

**Dumkal College**  
Dumkal, Murshidabad  
(Affiliated to the University of Kalyani)  
Department of Bengali  
**Course Outcomes of**  
**Bengali Honours and Program/General Course (BA)**  
(Under CBCS System)

Sl. No.	Subject	Course	Sem	Outcome
1.	History of Bengali Literature	H-CC-T- 1 H-CC-T- 2 P-CC-T- 1 GE-T- 1& 3	I	History of Bengali Literature: (8 <sup>th</sup> century - 19 <sup>th</sup> century) a) History of Bengali Literature makes students aware of the past cultural history of Bengal. b) It helps students understand the origin of Bengali Literature and the evolution of Bengali Literature and culture. c) It also creates a sense of history and historical analysis of Bengali Literature. d) History of Bengali Literature helps students to know about religion, society, culture and development of Bengali Literature in prose, poetry, drama, novel, etc. e) It also creates a strong foundation of studying future courses of literature.
2.	Linguistics	H-CC-T- 1 H-CC-T- 2 GE-T- 2		a) Language is the main key object of literature; if the students of literature don't understand the importance of the language, then their knowledge will remain incomplete. b) Linguistics helps students to be familiar with the aspects of the Bengali language-including sound, word, sentences and syntax. c) Students will understand Bengali language in a historical context and they will learn how Bengali language changed over time and how it varies from situation to situation and place to place. d) Study of Linguistics will improve the practical and intellectual skill.

3.	Boishnab Padabali	H-CC-T- 3 GE-T- 1& 3		<p>a) Vaishnava Padabali is one of very influential part of Bengali culture and literature of Medieval Period in Bengal.</p> <p>b) Its helps students to understand about Vaishnava Philosophy which is mainly created by Sree Chaitanya Mahaprabhu and his followers.</p> <p>c) It also indicates the actual nature of Bengal which helps student to understand the Bengali culture and its origin.</p>
4.	Chhanda	H-CC-T- 3 GE-T- 1& 3		It helps Students to understand the mystery of poetry
5.	The Ramayana	H-CC-T- 3		<p>a) The Ramayana is one of the largest ancient epics in world literature. Every Indian should know about it.</p> <p>b) Because Ramayana is not only a literary work but also it represents ancient India, our culture and moral value.</p> <p>c) Ramayana was written by Maharshi Valmiki which is in Sanskrit but it was translated in so many Indian and foreign languages.</p> <p>d) In India every translation of the Ramayana was a new creation. Most of translator were poet and they put their imagination in their work. Bengali Ramayana is not an exception.</p>
6.	Shakto Padabali	H-CC-T- 4 LCC-T-1		<p>a) Shakto Padabali is one of very influential part of Bengali culture and literature of Medieval Period in Bengal.</p> <p>b) Its helps students to understand about Shakto Philosophy which has a very deep root in our Bengali culture and literature.</p> <p>c) Its helps students to understand not only the ancient Tantra sadhana but also the socio-economic aspect of Bengal in 18<sup>th</sup> century.</p>
7.	Chandimangal	P-CC-T- 2		<p>a) Mangalkabya is one of the major creations of Medieval Bengali literature. It is also known as Loukik Puran.</p> <p>b) Mangalkavya is about story of common people of Bengal after Turkey attack in disguise of devotional story.</p> <p>c) Chandimangal is not an exception. It is a complete mirror work of Bengal's socio-economic-religious belief in 16<sup>th</sup> century.</p> <p>d) This literary work help students understand how does society of Bengal evolutes itself.</p>

8.	Novels and short stories	H-CC-T- 5 H-CC-T- 6 H-CC-T- 11		<p>a) Novels and short stories are the mirror work of society. These two reflect our modern bourgeoisie society.</p> <p>b) In syllabus students of Bengali literature study many novels and short stories.</p> <p>c) Students are privileged to read the literary work of Bankim Chandra Chattopadhyay, Rabindranath Tagore, Sharat Chandra Chattopadhyay, Atin Bandopadhyay, Satinath Bhaduri, Narayan Gangopadhyay and so many others.</p> <p>d) A thorough interaction with these creations helps students to understand their society, they can also relate the character with the reality.</p> <p>e) They also learn being a student of literature how to analysis a literary works critically.</p>
9.	Prabandha	H-CC-T- 7		It helps students think rationally.
10.	Alamkar	H-CC-T-4 GE-T-1&3		<p>a) To make students aware about the importance of chhanda and alamkar while studying poetry.</p> <p>b) To give practical lesions of chhanda and alamkar to students.</p> <p>c) To prepare students about the ornamental use of language in constructing sentences while speaking and writing.</p> <p>d) Introducing the foundation of chhanda along with the basic knowledge of Linguistic.</p>
11.	Rabindra Sahitya	H-CC-T- 5 H-CC-T- 8 H-CC-T- 6 H-CC-T- 10 H-CC-T- 12		<p>a) Rabindranath Tagore is one of the pioneers of Bengali Literature. He was a polymath who wrote as a poet, writer, Play Writer, Composer, Philosopher, Social reformer &amp; Painting. He reshaped Bengali Literature and music as well as Indian art, with contextual modernism in the late 19 and 20<sup>th</sup> Centuries. He was the first non-European Nobel Prize Winner in Literature.</p> <p>b) In our syllabus we taught Tagore's Poetry, Novel, Short Story, Drama, and Essay.</p> <p>c) Without knowing about Tagore's Creation study of Bengali Literature is incomplete.</p>
12.	Adhunik Kabita	H-CC-T- 10 H-CC-T- 11		<p>a) Literature is the mirror of our society. Changes of time, society, economics and politics always reflect in literature. Poetry is not an exception. By the time it also changes its features.</p> <p>b) Bengali Poetry enriched with so many poets and their creations.</p>

				<p>c) Kobiguru was the Pioneer of modern poetry of Bengali Literature.</p> <p>d) After him there are so many eminent poets who enlighten the path of poetry of Bengali literature.</p> <p>e) All ages have seen different forms of poetry and poetic traditions. It reached the pinnacle during the Bengali Renaissance period although it has a rich tradition and has grown independent of the movement.</p> <p>f) Our syllabus tries to cover all the eminent poet's creation to make students understand about Bengali Poetry and its changes.</p>
13.	Bangla Natak	H-CC-T-12 GE-T-1		<p>a) Bengali drama had a very long past. Critics thought that the first creation of Bengali literature also has some elements of drama.</p> <p>b) Bengali drama had a great past to convey the changes of society.</p> <p>c) 3. Every movement of society creates reflection on drama, like independence movement, Tevaga Andolon, anti-fascist movement etc.</p>
14.	Bangla Rangamancher Itihas	H-CC-T-12 GE-T-1		This part of syllabus helps students to understand the history of Bengali theatre and its transformations.
15.	Poetics	H-CC-T-14 P-DSE-T- 4		Poetics is a rare piece of work in world literature. Students are fortunate to learn about this book in their syllabus. This book helps students to understand how they critically analyse a literary work.
16.	Sahityer Rupantar	H-CC-T-14		It enhances student's creative writing ability.
17.	DTP, Proof Correction	SEC-T-2 & 4		It helps students to understand how to write a research paper, how to correct a paper by Proof correction. It also helps students to be a proof reader in their future.
18.	Bengali Folk Literature	SEC-T-3		<p>a) Folklore has a very deep root in our modern society its traces are ever present among those societies who have already achieved a height of civilizations.</p> <p>b) Study of folklore helps students to find out their culture and their root and save the originality of their race from the aggression of globalisation.</p>

**Dumkal College**  
Dumkal, Murshidabad  
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**Department of English**  
**Course Outcomes of**  
**English Honours and Program/General Course (BA)**  
(Under CBCS System)

The Department of English of Dumkal College seeks to foster the intellectual development of its students by encouraging study of literature and writing. The Department strives to make its students familiar with a wide range of works of British writers in particular and World literature in general with a special focus on Indian writings in English. The issues of culture, history, gender, race, ethnicity, politics are addressed and negotiated in the process of imparting knowledge of English literature in its pluralistic forms, to help student develop a critical mindset of their own. The Department wishes that each student who graduates with a BA Honours in English from Dumkal College, will have an enduring interest in language and literature, an awareness of their historical and cultural legacies, knowledge of complexities of human existence, the political and social upheavals and its bearing on literature, an understanding of the ability of great literature to arouse and challenge people to struggle with insightful questions of human identity and values. With the introduction of new syllabus under CBCS from the year 2018, which promotes a new thematic frame work where Indian classical literature share space with contemporary literary crosscurrents, UG syllabus at Dumkal College will help students to build skills of analytical and interpretive argument, and become careful and critical readers.

## **Course Outcome (CBCS)**

### **1. Classical Literatures (Honours- CC1, CC2):**

**After Completion of this Course Students will be able to**

- A.** Read and understand about the rich classical texts from Greco-Roman literatures as well as Indian literatures written in Sanskrit, in translated versions.
- B.** Explain the eco-socio-political-cultural context of the age that produced Indian classical literature from its early beginning till 1100 AD
- C.** Appreciate the pluralistic and inclusive nature of Indian classical literature and its attributes
- D.** Historically situate the classical literature and diverse literary cultures from India, mainly from Sanskrit, but also Tamil, Prakrit and Pali by focusing on major texts in the principal genres
- E.** Trace the evolution of literary culture(s) in India in its/their contexts, issues of genres, themes and critical cultures
- F.** Understand, analyze and appreciate various texts with comparative perspectives
- G.** Trace the nature of influence that all the classical texts have on modern English literatures both in British and Indian writings in English.
- H.** Appreciate these texts as a source of great wisdom.
- I.** Interpret these texts from contemporary points of view.

### **2. Indian Writing in English (Honours- CC3, DSE1, GE4; Pass- LCC1, DSE1, GE2):**

**After Completion of this Course Students will be able to**

- A.** How and why Indian literature emerged as a distinct field of study.
- B.** Trace the development of history of English literature from its beginning to the present day.
- C.** Interpret the works of great writes of Indian writers in English.
- D.** Demonstrate, through discussion and writing, an understanding of significant cultural and societal issues presented in Indian English literature.

**3. British Literature (Honours- CC4, CC7, CC8, CC9, CC10, CC12, DSE2; Pass- CC1, CC2, CC3, CC4):**

**After Completion of this Course Students will be able to ...**

- A. Trace the developmental history of English Literature from Old English Period to 19th century.
- B. Show familiarity with major literary works by British writers in the field of Drama and Poetry.
- C. Be acquainted with major religious, political and social movements from 14th to 19th century and their influence on literature.
- D. Learn various interpretative techniques to approach literary texts of varied genres.

**4. Popular Literature (Honours- CC6):**

**After Completion of this Course Students will be able to ...**

- A. Know the meaning of Popular Literature and its distinct characters.
- B. Read and understand some of the representative popular literary pieces.
- C. Understand how formulaic elements create the ideal world without limitations or uncertainties in readers' imagination.
- D. Probe into the literary and aesthetic merits of popular fictions.

**5. Literary Theory & Criticism (Honours- DSE 3, DSE4):**

**After Completion of this Course Students will be able to ...**

- i. Learn the history of literary criticism and various literary theories.

- ii. Apply critical and technical theory and vocabulary to describe and analyze, and formulate an argument about literary and other texts.
- iii. Think about the non-fixity of meaning of literacy texts.
- iv. Develop a skill in applying various literary theories in interpreting a specific text.

#### **6. Women's Writing (Honours- CC11):**

##### **After Completion of this Course Students will be able to**

- A. Learn how and on what grounds women's writings can be considered as a separate genre.
- B. Read and understand canonical texts written by Women writers across different ages.
- C. Differentiate between sex and gender.
- D. Be aware about the issues and concerns of the women writers of the developed, developing and under-developed countries.

