	96
RABIUL HAQUE	III	**Course Code:** PHIL-H-SEC-T-1 **Course Title:** Logical Rules and Fallacies (Indian)	1. Definition and classification of anumāna 2. Aid to Anumāna: (a) tarka (b) avayava (c) dṛṣṭānta (d) siddhānta 3. Nature of Hetu and Hetvābhāsa	64
ABDUL ALIM SEIKH	III	**Course Code:** PHIL-H-GE-T-03 **Course Title:** Indian Philosophy	1. General Introduction 2. Cārvāka 3. Jainism 4. Buddhism	52
SOMASHREE GHOSH CHOWDHURY			5. Nyāya 6. Vaiśeṣika 7. Advaita Metaphysics	41

MIR ALAM KHAN	III	**Course Code:** PHIL-G-CC-T-03 **Course Title:** History of western Philosophy	1. Plato 2. Descartes 3. Spinoza 4. Leibniz	48
SOMASHREE GHOSH CHOWDHURY			5. Locke 6. Berkeley 7. Hume 8. Kant	48
RABIUL HAQUE	III	**Course Code:** PHIL-G-SEC-T-1 **Course Title:** Logical Rules and Fallacies (Indian)	1. Definition and classification of anumāna 2. The Nyāya model (chala, jāti, nigrahasthāna, vāda, jalpa, vitaṇḍā) 3. The Buddhist model (prasanga) 4. Aid to Anumāna: (a) tarka (b) avayava (c) dṛṣṭānta (d) siddhānta 5. Nature of Hetu and Hetvābhāsa	64

05/2018.

Head of the Department
Dept. of Philosophy
Dumkal College, Murshidabad

Name of Teacher	Semester	Course Details	Content	No. of Lecture
ABDUL ALIM SEIKH	IV	**Course Code:** PHIL-H-CC-T-08 **Course Title:** Western Logic – 1	1. Introduction 2. Deductive Logic	55
RABIUL HAQUE			3. Inductive Logic	41
MIR ALAM KHAN	IV	**Course Code:** PHIL-H-CC-T-09 **Course Title:** Psychology	1. Nature and Scope of Psychology 2. Methods of Psychology 3. Psychological Process 4. Unconscious and Dream	96
SOMASHREE GHOSH CHOWDHURY	IV	**Course Code:** PHIL-H-CC-T-10 **Course Title:** Philosophy of Religion	1. Nature and Scope of Philosophy of Religion 2. Religion: Origin and Development of Religion 3. Basic Tenets of some Religion 4. Argument for the Existence of God 5. Arguments against the Existence of God.	96
RABIUL HAQUE	IV	**Course Code:** PHIL-H-SEC-T-2 **Course Title:** Logical Rules and Fallacies (Western)	R.Jeffry: Formal Logic (1st Edition) It's scope and Limits, Chapter-4	28
ABDUL ALIM SEIKH			P. Suppes: Introduction to Logic (Indian edition) Chapter-9, Section –9.1 to 9.8	36
ABDUL ALIM SEIKH	IV	**Course Code:** PHIL-H-GE-T-04 **Course Title:** Western Logic	1. Introduction 2. Deductive Logic 3. Inductive Logic	71
SOMASHREE GHOSH CHOWDHURY	IV			25

MIR ALAM KHAN	IV	**Course Code:** PHIL-G-CC-T-04 **Course Title:** Social and Political Philosophy.	1. Nature and Scope of Social Philosophy and 2. Individual, society & Community. 3. Social Instituition: Association, instituition, Family, Marriage, Education & Religion. 4. Political Ideology: Democracy, Socialism & Sarvodaya. 5. Methods of political Action: Terrorism & Satyagrahy.	96
RABIUL HAQUE	IV	**Course Code:** PHIL-G-SEC-T-2 **Course Title:** Logical Rules and Fallacies (Western)	1. R.Jeffry: Formal Logic (1st Edition) It's scope and Limits, Chapter-4	28
ABDUL ALIM SEIKH			2. P. Suppes: Introduction to Logic (Indian edition) Chapter-9, Section –9.1 to 9.8	36