#### **7. English Communication, English Language Teaching, Soft Skills, Academic Writing and Composition, Creative Writing etc. (Honours- GE1, GE3, AECC1, SEC1, SEC2; General-AECC1, SEC1, SEC2, GE1, SEC3, SEC4):**

##### **After Completion of this Course Students will be able to**

- A. Know the process of beginning and growth of English language
- B. Know about various innovative ways of using English language in verbal and non-verbal communications.
- C. Write clearly, effectively, and creatively, and adjust writing style appropriately to the content, the context, and nature of the subject.
- D. Think about the relation between language and literature

- E. Convey their ideas in English using simple and acceptable English in writing
- F. Understand to recognize and draft different types of writing – e.g. classroom notes, summaries, reports, exploratory and descriptive paragraphs, substantiating etc
- G. Describe a diagram or elaborate information contained in a graph, chart, table etc
- H. Write a review of a book or a movie
- I. Write a report on an academic or cultural event that takes place in a college or university for a journal or a newspaper

#### **8. Modernism and beyond (Honours- CC13):**

##### **After Completion of this Course Students will be able to**

- A. Know about the meaning and scope of the concepts of the Modern/Modernity/Modernism.
- B. Study and interpret representative writings from the 20th and 21st century.
- C. Acquaint themselves with the great tradition of modern European drama
- D. Examine various literary techniques that writers of 20th century use in writing their texts, and demonstrate an understanding of these techniques.
- E. Reflect upon the great upheaval that the world has undergone during 20th century and the constructive role of literary activism/movements in restoring humane values.

#### **9. Post-colonial Literature (Honours- CC14):**

##### **After Completion of this Course Students will be able to**

- A. Know how a literary text, explicitly or allegorically; represents various aspects of colonial oppression.
- B. Question how does a text reveal about the problematic of post-colonial identity.

- C. Learn how a text reveals about the politics and/or psychology of anti-colonialist resistance.
- D. Trace the history of post-colonial movements in India and its textual representations.
- E. Locate and represent subaltern voices through their own writings.

#### **10. American Literature (Honours- CC5):**

##### **After Completion of this Course Students will be able to**

- A. Comprehend the implications and reverberations of the American freedom struggle through the prescribed texts.
- B. Be well-informed about the evolution of American literature and the different cultural backgrounds of the American authors and the themes, and their different writing styles.
- C. Comprehend the unyielding American dream.
- D. Recognize the universality of human experiences reflected in the works produced by Americans.

#### **11. Research Methodology (Honours- DSE6):**

##### **After Completion of this Course Students will be able to**

- A. Comprehend Literary Research against other types of researches and will have learnt to identify and describe the Research Question.
- B. Imbibe the rhetoric styles, language appropriate for research and the knowledge on the mechanics and methodology of writing a literary project.
- C. Acquire training in selecting and defining the appropriate research problem and parameters.
- D. Understand how to organize ideas and format a dissertation.

## **12. Partition Literature (Honours- DSE5, Pass- DSE2):**

### **After Completion of this Course Students will be able to**

- A.** Explain historical and socio-cultural factors responsible for the Partition of Indian Sub-continent.
- B.** Demonstrate critical understanding of manifestations of the experience of the partition in various art forms.
- C.** Link and analyze the eco-socio-historical-cultural contexts and dimensions related to the Partition of India e.g. nation, nationalism, communication, violence, exile, homelessness, refugee, rehabilitation, resettlement, border and border lands (colonialism and post colonialism), literary responses to the partition in different parts of Indian continent and interpret them.
- D.** Interpret texts and experience and relate it to their contexts and experiences

### **Specific outcomes for B.A. English courses include the following:**

**1. Literature, Nation and Tradition:** The current syllabus in the UG level will provide students an opportunity to know India's age old literary and cultural tradition through their exposure to Sanskrit texts and modern Indian vernacular literature in translation. How reading literature in English can be an effective means to address the complex issues of identity, nationalism, historical tradition in Indian context, is a new focus area of the present course.

**2. Awareness about Culture and History:** Students gain an understanding of the relations between culture, history and texts. They learn to use texts as a gateway to various cultural traditions and interpret them in their historical contexts. How a literary text can appear as an ideal platform to locate dominant and marginalized voices of a society, is an important focus of the under-graduate literature programme.

**3. Issue of Sexuality and Gender:** Literature course teaches a student to believe that one's own sense of identity is not enough to persuade the rest of the world to agree. Human beings are no longer bound by such binary concepts as male-female or masculine-feminine. They will learn that sex is a biological concept based on biological characteristics, whereas gender deals with personal, societal and cultural perceptions of sexuality. Appropriation of literary texts as tools of cultural study will help students to challenge centuries of social tradition and scientific belief which promote such and other types of differentiations. Cross Fertilization with allied Arts Students of English Honours should also be able to articulate the relations among culture, history, and texts—for example, ideological and political aspects of representation, economic processes of textual production, dissemination and reception, and cross-fertilization with other arts: architecture, sculpture, music, film, painting, dance, and theatre.

**4. Reading:** Students will gain awareness about the best literary traditions of the world. By learning how others live and handle their lives, one becomes connected with the world in a way we might not otherwise experience. They will discover that they are part of a huge conglomerate of human thought and emotion. All the great texts that a student of English Honours will get chance to study will expand their range of experience. They can gain courage and strength by living vicariously through well-developed characters. Through reading students will have an awareness for various perspectives. This will also expand their range of experience and in the process they will learn to be more empathetic toward the plights of others.

**5. Writing skills and Process:** Students will be able to recognize and comprehend different varieties of English language and develop a writing style of their own. English honours students should be aware also that textual analysis can be extended with profit to political, journalistic, commercial, technical, and web-based writing. It is expected that their exposure to the ideas of variety of writers and their cultural backgrounds, will have a bearing in their own literary styles. With the development of their writing skills and finesse of style there will be a possibility of them emerging as perspective writers, editors, content developers, teachers etc.

**6. Means of Effective Communication:** Study of literature is intertwined with the study of language. Learning various language patterns, sentence structures and dialogue forms can help one in real life in effectively communicating with others. English is the language of science,

computers, diplomacy, and tourism. Knowing English increases students' chances of getting a good job in future.

**7. Gaining of Critical Insight:** An exposure to various social and cultural traditions and through the reading of representative texts from different periods help a student gain a critical insight about the reality as a whole.

**8. Acquisition of Values:** Acquisition of values is needed for individual development and social transformation. English literature course at UG level, like any other literary course, helps a student to gain subjective experience of the text's aesthetic value. This helps in developing quality of thinking and imagination and is a step forward to emerge as a better human being. Through their judgment of the aesthetic value of a literary text students will learn to appreciate whatever is good and beautiful in life. Their healthy mind will thus be storehouse of healthy thoughts.

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**Dumkal College**  
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Department of History  
**Course Outcomes of**  
**History Honours and Program/General Course (B.A.)**  
(Under CBCS System)

**SEMESTER-1**

CORE COURSE-1 (History of early India from remote past to the end of the Vedic polity)

- Students of history honours can achieve knowledge regarding geographical background and sources with approaches to Ancient Indian history.
- They can learn about the pre and proto history of our country.
- They can gather knowledge about the society, culture, religion and political history of ancient India.
- They will learn about trade and urbanization of ancient civilization, like Harappan civilization, Vedic civilizations etc.

CORE COURSE -II: (Social Formations & the Cultural Pattern of the Ancient early Medieval World)

- Students can understand about the evolution of human Society & how the society of agricultural and animal husbandry had begun in Ancient Times.
- They also learn how the human society had transformed from Nomadic to civilized society in ancient history of the World.
- They can acquire knowledge about the ancient Greek and Roman society. They can compare to each and other.

**SEMESTER-II**

CORE COURSE -III : (*Ancient India from the Maurya to Late Gupta Period* )

- Students can learn about the economic transformation of India during this period.
- They can understand the rise of Indian feudalism and evolution of the political structures of early-medieval north and south India. They can get a thorough idea of rise of ancient Indian empire.

### **CORE COURSE –IV:(History of Early Medieval India)**

- They can acquire knowledge towards the society, economy and culture in early medieval India.
- They can gather knowledge towards the Arabs conquest of Northern part of India from this paper.
- They will achieve knowledge about the religious and cultural changing scenarios after the advent of the Islam in India; especially impact bhakti cult and Tantrism. They will gather knowledge how the Sultanate of Delhi had established in 1206.

### **SEMESTER-3**

### **CORE COURSE- V: (The Delhi sultanate in Retrospect)**

- They will learn towards the emergence of provincial dynasties & Consolidation of regional identities like, Bahamani, Vijayanagar and Bengal.
- They also acquire the knowledge about the Changing scenarios of the urban and rural societies after consolidation of the rule of the Sultanate of Delhi.
- They can learn about the activities of Delhi Sultanate i.e., revenue systems monetization, market regulations, growth of urban centers, trade and commerce, Indian Ocean trade etc.
- Students can get the idea of religious syncretism; rise of Sufi and Bhakti and their impact on Indian society.

### **CORE COURSE- VI (Rise of the Modern West)**

- Students of history will learn about the rise of the modern west world and transition the society and economy from feudalism to capitalism.
- They will learn how to rise of Renaissance in Italy and spread of humanism in Europe and results of the European Reformation in the 16th century and Shift of economic balance from the Mediterranean to the Atlantic, Commercial Revolution, Influx of American silver and the Price Revolution.
- They gathered knowledge towards the emergence of European state system like Spain, France, and England etc.

### **CORE COURSE- VII: (Europe in Transition)**

- History students will learn about the European crisis of economic, social and political dimensions as well as the English Revolution, major issues like political and intellectual currents in 17th century.
- They will also learn about the rise of modern science in relation to European society by the Renaissance and the European politics in the 18th century like parliamentary monarchy, patterns of Absolutism in Europe and prelude to the Industrial Revolution in England and other European countries.

### **SEMESTER-4**

### **CORE COURSE- VIII: (History of Mughal India)**

- Students will learn about the Mughal Indian society, economy and culture after consolidation of the Mughal rule India.
- They also learn different aspects of Mughal Historiography. The state making procedure of Mughal India from Akbar to Aurangzeb.

### **CORE COURSE- IX: (History of Late Medieval India)**

- They will learn from this course about the consolidation and expansion of the Mughal empire and how far it has changed its character during the reign of Aurangzeb.
- They can understand the roots of the fall of Mughal empire as well. They will square knowledge on visual culture of this time.
- At the end of this course, they will understand the features of 18th century India.

### **CORE COURSE- X: (Rise of the Modern Europe)**

- The students will learn about the modern world historians thought and their ideas.
- They will learn about the French Revolution and its impact of European countries. Unity and power makes people to strength which has showed in

the French revolution in 1789.

- How the Industrialization had occurred and it's affected on socio economic transformation of Europe.
- They will know about the politics of super power among the European countries. How the sense regarding the nationalism and unification had developed among the European countries.

## SEMESTER 5

CORE COURSE- XI: (History of the Modern India from the beginning of colonial rule to the Great Revolt)

- Students of history will learn in the course of time how to rise of the Company's absolute power in India.
- They can understand about the colonial nature of state during 200 years rule of the British power in this land.
- They can gather knowledge about how the Indian society, politics,
  - **religion and economy had changed during the Company's rule in India.**
- They will understand how the company's economic exploitation made Indian revolutionary against the British rule. That ultimately paved the background of the Great Revolt of 1857.

**CORE COURSE- XII: (History of Modern India from Renaissance to Independence)**

- Students can acquire vast knowledge on local rebellion and movements like the Indigo rebellion, the Deccan Riots, the growth of the new middleclass; the age of associations, the Aligarh movement, the Arya and the Prarthana Samaj aftermath of 1857.
- They will learn the real historiography of Indian Nationalism; Birth of Indian National Congress, The Moderates and the Extremists, Partition of Bengal ,the Swadeshi movement in Bengal in 1905.
- They can acquire knowledge how to rise of Gandhis power in Indian politics and his activities towards the freedom like, Rowlatt Satyagraha, Khilafat and Non-co-operation movement, The Swarajya party, Poona Pact, Civil Disobedience Movement, Quit India Movement.

- They also learn how to raise communal politics and opposition politics on the eve of the freedom movement in India and aftermath of partition in India.

## SEMESTER -6

### **CORE COURSE- XIII: (Modern Europe: *From Nationalism to socialism*)**

- Bismarck and his diplomacy, system of alliances, 1917 Russian Revolution, Fascism, Nazism and the origin of World War II all these important issues are incorporated in this paper.
- European countries on eve of the 2nd world war. Students can understand about the rise of imperialism and how far German imperialism was responsible for the first and Second World War.
- They will know about the Bolshevik revolution and the politics between two worlds.