Head of the Department
Dept. of Philosophy
Dumkal College, Murshidabad

Name of Teacher	Semester	Course Details	Content	No. of Lecture
MIR ALAM KHAN	V	**Course Code:** PHIL-H-CC-T-11 **Course Title:** Social and Political Philosophy.	1. Nature and Scope of Social Philosophy and Political Philosophy 2. Theories about the relations between individuals and society. 3. Political Ideology. 4. Social change 5. Concepts of Gandhi	96
ABDUL ALIM SEIKH	V	**Course Code:** PHIL-H-CC-T-12 **Course Title:** Western Logic – II	1. Introduction to Logic – P. Suppes Chapter – 9 & 10 2. H.W.B. Joseph: An Introduction to Logic Chapter-II, IV & Chapter- V	96
SOMASHREE GHOSH CHOWDHURY	V	**Course Code:** PHIL-H-DSE-T-1 **Course Title:** Vedāntasāra	Vedāntasāra (Text) (Upto viksepaśakti)	96
RABIUL HAQUE	V	**Course Code:** PHIL-H-DSE-T-2 **Course Title:** An Enquiry Concerning Human Understanding	An Enquiry Concerning Human Understanding (Text) (Chapter 1 to 12)	96
SOMASHREE GHOSH CHOWDHURY	V	**Course Code:** PHIL-G-DSE-T-1A	1. Vedic System of Values 2. Concept of Man and Humanity 3. Purusartha-s 4. Nature of svadharma and sādhāraṇa dharma 5. Varnāśrama dharma	96

		Course Title: Vedic Value System	6. Three ways to attain Mokṣa 7. Niskāma Karma	
RABIUL HAQUE	V	**Course Code:** PHIL-G-SEC-T-03 **Course Title:** Philosophy in Practice.	1. Characteristic and nature of inquiry in Philosophy and Darshana. 2. Outline of types of inquiry in Philosophy and Darshana. 3. World views and corresponding paths leading to perfection Plato's, Gita & Ten commandments.	64
MIR ALAM KHAN	V	**Course Code:** PHIL-G-GE-T-1 **Course Title:** Applied Ethics	1. An Introduction to Moral Philosophy and Applied Ethics. 2. Value of Human Life 3. Environmental Ethics 4. Professional Ethics and Public Policy 5. Discrimination	96

Head of the Department
Dept. of Philosophy
Dumkal College, Murshidabad

Name of Teacher	Semester	Course Details	Content	No. of Lecture
ABDUL ALIM SEIKH	VI	**Course Code:** PHIL-H-CC-T-13 **Course Title:** Western Epistemology	An Introduction to Philosophical Analysis – John Hospers. Chapter I, II,III & IV	96
RABIUL HAQUE	VI	**Course Code:** PHIL-H-CC-T-14 **Course Title:** Western Metaphysics	An Introduction to Philosophical Analysis – John Hospers. Chapter-V,VI & VIII	96
SOMASHREE GHOSH CHOWDHURY	VI	**Course Code:** PHIL-H-DSE-T-3 **Course Title:** Practical Ethics	1. An Introduction to Moral Philosophy and Applied Ethics. 2. Value of Human Life 3. Nature as Means & Ends 4. Medical Ethics 5. Discrimination: Gender, Caste & Class.	96
MIR ALAM KHAN	VI	**Course Code:** PHIL-H-DSE-T-4 **Course Title:** Contemporary Indian Philosophy.	1. Rabindranath Tagore- Surplus in Man, Education 2. M.N. Roy – Radical Humanism 3. Aurobindo- Evolution, Involution 4. Vivekananda- Universal Religion, Practical Vedanta	96

MIR ALAM KHAN	VI	**Course Code:** PHIL-G-DSE-T-1B **Course Title:** Contemporary Indian Philosophy	1. Rabindranath Tagore- Surplus in Man, Education 2. M.N. Roy – Radical Humanism 3. Aurobindo- Evolution, Involution 4. Vivekananda- Universal Religion, Practical Vedanta	96
SOMASHREE GHOSH CHOWDHURY	VI	**Course Code:** PHIL-G-SEC-T-04 **Course Title:** Yoga Philosophy	1. The definition and essence of Yoga 2. Yoga in Jainism, Buddhism & Bhagavadgita 3. Patanjali's Astanga Yoga Marga.	64
ABDUL ALIM SEIKH	VI	**Course Code:** PHIL-G-GE -T-02 **Course Title:** INDUCTIVE LOGIC	1. Introduction to Inductive Logic 2. Kinds of Induction 3. Postulates of Induction 4. Hypothesis 5. Mills method of experimental enquiry	96

02/09/2018.