### **CORE COURSE- XIV: (*Trends in World Politics from the First to the Second World War*)**

- Students will gather knowledge about the impact of the Second World War on the International System like Cold War, emergence of third world, non-alignment, bipolar world through this paper.
- The system of military and economic alliances, decline of European Imperialism, decolonization has been explained in this paper.

## **Discipline Specific Elective (DSE)**

### **SEMESTER-5**

#### **Course -1 (History of China from tradition to revolution)**

- Students will learn about the nature and structure of the traditional Chinese society and how to transform the Chinese society from traditional to modern cultures.

- They can also learn about how the strong countries of the World were captured the Chinese society, culture and economy during the nineteenth century.
- They will be aware how the Chinese were united towards the foreign colonial powers and defeated them and ultimately gain to freedom.

### **Course-2 (History of Japan from Meiji Restoration to the Second World War)**

- This course will make the student of history aware about the transformation of feudal society and rise of capitalism in Japan.
- They will know the process through which Japan emerged as a Fascist power.
- Students learn about Japan- Meiji Restoration, Meiji constitution, Sino-Japanese war, Anglo-Japanese war, Russo-Japanese war, Manchurian crisis etc.

### **Course-3 ( Issues of the Contemporary World)**

- Students will know about the impact of the Second World War on the International System like Cold War, glasnost- perestroika , collapse of Soviet Union, Emergence of Third world, non-alignment movement, bipolar world to unipolarism, oil politics, nuclear diplomacy Globalization through this paper.

## **SEMESTER-6**

### **Course-1 (History of Bangladesh from Liberation to the Present day)**

- Through this course students will learn more about the country and its struggle for freedom.
- It will also provide students with a glimpse of the geographical and environmental aspects of Bangladesh.
- The course will also dwell upon the various developments and heroic efforts of the political and student leaders proceeding independence and finally on the valiant efforts on the freedom fighters of the liberation war of 1971.

### **Course -2 (History of Africa)**

- The course aims to provide students with a broad foundation for in-depth study of particular themes and regions in the history of Africa.
- The students will learn about the political, social and cultural history of Africa, An appreciation of the nature and impact of the key forces shaping the continent's history.

### Course -3(History of Women in Modern India)

- In this Course students should be able to explain different socio religious movements in pre-colonial India, feminism in Indian context.
- They will also know about the women's question in 19<sup>th</sup> century India, debates on Sati and Prudah , women in the freedom movement in India.They will demonstrate women in Indian literature and art.

## Skill Enhancement Course (SEC)Semester-3

### **Course-1 (Understanding Heritage, Art and Architecture of India)**

- Students to understand the different facts of heritage and their significance.
- They also understand about the legal and institutional frameworks for heritage protection in India as the challenges facing it.
- They can examine towards the implications of the rapidly changing interface between heritage and history. They will gather knowledge about the heritage through project and visit to Museum and Archives.

### **Semester-4**

#### **Course -2 ( The Bengal Music)**

- Students will learn the musicological terms and historical context in Indian Music. Students will also learn different genre in Hindustani music other than kheyal.
- The students will come to know about the influence of the Ramprasadisur an Tappa style on Rabindra sangeet as well as Bengali song.
- They will know the origin and development of Modern Bengali Song.

## **GENERIC ELECTIVE (GE)**

### **SEM-1 (Human rights in India)**

- After studying the course the students should be able to understand the historical growth of the ideas of human rights.
- Demonstrate the international context of human rights. Reflectively evaluate the effectiveness of human rights practice on local, national or international humanitarian efforts.

### **SEM-2 (HISTORY OF MEDIEVAL INDIA)**

- They will learn how the foundation, expansion and consolidation of the Delhi Sultanate had established and ruled under five dynastic i.e. Ilbari Turkey's, Khaljis, Tughlaqs, Syed and Lodhi for a long time.
- They also learn about the nature of the state, nobility and under the Ulemas during Sultan and Mughal rule in medieval India.
- After the down fall of the Delhi Sultanate how the Mughal dynasty had come to power in India and had ruled up to 1707.
- They can acquire knowledge towards the polity, economy, Religion, Art, Architecture and Society during Mughal rule in India.

### **SEM-3 ( HISTORY OF MODERN INDIA TILL INDEPENDENCE)**

- Students can understand about the colonial nature of state during 200years rule of the British power in this land.
- They can gather knowledge about how the Indian society, politics, **religion and economy had changed during the Company's rule in India.**
- They will aware about in which situation the Indian Nationalism had raised among the Indian people for freedom.
- Students will acquire knowledge about the freedom struggle and partition of India and aftermath.

### **SEM-4 (HISTORY OF EUROPE FORM 15<sup>TH</sup> TO 20<sup>TH</sup> CENTURY)**

- From this paper students will learn about decline of feudalism and rise of modern era, renaissance, reformation, rise of absolutist state, glorious movements, Germany and Italian unification, 1st World War, peace settlement and 2nd World War etc.

## **GENERAL COURSE / PROGRAMME COURSE**

### **CORE COURSE-1 (History of india from the earliest times to medieval period)**

- As a history student will learn from this paper about the status of the society and culture of the Paleolithic, Mesolithic, Neolithic, Harappa and Bronze ages in ancient India.
- They will learn how to interpret of the historical sources of ancient India.
- They can acquire knowledge about the Vedic and later-Vedic Period of India and gather knowledge how to rise of Jainism and Buddhism religion and culture in ancient India.
- As well as conception will gather among them, how to rise of Magadha Empire from other sixteen Janapadas. They will realize about the religion and messages from Ashoke, the great Maurya Emperor from this paper.
- They will learn how to rise & Growth of the Gupta's Empire in ancient India and to raise regional Kingdoms in different parts of India after downfall of the Empire.
- They can acquire knowledge towards the society, economy and culture in early medieval India.
- They can gather knowledge towards the Arabs conquest of Northern part of India from this paper. They can understand how the land of India becomes handed over to the foreign powers gradually from the ancient times to medieval.

### **CORE COURSE -2 (HISTORY OF MEDIEVAL INDIA)**

- They will learn how the foundation, expansion and consolidation of the Delhi Sultanate had established and ruled under five dynastic i.e. Ilbari Turkey's, Khaljis, Tughlaqs, Syed and Lodhi for a long time.
- They also learn about the nature of the state, nobility and under the Ulemas during Sultan and Mughal rule in medieval India.
- After the down fall of the Delhi Sultanate how the Mughal dynasty had come to power in India and had ruled up to 1707.
- They can acquire knowledge towards the polity, economy, Religion, Art, Architecture and Society during Mughal rule in India.

### **CORE COURSE -3 ( HISTORY OF MODERN INDIA TILL INDEPENDENCE)**

- Students can understand about the colonial nature of state during 200 years rule of the British power in this land.
- They can gather knowledge about how the Indian society, politics,
  - **religion and economy had changed during the Company's rule in India.**
- They will be aware about in which situation the Indian Nationalism had raised among the Indian people for freedom.
- Students will gather knowledge about nationalism, genesis of congress, moderates, extremists,
- Gandhi and his movements, Subhas Chandra Basu and his INA, Princely states, integration of the Indian States, making of constitution and foreign policy.
- Students will acquire knowledge about the freedom struggle and partition of India and aftermath.

### **CORE COURSE -4 (HISTORY OF EUROPE FROM 15<sup>TH</sup> TO 20<sup>TH</sup> CENTURY)**

- From this paper students will learn about decline of feudalism and rise of modern era, renaissance, reformation, rise of absolutist state, glorious movements, Germany and Italian unification, 1st World War, peace settlement and 2nd World War etc.
- .....

**Dumkal College**  
Dumkal, Murshidabad  
(Affiliated to the University of Kalyani)  
**Department of Political Science**  
**Course Outcomes of**  
**Political Science Honours and Program/General Course (BA)**  
(under CBCS System)

**POLITICAL SCIENCE (HONOURS)**

**SEMESTER-I**

**The following topics will be discussed as part of the course (CC-1).**

**Unit 1:** What is Politics? Meaning of Political.

**Unit 2:** Key concepts I: State; Nation; Sovereignty (evolution); Power and Authority--- types and linkages;

**Unit 3:** Key concepts II: Law. Liberty, Equality—Their interrelationships.

**Unit 4:** Key concepts III: Rights; Justice (with special reference to Rawls); Freedom.

**Unit 5:** Key concepts IV: Democracy (with special reference to David Held); Authoritarianism.

**Unit 6:** Key concepts V: Citizenship.

After Completion of this Course, Students will be able to

1. Analyze certain key aspects of conceptual analysis in political theory.
2. Develop the skills required to understand and assess the critical concepts in Political Theory.

**The following topics will be discussed as part of the course (CC-2).**

**Unit 1:** Approaches I: Normative; Legal-Institutional; Empirical-Behavioral--- Systems Analysis; Structural -Functionalism.

**Unit 2:** Approaches II: Liberalism; Social Welfarism; Neo-Liberalism.

**Unit 3:** Approaches III: Postcolonial; Feminist.

**Unit 4:** Marxian approach--- Dialectical Materialism and Historical Materialism.

**Unit 5:** Key ideas: State (focus on Relative Autonomy); Class and Class Struggle; Surplus Value; Alienation.

**Unit 6:** Party--- Democratic Centralism; Lenin-Rosa Luxemburg debate; Revolution--- Lenin and Mao. Hegemony and Civil Society: Gramsci.

After Completion of this Course, Students will be able to.

1. Understand the contemporary approaches to the study of politics.
2. Develop critical and reflective analysis and interpretation of social practices.
3. Assess the critical and contemporary debates in Political Theory.

### **Semester-II**

**The following topics will be discussed as part of the course (CC-3).**

**Unit 1.** Approaches to the Study of Indian Politics – Marxist and Liberal- Indian Political Culture ,Various Interpretations.

**Unit2.** The Indian Party System – Main Features- Major National Political Parties – Major Regional Political Parties- From the Congress System to Multi-Party Coalitions.

**Unit 3.** Identity Politics and Social Cleavages in India- Role of Caste, Class, and Religion in politics.

**Unit 4.** Electoral Politics in India: The Election Commission- Electoral Reforms in India – Voting Behaviors in India- Its major determinants- Defection Politics in India – Crime and Politics in India.

**Unit 5. Nation Building in India – Major Challenges - Regionalism in India- Main Components Regionalism versus Nationalism Debate- Major Regional movements in India – Gorkhaland and Bodoland movement.**

After Completion of this Course, Students will be able to.

1. Develop a basic understanding of the Indian party system and electoral politics.
2. Identify the major challenges to the process of Nation-building in India.
3. It also familiarizes students with the working of the Indian state, paying attention to the contradictory dynamics of modern state power.

**The following topics will be discussed as part of the course (CC-4).**

**Unit 1: Framing of the Indian Constitution: Role of the Constituent Assembly, the Preamble and Philosophy of Indian Constitution.**

**Unit 2: Rights and Duties: Fundamental Rights and Duties, Directive Principles of State Policy.**

**Unit 3: Federalism and Decentralization in India: Nature of Indian Federalism: Union-State Relations – Nature and Evolving Trends of Federalism in India, 5th and 6th Schedules, Panchayati Raj and Municipalities.**

**Unit 4: Union Executive: President and Vice President. Prime Minister and Council of Ministers, Relationship between President and Prime Minister**

**Unit 5: Union Legislature: Rajya Sabha and Lok Sabha: Composition and Functions, Speaker.**

**Unit 6: The Judiciary: Supreme Court and High Courts – Composition and Functions, Judicial Activism & Public Interest Litigation (PIL).**

After Completion of this Course, Students will be able to.

1. Develop a basic understanding of the structure of the Indian Constitution.
2. Understand the nature of federalism in India.
3. Get an idea about the Fundamental rights of the Indian citizens and the role that the Indian judiciary plays in protecting and upholding these rights.

### SEMESTER-III

**The following topics will be discussed as part of the course (CC-5):**

**Unit 1:** Ancient Indian Political ideas: overview, Ideas on Brahmanic and Shramanic traditions.

**Unit 2:** Shantiparva with special reference to Rajdharma.

**Unit 3:** Buddhist political thought: Kingship and the relations between politics and Ethics.

**Unit 4:** Kautilya's Political Thought: Saptanga Theory of State –Mandala Theory and Diplomacy.

**Unit 5:** Medieval Political Thought in India: A broad outline- Zia Barani: Good Sultan and Ideal Polity. Principle of Syncretism.

**Unit 6:** Abul Fazl: Governance and Administration, Kabir: Syncretism.

After completion of the course the learners will be able to:

1. Understand the key concepts of ancient Indian political thought.
2. Identify the key concerns of medieval Indian political thinkers.

**The following topics will be discussed as part of the course (CC-6).**

**Unit 1:** Rammohan Roy– Views on rule of law, Rights, freedom of thought, and social justice.

**Unit 2:** Vivekananda: Views on Cultural nationalism, Society and Education.

**Unit 3:** Syed Ahmed Khan and Iqbal: views on colonialism and nationalism.

**Unit 4:** Rabindranath Tagore: Critique of Nationalism and his views on Internationalism.

**Unit 5:** M.N.Roy: Views on National and Colonial Questions and Radical Humanism.

**Unit 6:** B.R. Ambedkar: Views on social justice and Constitutionalism.

**Unit 7:** Pandita Ramabai: Her views on Gender & Social Justice.

**Unit 8:** Pt. Nehru: Views on Socialism

**Unit 9:** Ram Manohar Lohia: Views on Socialism.

After Completion of this Course, Students will be able to.

1. Understand the key concerns of major political thinkers of modern India.

**The following topics will be discussed as part of the course (CC-7).**

**Unit 1:** International Relations: outline of its evolution as academic discipline – What is International Relations Theory?

**Unit 2:** The Great Debates in the discipline of International Relations: First, Second and Third.

**Unit 3:** Mainstream International Relations Theories: (a) Classical Realism and Neo-Realism

(b) Liberalism and Neo-Liberalism (c) Marxian - Dependency & World Systems theory (d) Feminist Approach

(e) Eurocentrism and Perspectives from the Global South.

**Unit 4:** National Power- Definition, Elements,

and Limitation – Balance of Power- Devices of maintaining Balance of Power- Collective Security.

**Unit 5:** Foreign Policy- Objectives – Instruments of foreign policy- Diplomacy, Propaganda and Foreign Aid.

After Completion of this Course, Students will be able to.

1. Understand the major approaches to the study of International Relations.
2. Comprehend the main theories in International Relations
3. Develop an idea about some major concepts of International Relations.

## Skill Enhancement Course:

### **POL-H-SEC-T-1(A): Legislative Practices and Procedures**

The following topics will be discussed as part of the course:

**Unit 1:** Powers and functions of people's representative at different tiers of governance:

Members of Parliament, State Legislative Assemblies - functionalities of rural and urban local governance.

**Unit 2:** Legislative Process - How a Bill becomes a Law, Role of the Standing Committee in reviewing a Bill, Legislative Consultations, amendments to a Bill, the framing of Rules and Regulations.

**Unit 3:** Legislative Committees: Types and role – Types of committees, Role of committees in reviewing government finances, policy, programmes, and legislation.

**Unit 4 :** Budget Document : Overview of Budget Process, Role of Parliament in reviewing the Union Budget, Railway Budget, Examination of Demands for Grants of Ministries, Working of Ministries.

**Unit 5:** Media monitoring and communication: Types of media and their significance for

legislators. Basics of communication in print and electronic media

After completing the course, the learners will be able to:

1. To Identify the legislative process in India at various levels,
2. To understand the basic requirements of peoples' representatives in policy-making process.
3. To understand the basic skills required for understanding the political process.

## **Semester: IV**

The following topics will be discussed as part of the course (CC-8).

**Unit 1:** Public Administration: Definition, Nature and Scope; Difference between Private and Public Administration; Evolution of the Discipline of Public Administration.

**Unit 2:** Classical Theories of Administration: Classical Theory, (Fayol, Urwick and Gulick) Scientific Management Theory, (F.W.Taylor) Bureaucratic Theory, (Max Weber).

**Unit 3:** Neo-Classical Theories of Administration: Elton Mayo and Human Relations Theory; Decision-making with special reference to H.Simon,

**Unit 4:** Contemporary Theories of Administration: Ecological Approach of Fred Riggs; Innovation and Entrepreneurship of Peter Drucker.

**Unit 5:** Public Policy: Concept and Relevance – Approaches to the Study of Public Policy; Public Policy Formulation, Implementation, and Evaluation.

**Unit 6:** Major Approaches in Public Administration:

New Public Administration, New Public Management, New Public Service Approach, and Good Governance.

After Completion of this Course, Students will be able to.

1. Understand the nature of public administration and distinguish it from private administration.
2. Trace the evolution of public administration as an academic discipline.
3. Develop an understanding of the major concept & theories of public administration.

**The following topics will be discussed as part of the course (CC-9)**

**Unit 1:** Evolution of Indian Administration – Ancient-Medieval and Modern period: brief historical overview -Continuity and change in Indian administration.

**Unit 2:** Civil Service in India (Bureaucracy): Recruitment & training- Role of UPSC and SPSC Minister - Civil Servant Relationship - Generalists and Specialists Debate.

**Unit 3:** Social Welfare Policies in India: Concept and Approaches of Social Welfare – Social Welfare Policies – a) Education: Right to Education, b) Health: National Health Mission, c) Food: Right to Food Security and d) Employment: MNREGA.

**Unit 4:** Citizen and Administration: Concept of Accountability- Major forms of administrative accountability- Legislative- Executive & Judicial- Citizen’s Charter- Right to Information Act, 2005, E-Governance.

**Unit 5:** Financial Administration and Budget: Concept and Significance of Budget – Budget Cycles in India- Various Approaches and Types of Budget - Public Accounts Committee, Estimates Committee – the role of CAG.

**After Completion of this Course, Students will be able to.**

1. Trace the evolution of the Indian administrative system.
2. Understand the maladies in the Indian civil service and identify the major reforms made.
3. Identify the major issues affecting the Indian administrative system in the contemporary period.

**The following topics will be discussed as part of the course (CC-10).**

**Unit 1:** Contemporary Global Issues I: Proliferation of nuclear weapons- Arms race, arms control and Disarmament Policy: PTBT, NPT, and CTBT; Ecological Issues – Historical Overview of International Environmental Agreements – Climate Change- Global Commons Debate.

**Unit 2:** Contemporary Global Issues II: Understanding Globalization and Its alternative Perspectives – Debates on Sovereignty and Territoriality – Cultural and Technological Dimensions of Globalization; Political Economy of International Relations: New International Economic Order- North-South Dialogue- South-South Cooperation- World Bank- IMF- WTOTNCs- Global trade & Finance- Neo-Colonialism and Dependency.

**Unit 3:** Contemporary Global Issues III: Terrorism & International System: Conceptual Framework – Challenges to Global Security – Post 9/11 Developments - Counter Terrorist Strategies and War on Terror; Human Rights: The politics of human rights promotion – UN and Human Rights- Human Security-Migration.

**Unit 4:** Cold War and its evolution: Different Phases- Collapse of USSR and End of Cold War Emergence of Third World: NAM; Pan Africanism. Post-Cold War Developments: overview. West Asia and the Palestine question.

**Unit 5:** Europe in transition: European Union, Brexit (overview).

**Unit 6:** Major regional organizations: ASEAN, OPEC, SAFTA, SAARC and BRICS.

After Completion of this Course, Students will be able to.

1. Understand the major issues influencing international politics.
2. Identify the major regional organizations and their policies.

### **Skill Enhancement Course**

#### **POL-H-SEC-T-2(A): Public Opinion and Survey Research:**

The following topics will be discussed as part of the course:

**Unit 1:** Definition and characteristics of public opinion, conceptions and characteristics, debates about its role in a democratic political system uses for an opinion poll.

**Unit 2:** Measuring Public Opinion: What is sampling? Why do we need to sample? Sample design, Methods and Types of Sampling- Non-Random Sampling (Quota, Purposive and Snowball sampling) – Random Sampling (Simple and Stratified)), Sampling error, and non-response.

**Unit 3:** Interviewing: Interview techniques pitfalls, different types of and forms of interview **Unit 4:** Questionnaire: Question-wording; fairness and clarity

**Unit 5:** Quantitative Data Analysis: Introduction to quantitative data analysis, Basic concepts: correlation research, causation and prediction, descriptive and inferential Statistics.

**Unit 6: Prediction in polling research: possibilities and pitfalls, Politics of Interpreting Polls**

After completing the course, the learners will be able to:

1. Identify the debates, principles, and practices of public opinion polling in the context of democracies with special reference to India.
2. Understand how to conceptualize and measure public opinion using quantitative methods, with particular attention being paid to developing basic skills pertaining to the collection, analysis and utilization of quantitative data.

**Skill Enhancement Course**

**POL-H-SEC-T-2(B): Peace and Conflict Resolution:**

**The following topics will be discussed as part of the course:**

**Unit 1:** Understanding Conflict and Conflict Management, Conflict Resolution and Conflict Transformation- Peace Building.

**Unit 2:** Dimensions of Conflict: Ideological, Economic (Resource Sharing) and Socio-Cultural (Ethnicity, Religion and Gender).

**Unit 3:** Nature of Local, Sub-national and International Conflicts.

**Unit 4:** Techniques of Conflict Resolution: Negotiations – Trust building; Mediation: Skill Building and Active Listening; Track- I, II & and Multi Track Diplomacy; Gandhian Methods.

After completing the course, the learners will be able to:

1. Help build an understanding of a variety of conflict situations.
2. Understand the various dimensions of Conflict.
3. Identify the Gandhian Techniques of Peace-Building.
4. Develop ideas on Conflict Responses.

## Semester: V

**The following topics will be discussed as part of the course (CC-11).**

**Unit 1:** Background of Western Political Thought: A Brief Outline with special reference to Stoics and Sophists of ancient Greece.

**Unit 2:** Plato – Philosophy and Politics- Theory of Forms, Justice, Philosopher King/Queen, Communism- Women and Guardianship- Critique of Democracy - Censorship.

**Unit 3:** Aristotle – Theory of State – Classification of Governments- Man as a Zoon Politikon - Justice Citizenship.

**Unit 4:** Medieval Theological Thought: Basic Features, Conflict between Church and State- Contribution of St. Augustine, St. Thomas Aquinas, and Marsiglio of Padua.

**Unit 5:** Machiavelli: Virtue & Vice – Morality and Statecraft – Religion- Republicanism.

After Completion of this Course, Students will be able to.

1. Have insightful knowledge about ancient and medieval western political thought.
2. Understand the key ideas of western political thinkers of the ancient and medieval periods.

**The following topics will be discussed as part of the course (CC-12).**

**Unit 1:** Thomas Hobbes – Materialism, Human Nature & Sovereignty- John Locke – Natural Rights and Property- JJ Rousseau – Concept of General Will, Local or Direct Democracy, Origin of Inequality.

**Unit 2:** Immanuel Kant – Enlightenment and Moral Freedom - Hegel – Dialectics, Civil Society and State.

**Unit 3:** J.S. Mill- Liberty, Suffrage, Subjection of Women, right of minorities, utility principles.

**Unit 4:** Mary Wollstonecraft: Women and Paternalism- Critique on Rousseau's idea on education- legal rights.

**Unit 5:** Alexandra Kollontai: Winged and Wingless Eros, Proletarian women, Socialization of housework, disagreement with Lenin.

After Completion of this Course, Students will be able to.

1. Have insightful knowledge about the western political thought of modern times.
2. Understand the key ideas of western political thinkers of the modern period.

### **Discipline-Specific Elective Course**

**POL-H-DSE-T-1(A): Citizenship in a Globalizing World:**

**The following topics will be discussed as part of the course (CC-12)**

**Unit 1:** Classical conceptions of citizenship

**Unit 2:** The Evolution of Citizenship and the Modern State

**Unit 3:** Citizenship and Diversity

**Unit 4:** Citizenship beyond the Nation-state: Globalization and global justice

**Unit 5:** The idea of cosmopolitan citizenship

After the end of this course, learners will be able to After end of this course learner will be able to:

1. Understand the theories of citizenship and the historical development of the concept.
2. Develop an idea about citizenship as a practice in an increasingly globalizing world.