Head of the Department
Dept. of Philosophy
Dumkal College, Murshidabad

DUMKAL COLLEGE

DEPARTMENT OF SANSKRIT

LESSON PLAN

(SESSION : 2018-2019)

Name of Teacher: Sukalyan Biswas

SEMESTER	PAPER	CONTENT & TOTAL CLASSES	TOPIC WISE NUMBER OF CLASSES
1ST SEMESTER	SANS-H-GE-T-01	Basic Sanskrit ---------- 48	• *Grammar and Composition Part-I* ----------26 • *Grammar and Composition Part-II.*.----------20 • *Literature* ----------10
2ND SEMESTER	SANS-H-GE-T-02	Classical Sanskrit Literature (Prose) -----48	• *Śukanāsopadeśa* ---- *20* • Vis'rutacaritam upto 15th Para ---- 16 • Survey of Sanskrit Literature – Prose------12

SYLLABUS DISTRIBUTION & LESSON PLAN

Department: Sanskrit
Session 2018-2019
B.A. (General)
Part-II (2nd Paper)

DESCRIPTION	TOPIC	MARKS	CLASS TAKEN BY	NO OF LECTURES
Unit-I	Abhijnanasakuntalam	50	S.B	50
Unit-II	Raghuvamsam(Canto I)	40	S.B	40
	Translation from Sanskrit into English or Bengali	10	S.B	10
Total		100		100

Part-II (3rd Paper)

DESCRIPTION	TOPIC	MARKS	CLASS TAKEN BY	NO OF LECTURES
Unit-I	History of Sanskrit Literature (Excluding Vedic Portion)	35	S.B	35
	Ramayana (Balakanda, Chapter I only)	15	S.B	15
Unit-II	Isopanisad	25	S.B	25
	Manusamhita, Chapter VII,(Verses 1- 100 only)	25	S.B	25
Total		100		100

DUMKAL COLLEGE

DEPARTMENT OF SANSKRIT

LESSON PLAN

(SESSION : 2019-2020)

Name of Teacher: Sukalyan Biswas

SEMESTER	PAPER	CONTENT & TOTAL CLASSES	TOPIC WISE NUMBER OF CLASSES
1ST SEMESTER	SANS-H-GE-T-01	Classical Sanskrit Literature (Poetry) ---- 48	• *Raghuvaṃśam*: Canto-I (Verse: 1-25) ---- 12 • *Kirātārjunīyam*: Canto I (1-25 Verses) ---- 12 • *Nītiśatakam* (1-20 Verses, 1st two Paddhatis)-M. R. Kale Edition -----12 • History of Sanskrit Poetry --- 12
3RD SEMESTER	SANS-H-GE-T-01	Classical Sanskrit Literature (Poetry) ---- 48	• *Raghuvaṃśam*: Canto-I (Verse: 1-25) ---- 12 • *Kirātārjunīyam*: Canto I (1-25 Verses) ---- 12 • *Nītiśatakam* (1-20 Verses, 1st two Paddhatis)-M. R. Kale Edition -----12 • History of Sanskrit Poetry ---- 12

DUMKAL COLLEGE

DEPARTMENT OF SANSKRIT

LESSON PLAN

(SESSION : 2020-2021)

Name of Teacher: Sukalyan Biswas

SEMESTER	PAPER	CONTENT & TOTAL CLASSES	TOPIC WISE NUMBER OF CLASSES
1ST SEMESTER	SANS-H-GE-T-01	Classical Sanskrit Literature (Poetry) ---- 48	• *Raghuvaṃśam*: Canto-I (Verse: 1-25) ---- 12 • *Kirātārjunīyam*: Canto I (1-25 Verses) ---- 12 • *Nītiśatakam* (1-20 Verses, 1st two Paddhatis)-M. R. Kale Edition -----12 • History of Sanskrit Poetry --- 12
2ND SEMESTER	SANS-H-GE-T-02	Classical Sanskrit Literature (Prose) -----48	• *Śukanāsopadeśa* ---- *20* • Vis'rutacaritam upto 15th Para ---- 16 • Survey of Sanskrit Literature – Prose------12
4TH SEMESTER	SANS-H-GE-T-02	Classical Sanskrit Literature (Prose) -----48	• *Śukanāsopadeśa* ---- *20* • Vis'rutacaritam upto 15th Para ---- 16 • Survey of Sanskrit Literature – Prose -----12

DUMKAL COLLEGE

DEPARTMENT OF SANSKRIT

LESSON PLAN

(SESSION : 2021-2022)