## **Discipline-Specific Elective Course**

### **POL-H-DSE-T-1(B): Public Policy in India**

**The following topics will be discussed as part of the course:**

**Unit 1:** Public Policy: Meaning, Scope, and Importance – The emergence of Policy Sciences.

**Unit 2:** Models of Policy Decision-Making.

**Unit 3:** Policymaking in India - Nehruvian Vision- – Pre and Post-Liberalization period in India – Determinants of Public Policy in India.

**Unit 4:** Major Public Policies in India: a) Public Health; b) Education and c) Environment.

**Unit 5:** Constraints and Challenges to Public Policy implementation in India: Economic, Political and Socio-Cultural.

After the end of this course learners will be able to:

1. Be familiar with different public policies in India.
2. Understand various theories and methods of understanding public policy and governance
3. Identify the different challenges to governance which has hampered effective
4. implementation of public policies.

## **Discipline-Specific Elective Course**

### **POL-H-DSE-T-2(A): Development Process and Social Movements in Contemporary India**

**The following topics will be discussed as part of the course:**

**Unit 1:** Development Process in India since Independence: State and planning – Liberalization and reforms.

**Unit 2:** Industrial Development Strategy and its Impact on the Social Structure: Mixed economy, privatization, the impact on organized and unorganized labor - Emergence of the new Indian middle class.

**Unit 3:** Agrarian Development Strategy and its Impact on the Social Structure: Land Reforms, Green Revolution, Agrarian crisis since the 1990s and its impact on farmers.

**Unit 4:** Social Movements in India: Tribal, Peasant, Dalit and Women's movements - Maoist challenge - Civil rights movements in India.

After the end of this course learners will be able to:

1. To understand the development process in India since its Independence.
2. Understand a variety of protest movements in the context of development in India.
3. To analyze the conditions, contexts and forms of political contestation over development paradigms.

### **Discipline-Specific Elective Course**

#### **POL-H-DSE-T-2(B): Human Rights in a Comparative Perspective:**

The following topics will be discussed as part of the course:

**Unit 1:** Understanding Human Rights: Three Generations of Rights - Institutionalization: Universal Declaration of Human Rights –

**Unit 2:** Human Rights in National Constitutions: South Africa and India.

**Unit 3:** Human Rights Issues in Comparative Perspective: 1. Torture: USA and India; 2. Surveillance and Censorship: China and India; 3. Terrorism and Insecurity of Minorities: USA and India.

**Unit 4:** Violation of Human Rights in Comparative Perspective: 1. Caste and Race: South Africa and India; 2. Gender and Violence: India and Pakistan; 3. Adivasis/Aboriginals and the Land Question: Australia and India.

After completion of the course the learners will be able to –

1. Develop an understanding of Human Rights from a comparative perspective.

## SEMESTER-VI

### **POL-H-CC-T-13: Introducing Political Sociology Core Course:**

The following topics will be discussed as part of the course:

**Unit 1:** Nature, scope, and the emergence of Political Sociology – Sociology of politics and political sociology-Theoretical Approaches to the study of Political Sociology.

**Unit 2:** Social Stratification and Politics: Caste, class, and elite.

**Unit 3:** Power, Influence, and Authority.

**Unit 4:** Political Culture: Meaning, nature, and types.

**Unit 5:** Political Socialization: Meaning and agencies.

**Unit 6:** Political Development and Political Modernization

After completion of the course the learners will be able to:

1. Understand the nature and scope of Political Sociology
2. Understand the concept of Social Stratification and the role of caste, class, and elite in politics.
3. Comprehend the concepts of Power, authority, and Influence and their inter-relationships.
4. Understand the meaning, nature and type of Political Culture
5. Identify the process of political socialization

## Core Course

### **POL-H-CC-T-14: Comparative Government & Politics:**

Course Objectives:

The following topics will be discussed as part of the course:

**Unit 1:** The Nature and Scope of Comparative Government - Distinction between Comparative Politics and Comparative Government- Going beyond Eurocentrism.

**Unit 2:** Major approaches to the study of comparative politics Institutional approach (dominant schools: Systems approach and Structural Functional

approach)- limitations; New Institutionalism, Political Economy--- origin, and key features.

**Unit 3:** Colonialism and Decolonization: Meaning, context, forms – anti-colonial struggles and process of decolonization.

**Unit 4:** Socialism: Meaning, growth, and Development.

**Unit 5:** Comparative study of the Constitutional Developments and Political Economy of Britain, Brazil, Nigeria, and China.

After completion of the course the learner will be able to:

1. Identify the difference between Comparative Politics and Comparative Government.
2. Identify the different types of Constitutional Systems.
3. Gain knowledge about the basic features of the constitution in UK, USA and PRC.

### **Discipline-Specific Elective Course**

**POL-H-DSE-T-3(A): Understanding South Asia.:**

**The following topics will be discussed as part of the course:**

**Unit 1:** South Asia as a region: Historical and Colonial Legacies - Geopolitical dimensions.

**Unit 2:** Politics and Governance: a) Regime Types: Democracy, authoritarianism, monarchy; b) Emerging Constitutional practices: Federal experiments in Pakistan, constitutional debate in Nepal and Bhutan; devolution debate in Sri Lanka.

**Unit 3:** Socio-Economic Issues: Identity politics and economic deprivation: Challenges and Impact (case studies of Pakistan, Bangladesh, Nepal, Sri Lanka)

**Unit 4:** Regional Issues and Challenges: a) SAARC: problem and prospects; b) Terrorism, c) Migration.

**After completion of the course the learner will be able to:**

1. Understand the Geopolitics of South Asia as a region.
2. Understand the nature of state systems in various countries of South Asia.
3. Understand the process of regional integration in South Asia.
4. Identify the major environmental issues in South Asia.

### **Discipline-Specific Elective Course**

#### **POL-H-DSE-T-3(B): India's Foreign Policy in a Globalizing World:**

The following topics will be discussed as part of the course:

**Unit 1:** India's Foreign Policy: From a Postcolonial State to an Aspiring Global Power

**Unit 2:** India's Relations with the USA and USSR/Russia

**Unit 3:** India's Engagements with China

**Unit 4:** India in South Asia: Debating Regional Strategies

**Unit 5:** India's Negotiating Style and Strategies: Trade, Environment, Energy and Security Regimes.

After completing the course, the students will be able to-

1. Have an insightful understanding of India's foreign policy preferences in the globalizing World.
2. Identify the pattern of India's engagements with global powers.

#### **POL-H-DSE-T- 4 (A): Dilemmas in Politics Discipline Specific Elective Course:**

The following topics will be discussed as part of the course:

**Unit 1:** The Moral Economy of Violence

**Unit 2:** The Politics of Exclusion

**Unit 3:** Debates on Human Rights

**Unit 4:** Ecology and Political Responsibility

**Unit 5:** Capabilities and the Politics of Empowerment

**Unit 6:** Global Justice and Cosmopolitanism

**Unit 7:** Feminism and the Politics of Interpretation

**Unit 8:** Legitimacy of Humanitarian Intervention

After completion of the course the learners will be able to:

1. Explore, analyze and evaluate some of the central issues, values and debates in the contemporary world.

**Discipline-Specific Elective Course:**

**POL-H-DSE-T-4(B): Dissertation**

After completion of the course the learners will be able to:

1. Apply the knowledge gained through different courses in the practical field.
2. Solve problems related to his course of study.
3. Document, calculate, analyze and interpret data.
4. Deduce findings from different studies
5. Write and report in standard academic formats.

Following guidelines should be followed by the students for completion of this course.

1. The students undertaking this course shall be allotted a supervisor/mentor/guide at the beginning of the semester.
2. The student shall select a topic for the dissertation from any field of Political Science taking help from the supervisor/mentor/guide.
3. The work completed within the stipulated time and written in standard academic format shall be submitted at the end of the semester.
4. The work shall be evaluated on the basis of the written document submitted by the student and a viva-voce conducted on the same.

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**Dumkal College**  
Dumkal, Murshidabad  
(Affiliated to the University of Kalyani)  
Department of Philosophy  
**Course Outcomes of**  
**Philosophy Honours and Program/General Course (B.A.)**  
(under CBCS System)

**1. Outline of Indian Philosophy (Honours- CC1, CC3,GE1,GE3, PROGRAMME.- G-CC1,G-DSE1A, G-SEC4) :**

**After successfully Completion of this Course Students will be able to :**

- Students will gain detailed knowledge about the Outline of Indian Philosophy and the different schools of Indian thought like Cārvāka, Jainism and Buddhism as Nāstika schools on the other hand, Sāṃkhya, Yoga, Nyāya, Vaiśeṣika, Mimāṃsā and Vedānta as Āstika school.
- The aim of this course is to improve the Upanisadic ideas among the students.
- Students will be able to realize that there is something beyond the logical world.

**2. Outline of Western Philosophy (Honours- CC2, CC4, PROGRAMME.- G-CC3):**

**After successfully Completion of this Course Students will be able to:**

- Students will be acquainted with the historical development of western philosophy.
- They will become acquainted with Pre-Socratic Philosophers theories of Knowledge and that of metaphysics of Plato and Aristotle.
- The Outline of Western Philosophy consists of the epistemological and metaphysical perspectives of the philosophers like Socrates, Plato, Descartes, Spinoza, Leibnitz, Lock, Berkeley, Hume and Kant.
- Students will be acquainted with the concept of rationalism.

**3. Indian Ethics (Honours- CC5):**

**After successfully Completion of this Course Students will be able to :**

- Ethics is a study of moral issues in the fields of individual and collective interaction.
- The study of Ethics helps a student to gain the ability so that they can make themselves to

become a proper social being.

- Students can be familiar with ethical values such as right and wrong, virtue or vice, good or bad.
- Students get acquainted with Indian moral concepts like Dharma, Adharma, Liberation, Purusarthas and their inter-relations, Niskama and Sakama karma.
- Students will develop critical understanding about Indian Ethics. Indian Ethics consists of Ethics of Gita like Concepts of Karmayoga, Buddhist Ethics like Pancasila, Brahmaviharabhavna, Jaina Ethics like anubrata, mahabrata and also Mimamsa Ethics like nitty, naimittika karma and kamy karma.

#### **4. Western Ethics (Honours- CC6, PROGRAMME.- DSE-1B):**

**After successfully Completion of this Course Students will be able to:**

- Students will develop critical insight on this Western Ethics.
- Students can be familiar with ethical values such as right and wrong, virtue or vice, good or bad.
- Western Ethics discusses about object of moral judgement and also about the Moral Theories of Plato and Aristotle.
- Western Ethics also consists of Standards of Morality like Hedonism, Deontological Ethics and also of Theories of Punishment.

#### **5. Indian Logic (Honours- CC7, SEC1, PROGRAMME.- G-SEC1):**

**After successfully Completion of this Course Students will be able to:**

- Indian Logic will offer the students a textual reading of the Sanskrit text - Tarkasamgraha , written by Navya Naiyayika Sri Annambhatta Acharya.
- Students will penetrate into the arena of Indian Logic and gather the concepts of prama, pramana, jnana, buddhi, smriti, karana, hetu etc.

## **6. Western Logic - (Honours- CC8, GE-2, GE-4, SEC2, CC12, PROGRAMME.- G-CC2,G-SEC2 , G-GE2):**

**After successfully Completion of this Course Students will be able to:**

- Students will be able to think critically and logically.
- From this course students will get the knowledge about traditional and Aristotelian logic.
- Having completed the course of Western Logic, students demonstrate proficiency in critical thinking and understanding of deductive and inductive reasoning and competence in the basic analytical methods of logic.
- Identify premises and conclusions in both formal as well as informal proofs, and demonstrate an awareness of the limits of deductive forms as well as linguistic ambiguities.
- The student not only gains knowledge of traditional Aristotelian logic but also of symbolic logic- the use of symbols, the truth-functions and using truth-tables for testing the validity of arguments and statement-forms. It helps to develop a critical and logical mental attitude.

## **7. Psychology – (CC9):**

**After successfully Completion of this Course Students will be able to:**

- Students will learn the basic concepts of the field of psychology with an emphasis on application of psychology in everyday life.
- The students are introduced to the definition, nature and scope of psychology. They become acquainted with its different methods like introspection and extrospection. Sensation, perception, illusion and hallucination are the important topics in this paper. Emphasis is given on analyzing and clarifying the different theories of learning, philosophical theories of mind, consciousness, intelligence and personality.

## **8. Philosophy of Religion – (CC10, PROGRAMME. G-DSE1A):**

**After successfully Completion of this Course Students will be able to :**

- This course helps the students to understand the different religious traditions and their implications.
- They are introduced to the theories of orthodox and heterodox schools of philosophy. Arguments for the existence and non-existence of God, the religious language etc. Basic tenets of Christianity and Islam and Hinduism are explained and analyzed.

## **9. Social – Political Philosophy – (CC11, PROGRAMME.- G-CC4):**

**After successfully Completion of this Course Students will be able to :**

- This paper aids the students to have a primary concept of social and political philosophy like society, community, family, state, Association, caste, class, Democracy, socialism.
- The student become familiar with the theories reading relation between individual and society, social change and PROGRAMMERess etc. and also be aware of political ideologies like Democracy, Socialism.
- This course is designed to develop interest among the student about the Contemporary social issues and theories like Ambedkar, Gandhiji's Satyagraha, Sasobodaya.
- This paper also develops intercultural competence, knowledge of civic responsibility in students and ability to engage them effectively in society.

## **10. Western Epistemology – (CC13):**

**After successfully Completion of this Course Students will be able to:**

- After successful completion of this course the students would be able to recognize the true characteristics of knowledge i.e. what is knowledge proper, how we know, what are the conditions of justification of knowledge etc.
- The student can also explore the important philosophical theories like Realism, Idealism, Phenomenalism, Substance, Cause, Universal, other minds, Mind-body relation etc.
- This paper helps to develop a strong knowledge base of philosophical enquiry of criticism.

## **11. Western Metaphysics – (CC14):**

**After successfully Completion of this Course Students will be able to :**

- *After* completion of study of metaphysics the student can know the fundamental nature of reality and being. Questions subject related to existence and what is the cause for existence.

## **12. Vedantasara – (DSE1):**

**After successfully Completion of this Course Students will be able to :**

- Students will develop elaborate and detailed knowledge regarding the Vedantasara presents Sutratman (text) as Viraj, the prime means to reach knowledge of Atman and Brahman.
- Vedanta was the basis of the training for many of the greatest mind of India from ancient to modern times.

## **13. An Enquiry Concerning Human Understanding- (DSE2):**

**After successfully Completion of this Course Students will be able to :**

- This course helps the students to understand the detailed knowledge about the views of David Hume, a modern Western Empiricist, from both epistemological, metaphysical and ethical perspectives through his book An Enquiry Concerning Human Understanding.

## **14. Practical Ethics – (DSE3, G-GE1):**

**After successfully Completion of this Course Students will be able to :**

- The objective of the course is the application of ethical rules and principles which can apply for well-being of the society.
- This course is designed the theory of euthanasia, ecology, Surrogacy etc

## **15. Contemporary Indian Philosophy – (DSE4, G-DSE-1B)**

**After successfully Completion of this Course Students will be able to:**

- The courses create an understanding on contemporary problems in Philosophy.
- The courses introduce the thinkers of modern period like Vivekananda, Sri Aurabindo, Mahatma Gandhi, S. Radhakrishnan, M.N. Roy, etc. and their contributions to the philosophical richness of contemporary Indian thought.

## **16. Philosophy in Practice – (G-SEC3)**

**After successfully Completion of this Course Students will be able to ...**

- After completion of Philosophy in Practice a student should be able to understand and explain Philosophically important theories and concepts that have historically been used to organize and explain human experience.
- Objective of the course is the application of ethical rules and principles which can apply for well-being of the society.

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**Dumkal College**  
Dumkal, Murshidabad  
(Affiliated to the University of Kalyani)  
**Department of Sanskrit**  
**Course Outcomes of**  
**Sanskrit Generic Elective for Honours Course (BA)**  
(Under CBCS System)

**Core Course**

<b>SANS-H-GE-T-01</b>		
<b>Classical Sanskrit Literature (Poetry)</b>		
<b>Prescribed Course:</b>		<b>Total 48 Credits</b>
Section 'A'	<i>Raghuvamśam</i> : Canto-I (Verse: 1-25)	12 Credits
Section 'B'	<i>Kirātārjunīyam</i> : Canto I (1-25 Verses)	12 Credits
Section 'C'	<i>Nītīsatakam</i> (1-20 Verses, 1st two Paddhatis)-M. R.Kale Edition	12 Credits
Section 'D'	History of Sanskrit Poetry	12 Credits
<b>Unit-Wise Division:</b>		
<b>Section 'A'</b>		
<b><i>Raghuvamśam</i>: Canto-I (Verse: 1-25)</b>		
<b>Unit: I</b>	<i>Raghuvamśam</i> : Introduction (Author and Text), Appropriateness of title, Canto I, 1-10 Grammatical analysis, Meaning/translation, Explanation, content analysis, Characteristics of Raghu Clan.	<b>06 Credits</b>
<b>Unit: II</b>	<i>Raghuvamśam</i> : Canto I (Verses 11-25) grammatical analysis, Meaning/translation, Explanation, Role of Dilīpa in the welfare of subjects.	<b>06 Credits</b>
<b>Section 'B'</b>		
<b><i>Kirātārjunīyam</i> - Canto I (1-25 Verses)</b>		

<b>Unit: I</b>	<i>Kirātārjunīyam</i> : Introduction (Author and Text), Appropriateness of title, Background of given contents, Canto I Verses 1-16, Grammatical analysis, Translation, Explanation, Poetic excellence, thematic analysis.	06 Credits
<b>Unit: II</b>	<i>Kirātārjunīyam</i> : Verses 17-25, Grammatical analysis, Translation, Explanation, Poetic excellence, thematic analysis.	06 Credits
<b>Section 'C'</b>		
<b><i>Nītiśatakam</i> (1-20 Verses, 1st two Paddhatis)-M. R. Kale Edition</b>		
<b>Unit:</b>	<i>Nītiśatakam</i> : Verses (1-10) Grammatical analysis Translation, explanation.	<b>06 Credits</b>
<b>I Unit:</b>	<i>Nītiśatakam</i> : Verses (11-20) Grammatical analysis Translation, explanation, thematic analysis	<b>06 Credits</b>
<b>II</b>	Bhartṛhari's comments on society.	
<b>Section 'D'</b>		
<b>History of Sanskrit Poetry</b>		
<b>Unit:</b>	<i>Aśvaghōṣa, Kālidāsa, Bhāravi, Māgha, Śrīharsa, Jayadeva, Bhartṛhari</i> and their works.	<b>06 Credits</b>
<b>I Unit:</b>	Origin & Development of Different types of Mahākāvya and Gītikāvya with special reference to the following poets and their works <i>Kālidāsa, Bilhaṇa, Jayadeva, Amarūk, Bhartṛhari</i> and their works.	<b>06 Credits</b>
<b>II</b>		
<b>SANS-H--GE-02</b>		
<b>Classical Sanskrit Literature (Prose)</b>		
<b>Prescribed Course:</b>		<b>Total 48 Credits</b>
Section 'A'	<i>Śukanāsopadeśa</i>	20 Credits
Section 'B'	<i>Viśrutacaritam</i> upto 15 <sup>th</sup> Para	16 Credits
Section 'C'	Survey of Sanskrit Literature – Prose	12 Credits
<b>Unit-Wise Division:</b>		
<b>Section 'A'</b>		
<b><i>Śukanāsopadeśa</i></b>		

<b>Unit: I</b>	Introduction- Author/Text, Text up to page 116 of Prahlad Kumar upto यथा चेयं चपला दीप्यते समाप्तिपर्यन्त (up to the end of the text)	<b>14 Credits</b>
<b>Unit: II</b>	Society and political thought depicted in Śukanasopadeśa, logical meaning and application of sayings like बाणोच्छिष्टं जगत्सर्वम्, वाणी बाणो बभूव, पञ्चाननो बाण etc.	<b>06 Credits</b>
<b>Section 'B'</b> <b>Viśrutacaritam Upto 15<sup>th</sup> Paragraph</b>		
<b>Unit: I</b>	Para 1 to 10 – Introduction – Author, Text, Textreading (Grammar, Translation, and Explanation), Poetic excellence, plot, Timing of Action.	<b>08 Credits</b>
<b>Unit: II</b>	Para 11 to 15 – Text reading (grammar Translation, and Explanation), Poetic excellence, plot, Timing of Action, Society, Language and Style of Daṇḍin. Exposition of saying Dandina पदलालित्यम्, कविर्दण्डी कविर्दण्डी कविर्दण्डी न संशयः	<b>08 Credits</b>
<b>Section 'C'</b> <b>Survey of Sanskrit Literature: Prose</b>		
<b>Unit: I</b>	Origin and development of prose and important prose romances <i>Subandhu, Bāṇa, Daṇḍin, Ambikādatta Vyāsa.</i>	<b>06 Credits</b>
<b>Unit: II</b>	<i>Pañcatantra, Hitopadeśa, Vetālapañcaviṃśattikā, Siṃhāsanadvātriṃśikā and Purūṣaparīkṣā.</i>	<b>06 Credits</b>
<b>Section 'D'</b> <b>History of Sanskrit Poetry</b>		
<b>Unit:</b>	<i>Aśvaghoṣa, Kālidāsa, Bhāravi, Māgha, Śrīharṣa, Jayadeva, Bhartrhari</i> and their works.	<b>06 Credits</b>
<b>I Unit:</b>	Origin & Development of Different types of Mahākāvyas and Gītikāvyas with special reference to the following poets and their works <i>Kālidāsa,</i>	<b>06 Credits</b>
<b>II</b>	<i>Bilhaṇa, Jayadeva, Amarūk, Bhartrhari and their works.</i>	

## COURSE OUTCOME

1. Display a working knowledge of the prose as a literary genre.
2. Identify and describe distinct literary characteristics of the prose.
3. Reading Sanskrit Prose and story they can gain various moral value.
4. They will be able to engage a wider variety of people in conversation and in turn improve their knowledge and conversation skill.
5. Students would know the variety of prose- writings in Sanskrit & they will be able to analysis compound formation.
6. Reading Sanskrit Prose and story they can gain various moral value.
7. Students would be able to acknowledge the literary riches of their all-time great Classical Sanskrit drama.
8. Students would be able to know the original source of later developments in ornate poetry.
9. Students will be able to know not only ancient literature and their classification but also modern Sanskrit literature.
10. Display a working knowledge of the genres of fiction, poetry by writers from various cultures and historical eras.
11. Identify and describe distinct characteristics of literary texts.
12. Analyze literary works for their structure and meaning.
13. Identify and describe distinct literary characteristics of poetic forms.
14. Analyze poetic works for their structure and meaning, using correct terminology.
15. Effectively communicate ideas related to the poetic works during class and group activities.
16. Students can apply as a term to any argumentation about literature, whether or not specific works are analyzed.
17. They learn many notable works of criticism combine discussions of texts with broad arguments about the nature of literature and the principles of assessing it.