Name of Teacher: Sukalyan Biswas

SEMESTER	PAPER	CONTENT & TOTAL CLASSES	TOPIC WISE NUMBER OF CLASSES
1ST SEMESTER	SANS-H-GE-T-01	Classical Sanskrit Literature (Poetry) ---- 48	• *Raghuvaṃśam*: Canto-I (Verse: 1-25) ---- 12 • *Kirātārjunīyam*: Canto I (1-25 Verses) ---- 12 • *Nītiśatakam* (1-20 Verses, 1st two Paddhatis)-M. R. Kale Edition -----12 • History of Sanskrit Poetry --- 12
2ND SEMESTER	SANS-H-GE-T-02	Classical Sanskrit Literature (Prose) -----48	• *Śukanāsopadeśa* ---- *20* • Vis'rutacaritam upto 15th Para ---- 16 • Survey of Sanskrit Literature – Prose------12
3RD SEMESTER	SANS-H-GE-T-01	Classical Sanskrit Literature (Poetry) ---- 48	• *Raghuvaṃśam*: Canto-I (Verse: 1-25) ---- 12 • *Kirātārjunīyam*: Canto I (1-25 Verses) ---- 12 • *Nītiśatakam* (1-20 Verses, 1st two Paddhatis)-M. R. Kale Edition -----12 • History of Sanskrit Poetry ---- 12
4TH SEMESTER	SANS-H-GE-T-02	Classical Sanskrit Literature (Prose) -----48	• *Śukanāsopadeśa* ---- *20* • Vis'rutacaritam upto 15th Para ---- 16 • Survey of Sanskrit Literature – Prose -----12

DUMKAL COLLEGE

DEPARTMENT OF SANSKRIT

LESSON PLAN

(SESSION : 2022-2023)

Name of Teacher: Sukalyan Biswas

SEMESTER	PAPER	CONTENT & TOTAL CLASSES	TOPIC WISE NUMBER OF CLASSES
1ST SEMESTER	SANS-H-GE-T-01	Classical Sanskrit Literature (Poetry) ---- 48	• *Raghuvaṃśam*: Canto-I (Verse: 1-25) ---- 12 • *Kirātārjunīyam*: Canto I (1-25 Verses) ---- 12 • *Nītiśatakam* (1-20 Verses, 1st two Paddhatis)-M. R. Kale Edition -----12 • History of Sanskrit Poetry --- 12
3RD SEMESTER	SANS-H-GE-T-01	Classical Sanskrit Literature (Poetry) ---- 48	• *Raghuvaṃśam*: Canto-I (Verse: 1-25) ---- 12 • *Kirātārjunīyam*: Canto I (1-25 Verses) ---- 12 • *Nītiśatakam* (1-20 Verses, 1st two Paddhatis)-M. R. Kale Edition -----12 • History of Sanskrit Poetry ---- 12

DUMKAL COLLEGE

ECONOMICS (GENERAL) UG-CBCS SYLLABUS IN THE UNIVERSITY OF KALYANI

(ACADEMIC YEAR 2018-2019 ONWARDS)

Basantapur ; Dumkal; Murshidabad

Teacher-in-Charge
Dumkal College
Dumkal, Murshidabad

B.A./ B.Sc., ECONOMICS (GENERAL)
SEMESTER-I
Course: ECON—G-CC-T-01
Course title: Principles of Microeconomics - I Core Course;
Credit-6; Full Marks-75

COURSE OBJECTIVES:

After completion of the course the learners will be able to: Learn the basic functioning of individual economic agents in a market economy.

COURSE CONTENT:

1. Introduction

a. Problem of scarcity and choice: scarcity, choice and opportunity cost; production possibility frontier; economic systems.

b. Demand and supply: law of demand, determinants of demand, shifts of demand versus movements along a demand curve, market demand, law of supply, determinants of supply, shifts of supply versus movements along a supply curve, market supply, market equilibrium.

c. Applications of demand and supply: price rationing, price floors, consumer surplus, producer surplus.

d. Elasticity: price elasticity of demand, calculating elasticity, determinants of price elasticity, other elasticities.

2. Consumer Theory

Budget constraint, concept of utility, diminishing marginal utility, Diamond-water paradox, income and substitution effects; consumer choice: indifference curves, derivation of demand curve from indifference curve and budget constraint.

3. Production and Costs

a. Production: behaviour of profit maximising firms, production process, production functions, law of variable proportions, choice of technology, isoquant and isocost lines, cost minimizing equilibrium condition.

b. Costs: costs in the short run, costs in the long run, revenue and profit maximizations, minimizing losses, short run industry supply curve, economies and diseconomies of scale, long run adjustments.

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Dumkal, Murshidabad

4. Perfect Competition

Assumptions: theory of a firm under perfect competition, demand and revenue; equilibrium of the firm in the short run and long run; long run industry supply curve: increasing, decreasing and constant cost industries.

SUGGESTED READINGS:

1. Case, Karl E. & Ray C. Fair, Principles of Economics, Pearson Education, Inc., 8th edition, 2007.

2. Samuelson, P. & Nordhaus, Economics,

3. Lipsey and Chrystal: An Introduction to Positive Economics.

SEMESTER – II
Course: ECON—G-CC-T-04
Course title: Principles of Macroeconomics - I Core Course;
Credit-6; Full Marks-75

COURSE OBJECTIVES:

After the completion of the course the learner will be able to: Learn the basic variables of a market economy at the macro level. Learn the concepts like national income and money in modern market economy.