18. Criticism will help the students to cover all phases of literary understanding.

19. Students can evaluate and interpret of a topic.

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**Dumkal College**  
Dumkal, Murshidabad  
(Affiliated to the University of Kalyani)  
Department of Physical Education  
**Course Outcomes of**  
**Physical Education Program/General Course (BA)**  
(Under CBCS System)

**CBCS CURRICULUM FOR THREE YEAR UNDER-GRADUATE COURSE IN PHYSICAL EDUCATION(GENERAL)**

**SEMESTER – 1**

CORE PAPER – 1: Foundation and History of Physical Education

Course Code: PEDG-CC-T-1A

Unit – I: Introduction LH - 12

- 1.1. Meaning and definition of Physical Education
- 1.2. Aim and objectives of Physical Education
- 1.3. Misconcept and Modern concept of Physical Education
- 1.4. Importance of Physical Education in modern society

Unit – II: Biological and Sociological Foundation of Physical Education LH - 18

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

2.2. Age- Chronological age, anatomical age, physiological age and mental age

2.3. Sociological Foundation- meaning and definition of Sociology, Society, Socialization and Physical Education

2.4. Role of games and sports in National and International harmony

### Unit – III: History of Physical Education LH - 18

3.1. Historical development of Physical Education and Sports in India: Pre-Independence period and Post-Independence period

3.2. Olympic Movement: Ancient and Modern Olympic Games

3.3. Brief historical background of Asian Games, Commonwealth Games, and SAF Games

3.4. National Sports Awards: Arjuna Award, Major Dhyan Chand Khel Ratna Award, Dronacharya Award, and Dhyanchand Award

### Unit – IV: Yoga Education LH - 12

4.1. Meaning and definition of the term Yoga, types, aim, objectives and importance of Yoga

4.2. History of Yoga

4.3. Astanga Yoga

4.4. Hatha Yoga

### Field Practical

1.. Learn and demonstrate the technique of Suryanamaskar

2.. Development of physical fitness through Callisthenics, Marching, Aerobic activities (any one)

## **SEMESTER – 2**

CORE PAPER – 2: Management of Physical Education and Sports

Course Code: PEDG-CC-T-1B

### Unit – I: Introduction LH - 12

1.1. Concept and definition of Sports Management

1.2. Importance of Sports Management

1.3. Principles of Sports Management

1.4. Sports Manager and his duties

Unit – II: Tournaments LH - 18

2.1. Tournaments: Meaning and definition and types of tournaments (Knock-out, League, Combination, Challenge)

2.2. Procedure of drawing fixture

2.3. Methods of organising Annual Athletic Meet and Play Day

2.4. Methods of organising Intramural and Extramural competition

Unit – III: Facilities and Equipment LH - 18

3.1. Methods of standard Athletic Track marking

3.2. Care and maintenance of play ground and gymnasium

3.3. Importance, care and maintenance of sports equipments

3.4. Time Table: meaning, importance and factors affecting School's Physical Education Time Table

Unit – IV: Leadership LH - 12

4.1. Meaning and definition of leadership

4.2. Qualities of good leader in Physical Education

4.3. Types of leadership

4.4. Principles of leadership activities

Field Practical

Lay out, knowledge and officiating ability of

1.. Track and Field events (any one)

2.. Games: Football, Kabaddi, Kho-Kho, Volleyball (any one)

## **SEMESTER – 2 (Practical)**

### Track and Field

#### Track Events

- 1.1. Starting Techniques: Standing start and Crouch start (its variations) use of Starting Block
- 1.2. Acceleration with proper running techniques
- 1.3. Finishing technique: Run Through, Forward Lunging and Shoulder Shrug
- 1.4. Relay Race: Starting, Baton Holding/Carrying, Baton Exchange in between zone, and Finishing

#### Field Events (any two)

- 2.1. Long Jump: Approach Run, Take-off, Flight in the air (Hang Style/Hitch Kick) and Landing
- 2.2 High Jump: Approach Run, Take-off, Bar Clearance (Straddle) and Landing
- 2.3. Shot Put: Holding the Shot, Placement, Initial Stance, Glide, Delivery Stance and Recovery (Parry O'Brien Technique)
- 2.4. Discus Throw: Holding the Discus, Initial Stance, Primary Swing, Turn, Release and Recovery (Rotation in the circle)
- 2.5. Javelin Throw: Grip, Carry, Release and Recovery (3/5 Impulse stride)

### Ball Games and Indigenous Games

#### Football

##### A. Fundamental skills

- 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
- 2.. Trapping: trapping- the Rolling ball, and the Bouncing ball with sole of the foot
- 3.. Dribbling: Dribbling the ball with Instep of the foot, Dribbling the ball with Inner and Outer Instep of the foot
- 4.. Heading: In standing, running and jumping condition
- 5.. Throw-in: Standing throw-in and Running throw-in

- 6.. Feinting: With the lower limb and upper part of the body
- 7.. Tackling: Simple Tackling, Slide Tackling
- 8.. Goal Keeping: Collection of Ball, Ball clearance- kicking, throwing and deflecting
- 9.. Game practice with application of Rules and Regulations

## Volleyball

### A. Fundamental skills

- 1.. Service: Under arm service, Side arm service, Tennis service, Floating service
- 2.. Pass: Under arm pass, Over head pass
- 3.. Spiking and Blocking
- 4.. Game practice with application of Rules and Regulations

## Badminton

### A. Fundamental skills

- 1.. Basic Knowledge: Various parts of the Racket and Grip
- 2.. Service: Short service, Long service, Long-high service
- 3.. Shots: Over head shot, Defensive clear shot, Attacking clear shot, Drop shot, Net shot, Smash
- 4.. Game practice with application of Rules and Regulations

### B. Rules and their interpretations and duties of the officials

## Kabaddi

### A. Fundamental skills

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

2.. Skills of holding the raider: Various formations, catching from particular position, different catches, catching formation and techniques

3.. Additional skills in raiding: Escaping from various holds, techniques of escaping from chain formation, offense and defence

4.. Game practice with application of Rules and Regulations

B. Rules and their interpretations and duties of the officials

Kho Kho

A. Fundamental skills

1.. Skills in Chasing: Sit on the box (Parallel & Bullet toe method), Get up from the box (Proximal & Distal foot method), Give Kho (Simple, Early, Late & Judgment), Pole Turn, Pole Dive, Tapping, Hammering, Rectification of foul

2.. Skills in running: Chain Play, Ring play and Chain & Ring mixed play

3.. Game practice with application of Rules and Regulations

B. Rules and their interpretations and duties of the officials

### **SEMESTER – 3**

CORE PAPER – 3: Anatomy, Physiology and Exercise Physiology

Course Code: PEDG-CC-T-1C

Unit – I: Introduction LH - 12

1.1. Meaning and definition of Anatomy, Physiology and Exercise Physiology

1.2. Importance of Anatomy, Physiology and Exercise Physiology in Physical Education

1.3. Elementary concept of cellular organelles: Mitochondrion, Endoplasmic reticulum, Lysosome, Glycogen

1.4. Tissue: types and function

Unit – II: Musculo-skeletal System LH - 18

2.1. Skeletal System- structure of Skeletal System. Classification and location of bones and joints, Anatomical differences between male and female

2.2. Muscular System- types of muscles. Location, structure and function of skeletal muscle

- 2.3. Types of muscular contraction
- 2.4. Effect of exercise and training on muscular system

#### Unit – III: Circulatory System LH - 18

- 3.1. Blood- composition and function
- 3.2. Heart- structure and functions. Mechanism of blood circulation through heart
- 3.3. Blood Pressure, Athletic Heart and Bradycardia
- 3.4. Effect of exercise and training on circulatory system

#### Unit – IV: Respiratory System LH - 12

- 4.1. Structure and function of Respiratory organs
- 4.2. Mechanism of Respiration
- 4.3. Vital Capacity, O<sub>2</sub> Debt and Second Wind
- 4.4. Effect of exercise and training on respiratory system

#### Field Practical

- 1.. Measurement of BMI and WHR (Waist-to-hip ratio)
- 2.. Measurement of Heart rate, Blood Pressure, Respiratory Rate, and Peak Flow Expiratory Rate in resting and post exercise (any two)

### **SEMESTER – 3**

#### Track and Field

Course Code: PEDG-SEC-P-1

#### Track Events

- 1.1. Starting Techniques: Standing start and Crouch start (its variations) use of Starting Block
- 1.2. Acceleration with proper running techniques
- 1.3. Finishing technique: Run Through, Forward Lunging and Shoulder Shrug

1.4. Relay Race: Starting, Baton Holding/Carrying, Baton Exchange in between zone, and Finishing

Field Events (any two)

2.1. Long Jump: Approach Run, Take-off, Flight in the air (Hang Style/Hitch Kick) and Landing

2.2 High Jump: Approach Run, Take-off, Bar Clearance (Straddle) and Landing

2.3. Shot Put: Holding the Shot, Placement, Initial Stance, Glide, Delivery Stance and Recovery (Parry O'Brien Technique)

2.4. Discus Throw: Holding the Discus, Initial Stance, Primary Swing, Turn, Release and Recovery (Rotation in the circle)

2.5. Javelin Throw: Grip, Carry, Release and Recovery (3/5 Impulse stride)

## **SEMESTER – 4**

CORE PAPER – 4: Health Education, Physical Fitness and Wellness

Course Code: PEDG-CC-T-1D

Total number of classes – 60

Unit – I: Introduction LH - 18

1.1. Concept, definition and dimension of Health

1.2. Definition, aim, objectives and principles of Health Education

1.3. Activities of Health Agencies- World Health Organization (WHO), United Nations Educational Scientific and Cultural Organization (UNESCO) and United Nations International Children's Emergency Fund (UNICEF)

1.4. School Health Program- Health Service, Health Instruction, Health Supervision, Personal Hygiene and Health Record

Unit – II: Common Health Problems - Prevention and Control LH - 18

2.1. Communicable Diseases- Malaria, Dengue, Chicken Pox, Diarrhoea, Tuberculosis, Covid 19

2.2. Non-communicable Diseases- Obesity, Diabetes and Asthma

2.3. Nutrition- nutritional requirements for daily living. Preparation of Balance Diet chart. Health disorders due to deficiency of Protein, Carbohydrate, fat, Vitamins and Minerals

## 2.4. Concept of personal and environmental hygiene

### Unit – III: Physical Fitness and Wellness LH - 12

- 3.1. Physical Fitness- meaning, definition and Importance of Physical Fitness
- 3.2. Components of Physical Fitness- Health and Performance related Physical Fitness
- 3.3. Concept of Wellness. Relationship between Physical activities and Wellness
- 3.4. Ageing- physical activities and its importance

### Unit – IV: Health and First-aid LH - 12

- 4.1. First aid- meaning, definition, importance and golden rules of First-aid
- 4.2. Concept of sports injuries- Sprain, Strain, Wound, Fracture and Dislocation
- 4.3. Management of sports injuries through the application of Hydro-therapy
- 4.4. Management of sports injuries through the application of Thermo-therapy

### Field Practical

- 1.. First-aid Practical- Triangular Bandage: Slings (Arm Sling, Collar & Cuff Sling), Roller Bandages: Simple Spiral, Reverse Spiral, Figure of Eight, Spica splint
- 2.. Practical knowledge on application of Hydro-therapy and Thermo-therapy

## **SEMESTER – 4**

### Gymnastics and Yoga

Course Code: PEDG-SEC-P-2

### Gymnastics

1. Compulsory 2. Optional (any two)
  - 1.1. Forward Roll 2.1. Dive and Forward Roll
  - 1.2. T-Balance 2.2. Hand Spring

- 1.3. Forward Roll with Split leg 2.3. Head Spring
- 1.4. Backward Roll 2.4. Neck Spring
- 1.5. Cart-Wheel 2.5. Hand Stand and Forward Roll

### 3. Asanas

3.1. Standing Posture

3.2. Prone Posture

Ardhachandrasana Bhujangasana

Brikshasana Salvasana

Padahastasana Dhanurasana

3.3. Sitting Posture 3.5. Inverted Posture

Ardhakurmasana Sarbargasana

Paschimottanasana Shirsasana

Gomukhasana Bhagrasana

3.4. Supine Posture

Setubandhasana

Halasana

Matsyasana

### 4. Pranayama (any two)

Kapalbhati

Bhramri

Anulom Vilom

## **SEMESTER – 5**

Test, Measurement and Evaluation in Physical Education

Course Code: PEDG-DSE-T-1

Unit – I: Introduction LH - 12

- 1.1. Concept of test, measurement & Evaluation
- 1.2. Criteria of good test
- 1.3. Principles of Evaluation
- 1.4. Importance of Test, Measurement and Evaluation in Physical Education and Sports

Unit – II: Measurement of Body Composition and Somatotype Assessment LH - 18

- 2.1. Body Mass Index (BMI)- Concept and method of measurement
- 2.2. Body Fat- Concept and method of measurement
- 2.3. Lean Body Mass (LBM)- Concept and method of measurement
- 2.4. Somatotype- Concept and method of measurement