COURSE CONTENT:

1. ***Introduction***
   What is macroeconomics? Macroeconomic issues in an economy.

2. ***National Income Accounting***
   Concepts of GDP and National Income; measurement of national income and related aggregates; nominal and real income; limitations of the GDP concept.

3. **Determination of GDP**

   Actual and potential GDP; aggregate expenditure; consumption function; investment function; equilibrium GDP; concepts of MPS, APS, MPC, APC; autonomous expenditure; Concept of multiplier.

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4. **National Income Determination in an Open Economy with Government**
Fiscal Policy: impact of changes in government expenditure and taxes; net exports function; net exports and equilibrium national income.

5. ***Money in a Modern Economy***
Concept of money in a modern economy; monetary aggregates; demand for money; quantity theory of money; liquidity preference and rate of interest; money supply and credit creation; monetary policy.

SUGGESTED READINGS:

1. Case, Karl E. & Ray C. Fair. Principles of Economics, Pearson Education, Inc., 8th edition, 2007.
2. Sikdar, Soumyen, Principles of Macroeconomics, 2nd Edition, Oxford University Press, India
3. Lipsey and Chrystal: An Introduction to Positive Economiestroduction to Positive Economic

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DISTRIBUTION OF SYLLABUS
Department of Economics
Dumkal college

Name of Teacher	Year	Course	Content	No of Period
Amritendu Roy	1st sem	Unit-1: Principles of Microeconomics	Problem of scarcity and choice: scarcity, choice and opportunity cost; production possibility frontier; economic systems.	03
			Demand and supply: law of demand, determinants of demand, shifts of demand versus movements along a demand curve, market demand, law of supply, determinants of supply, shifts of supply versus movements along a supply curve, market supply, market equilibrium.	05
			Consumer surplus-using demand curve to measure consumer surplus, producer surplus.	02
			Elasticity: price elasticity of demand, calculating elasticity, determinants of price elasticity, income elasticity, elasticity of supply and its determinants.	02
Amritendu Roy	1st sem	Unit 2: Consumer Theory	Utility in Cardinal Approach-Utility and choice, Total Utility and Marginal Utility, Utility and choice-maximization, marginal utility, theory of demand reference;	07
			Ordinal utility: Indifference curve, marginal rate of substitution and convexity of IC, budget constraint, income and substitution effects;	06

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Debasis Bandyopadhyay	1st sem	Unit 2: Consumer Theory	Derivation of demand curve from indifference curve and budget constraint.	02
Amritendu Roy	1st sem	Unit 3: Production and Cost:	Behaviour of profit maximising firms, production process, production functions, law of variable proportions, choice of technology, Isoquant and iso-cost lines, cost minimizing equilibrium condition.	10
			Costs: costs in the short run, costs in the long run, relation between short run and long run costs.	05
Amritendu Roy	1st sem	Unit 4: Perfect Competition	Assumptions: theory of a firm under perfect competition, demand and revenue; marginal cost curve and supply decision of the firm, equilibrium of the firm in the short run and long run;	04
			long run industry supply curve: increasing, decreasing and constant cost industries.	02

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Amritendu Roy	2nd sem (G-CC-T-04)	**Macro Economics** **1. Introduction**	What is macroeconomics?	01
			Macroeconomic issues in an economy.	01
Debasis Bandyopadhyay	2nd sem	**2. National Income Accounting**	Concepts of GDP	01
			National Income	01
			Measurement of national income and related aggregates;	02
			Nominal and real Income;	01
			limitations of the GDP concept.	01
Amritendu Roy	2nd sem	**2. National Income Accounting**	Measurement of national income and related aggregates;	01
Amritendu Roy	2nd sem	**3. Determination of GDP**	Actual and potential GDP; aggregate expenditure;	02
			consumption function; investment function;	02
			Equilibrium GDP; concepts of MPS, APS, MPC, APC;	03

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			Autonomous expenditure; Concept of multiplier.	02
Amritendu Roy	2nd sem	4. National Income Determination In an Open Economy with Government	Fiscal Policy: impact of changes in government expenditure and taxes;	02
			Net exports function; net exports and equllibrium national income.	02
Amritendu Roy	2nd sem	5. Money in a Modern Economy	Concept of money in a modern economy; monetary aggregates; demand for money; quantity theory of money; liquidity preference and rate of interest;	03
			Money supply and credit creation; monetary policy.	03

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Dumkal, Murshidabad

Distribution of' Syllabus for UG
B.Com (Hons)
Session-2018-2019 (w.c.f. 01.07.2018 to 31.12.2018)

Sl. No.	Name of Teacher	Class	Name of the Subject	Details of the Subject
1.	Arup Ratan Misra	1st Sem	Financial Accounting – 1 (UG BCOM-H-CC-T-01)	Basic Principles of preparing Final Accounts, Final Accounts of Profit Seeking Organisation, Final Accounts of Not-for-Profit Organisation, Accounting for special sales transaction (Consignment, Joint Venture, Accounting for sales on Approval)
2.	Debasis Bandyopadhyay	1st Sem	Micro Economics (UG BCOM-H-CC-T-02)	Demand and Supply, Consumer Behaviour, Perfect Competition, Imperfect Competition.
			Principles of Management (UG BCOM-H-GE-T-01)	Introduction, Evolution of Management Thoughts, Planning, Organising, Motivation.
3.	Basudev Sinha	1st Sem	Principles of Management (UG BCOM-H-GE-T-01)	Leadership, Communication, Control, Co-ordination.
			Micro Economics (UG BCOM-H-CC-T-02)	Production and Cost
4.	Md. Hazarat Ali	1st Sem	Environmental Studies (UG BCOM-H-AECC-T-01)	
			Financial Accounting – 1 (UG BCOM-H-CC-T-01)	Introduction of Accounting, Double entry book keeping system, Accounting from Incomplete Records.

Distribution of' Syllabus for UG
B.Com (Hons)
Session-2018-2019 (w.c.f. 01.01.2019 to 30.06.2019)

Sl. No.	Name of Teacher	Class	Name of the Subject	Details of the Subject
1.	Arup Ratan Misra	2st Sem	Business Mathematics and Statistics (UG BCOM-H-GE-T-02)	Logarithim, Laws of Indices, A.P. Series, G.P. Series, Compound Interest &Annuities, Functions, Limit, Continuity and Differentiation.
2.	Debasis Bandyopadhyay	2st Sem	Marketing Management (UG BCOM-H-CC-T-03)	Introduction, Consumer Behaviour and Market Segmentation, Product,
			Business Mathematics and Statistics (UG BCOM-H-GE-T-02)	Statistical Data, Diagrammatic representation, Different Measures of Central Tendency, Different Measures of Despersion, Simple Correlation Analysis, SimpleRegression Analysis, Index Numbers.
3.	Basudev Sinha	2st Sem	Marketing Management (UG BCOM-H-CC-T-03)	Price and Promotion, Distribution and Retailing
			Business Laws (UG BCOM-H-CC-T-04)	The Indian Contract Act, 1872, The Sale of Goods Act, 1930, The Partnership Act, 1932,
4.	Md. Hazarat Ali	2st Sem	Business Laws (UG BCOM-H-CC-T-04)	The Limited Liability Partnership Act, 2008, The Negotiable Instruments Act 1881.

Distribution of' Syllabus for UG
B.Com (Hons)
Session-2019-2020 (w.c.f. 01.07.2019 to 31.12.2019)

Sl. No.	Name of Teacher	Class	Name of the Subject	Details of the Subject
1.	Arup Ratan Misra	3rd Sem	Financial Accounting- 2 (UG BCOM-H-CC-T-05)	Introduction to Company Accounts, Accounting for Shares and Debentures of Company, Investment Accounts, Insurance claim.
			E-Commerce & Computer Applications in Business (UG BCOM-H-SEC-T+P-01A)	Introduction, Models of E-Cmmerce, Digital Money Transactions, e-Commerce in India, Computer Applications in Business (Practical)
2.	Debasis Bandyopadhyay	3rd Sem	Income Tax Law (UG BCOM-H-CC-T-06)	Income from Salaries, Income from House Property, Profits and Gains from Business or Profession, Capital Gain, Income from Other Sources, Set off and Carry Forward of Losses, Deductions from Gross Total Income, Computation of Total Income and Tax Liability of an Individual.
			Macro Economics (UG BCOM-H-GE-T-03)	Macro Economics –Introduction, National Income Accounting, Determination of Equilibrium Level of Income.
3.	Basudev Sinha	3rd Sem	Financial Accounting- 2 (UG BCOM-H-CC-T-05)	Partnership Accounts, Branch Accounting, Hire Purchase and Installment Payment system, Departmental Accounts.
			Human Resource Management (UG BCOM-H-CC-T-07)	Human Resource Management-Training and Development Job Evaluation and Performance Appraisal. Nature and Scope, Human Resource Planning, Recruitment and Selection,
4.	Md. Hazarat Ali	3rd Sem	Income Tax Law (UG BCOM-H-CC-T-06)	Basic Concepts and Definitions under Income Tax Act, 1961, Residential Status of an individual and Incidence of Tax, Fully Exempted income of an Individual, Agricultural Income.
			Macro Economics (UG BCOM-H-GE-T-03)	Commodity Market and Money Market Equilibrium, Money and Inflation.

Distribution of' Syllabus for UG
B.Com (Hons)
Session-2019-2020 (w.c.f. 01.01.2020 to 30.6.2020)

Sl. No.	Name of Teacher	Class	Name of the Subject	Details of the Subject
1.	Arup Ratan Misra	4th Sem	Indirect Tax Laws (UG BCOM-H-CC-T-09)	Introduction, Supply, Registration, Documentation, Input Tax Credit.
			Tax Returns and Filing of Tax Returns (UG BCOM-H-SEC-T-02A)	Return under Income Tax, PAN and TAN, Payment of Advance Tax and Self Assessment Tax, Interest, Filing of Returns, Procedure of filing e-Return, ITR1 only. Returns under Goods and Service Tax, Practical on hard copy of ITR 1
2.	Debasis Bandyopadhyay	4th Sem	Cost Accounting (UG BCOM-H-CC-T-08)	Introduction, Costs, Material Costs, Labour Costs, Overhead Costs, Contract Costing,
			Indian Economics (UG BCOM-H-GE-T-04)	Basic Issues of Indian Development, Basic Issues of Indian Economy, Agricultural Sector.
3.	Basudev Sinha	4th Sem	Cost Accounting (UG BCOM-H-CC-T-08)	Process Costing, Operating Costing, Cost Control Accounts.
			Indirect Tax Laws (UG BCOM-H-CC-T-09)	GST Returns- GSTR 1, GSTR2 GSTR3 , Payment of GST – Through Input Tax Credit, By cash/bank after generation of online Challan.
4.	Md. Hazarat Ali	4th Sem	Company Law (UG BCOM-H-CC-T-10)	Introduction, Documents,Formation of Company, Management, Company Meetings.
			Indian Economics (UG BCOM-H-GE-T-04	Industrial Sector, External Sector.

Distribution of' Syllabus for UG
B.Com (Hons)
Session-2020-2021 (w.c.f. 01.07.2020 to 31.12.2020)

Sl. No.	Name of Teacher	Class	Name of the Subject	Details of the Subject
1.	Arup Ratan Misra	5th Sem	Corporate Accounting (UG BCOM-H-CC-T-11)	Schedule III(Division I) of the Companies Act 2013,Final Accounts of Companies, Redemption of Preference Shares and Debentures, Accounting of Limited Liability Partnership.
2.	Debasis Bandyopadhyay	5th Sem	Accounting for Local Bodies (UG BCOM-H-DSE-T-02A)	Introduction, 73rd Amendment of the Constitutionin 1992, Article 243J,Provisions related to Accounts in the West Bengal Panchyat Act, 1973, Financial Statements of Municipalities, Accounting Standards, Financial Statements of PRIs (Panchayat Raj Institutions) and Municipalities,
			Business Communication And Entrepreneurship Development (UG BCOM-H-DSE-T-01A)	Entrepreneurship Development-Introduction, Entrepreneurship Roles in Different Business Environment, Entrepreneur and Law, Financing of New Ventures, Project Planing and Feasibility Studies.
3.	Basudev Sinha	5th Sem	Auditing (UG BCOM-H-CC-T-05)	Introduction, Internal Control, Vouching & Verification.
			Corporate Accounting (UG BCOM-H-CC-T-11)	Reconstruction of Companies, Valuation, Holding Company.
4.	Md. Hazarat Ali	5th Sem	Business Communication And Entrepreneurship Development (UG BCOM-H-DSE-T-01A)	Business Communication, Significance of Communication, Business Productivity, Inter Group and Intra Group Conflict, Management Information System (MIS), Tools of Communication, Practice in Effective Communication.
			Auditing (UG BCOM-H-CC-T-05)	Audit of Limited Companies, Auditors' Report.

Distribution of' Syllabus for UG
B.Com (Hons)
Session-2020-2021 (w.c.f. 01.01.2021 to 30.6.2021)

Sl. No.	Name of Teacher	Class	Name of the Subject	Details of the Subject
1.	Arup Ratan Misra	6th Sem	Management Accounting (UG BCOM-H-DSC-T-03A)	Introduction, Budget and Budgetary Control, Standard Costing, Cost Volume Profit Analysis and Marginal Costing.
			Indian Financial System (UG BCOM-H-DSE-T-04A)	Financial System, Reserve Bank of India- Organisation, Management, Functions, Monetary Policy, Development Banks.
2.	Debasis Bandyopadhyay	6th Sem	Indian Financial System (UG BCOM-H-DSE-T-04A)	Insurance Sector, Regulatory Bodies.
			Financial Management (UG BCOM-H-CC-T-13)	Fundamentals of Financial Management, Sources of Finance and Cost of Capital, Working Capital and Its Management.
3.	Basudev Sinha	6th Sem	Management Accounting (UG BCOM-H-DSC-T-03A)	Ratio Analysis, Common Size Statements.
			Financial Management (UG BCOM-H-CC-T-13)	Capital Structure and Leverage, Capital Budgeting, Dividend Decision, Fund Flow Statement, Cash Flow Statement.
4.	Md. Hazarat Ali	6th Sem	Project Work (UG BCOM-H-CC-T-14)	Project Report and Presentation, Viva- Voce.

DISTRIBUTION OF SYLLABUS
Dumkal College
Session 2018-2019
Nome of the Department: Environmental studies
Name of the Teacher:- Parimal Saha

MONTHS	SEMESTER	COURSE	CONTENT	NO OF PERIOD
July	1st Honours Course	AECC	**Unit-1 Introduction & Environmental Studies** Multidisciplinary nature of environmental studies; Scope and importance; Concept of sustainability and sustainable development. **Unit-2- Ecosystem** What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems: • Forest ecosystem • Grassland ecosystem • Desert ecosystem • Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)	
August	1st		**Unit 3: Natural Resources: Renewable and Non-renewable Resources** • Land resources and landuse change; Land degradation, soil erosion and desertification. • Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. • Water use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state). • Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.	
September	1st		**Unit 4: Biodiversity and Conservation** • Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots. • India as a mega-biodiversity nation; Endangered and endemic species of India. • Threats to biodiversity: Habitat loss, poaching of wildlife, man---wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. • Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.	
November	1st		**Unit 5: Environmental Pollution** • Environmental pollution; types, causes, effects and controls; Air, water, soil and noise pollution. • Nuclear hazards and human health risks. • Solid waste management: Control measures of urban and industrial waste. • Pollution case studies. **Unit 6 Environmental Policies & Practices** • Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture • Environment Laws. Environment Protection Act. Air (Prevention & Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act. International agreements. Montreal and Kyoto protocols and Convention on Biological Diversity (CBD) • Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.	
December	1st		**Unit 7: Human Communities and the Environment** • Human population growth: Impacts on environment, human health and welfare. • Resettlement and rehabilitation of project affected persons; case studies. • Disaster management floods, earthquake, cyclones and landslides. • Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan. • Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. • Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).	

Months	semester	course	content	No of Period
January	2nd Programme Course	AFCC	**Unit-1 Introduction & Environmental Studies**	
			Multidisciplinary nature of environmental studies; Scope and importance; Concept of sustainability and sustainable development.	
			Unit-2- Ecosystem	
			What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems: • Forest ecosystem • Grassland ecosystem • Desert ecosystem • Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)	
February	2nd		**Unit 3: Natural Resources: Renewable and Non-renewable Resources**	
			• Land resources and landuse change; Land degradation, soil erosion and desertification. • Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. • Water use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state). • Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.	
March	2nd		**Unit 4: Biodiversity and Conservation**	
			• Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots. • India as a mega-biodiversity nation; Endangered and endemic species of India. • Threats to biodiversity: Habitat loss, poaching of wildlife, man---wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. • Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.	
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May (1-15th)	2nd		**Unit 7: Human Communities and the Environment**	
			• Human population growth: Impacts on environment, human health and welfare. • Resettlement and rehabilitation of project affected persons; case studies. • Disaster management floods, earthquake, cyclones and landslides. • Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan. • Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. • Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).	

DISTRIBUTION OF SYLLABUS
Dumkal College
Session 2019-2020
Nome of the Department: Environmental studies
Name of the Teacher:- Parimal Saha

MONTHS	SEMESTER	COURSE	CONTENT	NO OF PERIOD
July	1st Honours Course	AECC	**Unit-1 Introduction & Environmental Studies** Multidisciplinary nature of environmental studies; Scope and importance; Concept of sustainability and sustainable development. **Unit-2- Ecosystem** What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems: • Forest ecosystem • Grassland ecosystem • Desert ecosystem • Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)	
August	1st		**Unit 3: Natural Resources: Renewable and Non-renewable Resources** • Land resources and landuse change; Land degradation, soil erosion and desertification. • Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. • Water use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state). • Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.	
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Dumkal College
Session 2021-2022
Nome of the Department: Environmental studies
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July	1st Honours Course	AECC	**Unit-1 Introduction & Environmental Studies** Multidisciplinary nature of environmental studies; Scope and importance; Concept of sustainability and sustainable development. **Unit-2- Ecosystem** What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems: • Forest ecosystem • Grassland ecosystem • Desert ecosystem • Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)	
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Session 2022-2023
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