Unit – III: Fitness Test LH - 18

- 3.1. Measurement of strength using Dynamometer
- 3.2. AAHPER Health Related Fitness Test
- 3.3. Queens College Step Test
- 3.4. J.C.R. Test

Unit – IV: Sports Skill Test LH - 12

- 4.1. Lockhart and McPherson Badminton Skill Test
- 4.2. Johnson Basketball Test Battery
- 4.3. McDonald Soccer Test
- 4.4. Brady Volleyball Test

Field Practical

- 1.. Assessment of somatotype and % body fat (any one)
- 2.. Assessment of AAHPER Youth Fitness Test and Queens College Step Test (any one)

## **SEMESTER – 5**

Sports Training

Course Code: PEDG-DSE-T-2

Total number of classes – 60

Unit – I: Introduction LH - 12

- 1.1. Meaning and definition of Sports Training
- 1.2. Aim and characteristics of Sports Training
- 1.3. Principles of Sports Training
- 1.4. Importance of Sports Training

Unit – II: Methods of Training and Conditioning in Sports LH - 18

- 2.1. Warming up and Cooling down- meaning, types and methods
- 2.2. Conditioning- concept of Conditioning and its principles
- 2.3. Training Methods- Circuit Training, Interval Training, Weight Training
- 2.4. Periodisation- meaning, types, aim and contents of different periods

Unit – III: Training Load and Adaptation LH - 18

- 3.1. Training Load- meaning, definition, types and factors of training load
- 3.2. Components of training load
- 3.3. Over Load- meaning, causes, symptoms and tackling of over load
- 3.4. Adaptation- meaning and conditions of adaptation, Supercompensation

Unit – IV: Training Technique LH - 12

- 4.1. Strength- means and methods of strength development
- 4.2. Speed- means and methods of speed development
- 4.3. Endurance- means and methods of endurance development
- 4.4. Flexibility- means and methods of flexibility development

Field Practical

- 1.. Practical Experience of Weight Training and Circuit Training (any one)
- 2.. Measurement of Speed, Strength (Grip/Leg), Explosive Strength (Leg) and Flexibility (any two)

**SEMESTER – 5**

Kinesiology and Biomechanics

Course Code: PEDG-DSE-T-3

Total number of classes – 60

Unit – I: Introduction LH - 12

- 1.1. Basic nature and concept of Kinesiology, Biomechanics and Sports Biomechanics
- 1.2. Importance of Kinesiology and Sports Biomechanics in Physical Education
- 1.3. Classification of Joints and Muscles
- 1.4. Description of movements around the joints

Unit – II: Musculo-Skeletal Aspect of Human Motion LH - 18

- 2.1. Concept and types of Axes and Planes of human body movement
- 2.2. Fundamental concepts of Angle of Pull, All or None Law, Reciprocal Innovation
- 2.3. Equilibrium- concept, types and factors affecting equilibrium
- 2.4. Posture – meaning, types and importance. Causes and correction of postural deformities

Unit – III: Mechanical Concept LH - 12

- 3.1. Motion - meaning, definition, and classification
- 3.2. Concept of Kinematics – distance and displacement, speed and velocity, acceleration
- 3.3. Projectile motion - meaning, definition, and classification
- 3.4. Principles of Projectile motion

Unit – IV: Newton's Laws of Motion LH - 18

- 4.1. Newton's Laws of Motion
- 4.2. Application of laws of motion to sports activities
- 4.3. Force - meaning, definition, and classification
- 4.4. Lever - meaning, definition and classification

Field Practical

- 1.. Demonstration of fundamental movements of different joints
- 2.. Measurement of kinematic parameters of motion

**SEMESTER – 5**

Indian Games and Racket Sports

Course Code: PEDG-SEC-P-3

Kabaddi

A. Fundamental skills

- 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
- 2.. Skills of holding the raider: various formations, catching from particular position, different catches, catching formation and techniques
- 3.. Additional skills in raiding: escaping from various holds, techniques of escaping from chain formation, offense and defence
- 4.. Game practice with application of Rules and Regulations

## B. Rules and their interpretations and duties of the officials

### 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

2.. Skills in running: Chain Play, Ring play and Chain & Ring mixed play

3.. Game practice with application of Rules and Regulations

## B. Rules and their interpretations and duties of the officials

### Badminton

#### A. Fundamental skills

1.. Basic Knowledge: various parts of the Racket and Grip

2.. Service: Short service, long service, Long-high service

3.. Shots: Overhead shot, Defensive clear shot, attacking clear shot, Drop shot, Net shot, Smash

4.. Game practice with application of Rules and Regulations

### Table Tennis

#### A. Fundamental skills

1.. Basic Knowledge: various parts of the Racket and Grip (Shake Hand & Pen Hold Grip)

2.. Stance: alternate & parallel

3.. Push and Service: backhand & forehand

4.. Chop: backhand & forehand

5.. Receive: Push and Chop with both backhand & forehand

6.. Game practice with application of Rules and Regulations

## **SEMESTER – 6**

Psychology in Physical Education and Sports

Course Code: PEDG-DSE-T-4

Total number of classes – 60

### Unit – I: Introduction LH - 12

- 1.1. Meaning and definition Psychology
- 1.2. Importance and scope of Psychology
- 1.3. Meaning and definition of Sports Psychology
- 1.4. Need for knowledge of Sports Psychology in the field of Physical Education

### Unit – II: Learning LH - 18

- 2.1. Meaning and definition of learning
- 2.2. Theories and Laws of learning
- 2.3. Learning curve: meaning and types
- 2.4. Transfer of learning- meaning, definition and types. Factors affecting transfer of learning

### Unit – III: Psychological Factors LH - 18

- 3.1. Motivation- meaning, definition, types and importance of Motivation in Physical Education and Sports
- 3.2. Emotion- meaning, definition, types and importance of Emotion in Physical Education and Sports
- 3.3. Personality- meaning, definition and types. Personality traits
- 3.4. Role of physical activities in the development of personality

Unit – IV: Stress and Anxiety LH - 12

- 4.1. Stress- meaning, definition and types of Stress
- 4.2. Causes of Stress
- 4.3. Anxiety- meaning, definition and types of Anxiety
- 4.4. Management of Stress and Anxiety through physical activity and sports

Field Practical

- 1.. Assessment of Personality, Stress and Anxiety (any one)
- 2.. Measurement of Reaction Time, Depth Perception and Mirror Drawing (any one)

**SEMESTER – 6**

Sports Medicine, Physiotherapy and Rehabilitation

Course Code: PEDG-DSE-T-5

Total number of classes – 60

Unit – I: Introduction LH - 12

- 1.1. Meaning, definition, aim and scope of Physiotherapy
- 1.2. Need and importance of Physiotherapy
- 1.3. Different types of Physiotherapy
- 1.4. Principles of Physiotherapy

Unit – II: Sports Medicine LH - 18

- 2.1. Meaning and concept of Sports Medicine
- 2.2. Aim and objectives of Sports Medicine
- 2.3. Common regional injuries and their management-shoulder, elbow, wrist, knee and ankle
- 2.4. Exercise management of sports injuries

Unit – III: Doping and Ergogenic Aids LH - 12

- 3.1. Concept and meaning of Doping
- 3.2. Types of Doping and Doping-agents
- 3.3. Effects of Doping and Dope tests
- 3.4. Ergogenic aids: meaning, types and uses

Unit – IV: Athletic Care and Rehabilitation LH - 18

- 4.1. Rehabilitation in sports- meaning, principles, means and methods
- 4.2. Diagnosis of injuries-signs and symptoms of injuries
- 4.3. Different forms of Electrotherapy- infra-ray, short wave diathermy, ultrasound, interferential therapy (IFT)
- 4.4. Massage: definition and Types , physiological effects of Massage, therapeutic uses of Massage

Field Practical

- 1.. Application of massage technique and paraffin bath
- 2.. Practical knowledge on infra ray, ultrasound, SW diathermy and IFT
- 3.. Exercise prescription for sports injuries, diabetes, obesity and asthma etc.

**SEMESTER – 6**

Dissertation/ Project

Course Code: PEDG-DSE-T-6

Subjects

- 1.. Assessment of Physical Fitness Components
- 2.. Assessment of Body composition and Somatotype
- 3.. Educational Tour
- 4.. Leadership Camp

- 5.. Adventure Sport
- 6.. Non-communicable diseases
- 7.. Organization of Games & Sports

#### Project Report Format

- 1.. Introduction
- 2.. Procedure
- 3.. Results
- 4.. Conclusions
- 5.. Recommendations
- 6.. References

### **SEMESTER – 6**

Ball Games (any two)

Course Code: PEDG-SEC-P-4

Football

A. Fundamental skills

- 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
- 2.. Trapping: Trapping- the rolling ball, and the bouncing ball with sole of the foot
- 3.. Dribbling: dribbling the ball with instep of the foot, dribbling the ball with inner and outer instep of the foot
- 4.. Heading: in standing, running and jumping condition
- 5.. Throw-in: standing throw-in and running throw-in
- 6.. Feinting: with the lower limb and upper part of the body
- 7.. Tackling: simple tackling, slide tackling
- 8.. Goal Keeping: collection of ball, ball clearance- kicking, throwing and deflecting
- 9.. Game practice with application of Rules and Regulations

## Handball

### A. Fundamental skills

- 1.. Catching, Throwing and Ball control
- 2.. Goal Throws: Jump shot, Center shot, Dive shot, Reverse shot
- 3.. Dribbling: High and low
- 4.. Attack and counter attack, simple counter attack, counter attack from two wings and center
- 5.. Blocking, Goalkeeping and Defensive skills
- 6.. Game practice with application of Rules and Regulations

## 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.. Receiving: two hand receiving, one hand receiving, receiving in stationary position, receiving while jumping and receiving while running
- 3.. Dribbling: how to start dribble, drop dribble, high dribble, low dribble, reverse dribble, rolling dribble
- 4.. Shooting: lay-up shot and its variations, one hand set shot, two hands jump shot, Hook shot, Free Throw
- 5.. Rebounding: defensive rebound and offensive rebound
- 6.. Individual Defence: guarding the player with the ball and without the ball, Pivoting
- 7.. Game practice with application of Rules and Regulations

## Volleyball

### A. Fundamental skills

- 1.. Service: Under arm service, Side arm service, Tennis service, Floating service
- 2.. Pass: Under arm pass, Over head pass
- 3.. Spiking and Blocking

#### 4.. Game practice with application of Rules and Regulations

### Netball

#### A. Fundamental skills

- 1.. Catching: one handed, two handed, with feet grounded and in flight
- 2.. Throwing (Different passes and their uses): one hand passes (shoulder, high shoulder, underarm, bounce, lob), two hand passes (Push, overhead and bounce)
- 3.. Footwork: landing on one foot, landing on two feet, Pivot, Running pass
- 4.. Shooting: one hand, forward step shot, and backward step shot
- 5.. Techniques of free dodge and sprint, sudden sprint, sprint and stop, sprinting with change at speed
- 6.. Defending: marking the player, marking the ball, blocking, inside the circle, outside the circle. Defending the circle edge against the passing
- 7.. Intercepting: Pass and shot
- 8.. Game practice with application of Rules and Regulations

### Throwball

#### A. Fundamental skills

- 1.. Overhand service, Side arm service
- 2.. Two hand catching
- 3.. One hand overhead return, side arm return
- 4.. Game practice with application of Rules and Regulations

SEMESTER – 1/5

Generic Elective – 1: Modern Trends and Practices in Physical Education & Yoga

Course Code: PEDG-GE-T-1

Unit – I: Introduction LH - 12

- 1.1. Meaning, definition and importance of physical Education and Sports
- 1.2. Aims, objectives and scope of Physical Education
- 1.3. Types of sports and their utility in Health and Fitness
- 1.4. Meaning, definition and importance of Physical fitness and Motor fitness. Difference between physical fitness and motor fitness. Components of Physical fitness

Unit – II: Biological, Psychological and Sociological Foundation of Physical Education LH - 18

- 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
- 2.2. Meaning and definition of Psychology. Importance of Psychology in Physical Education Psychological factors effecting in Physical Activity and Sports
- 2.3. Sociological Foundation- meaning and definition of Sociology, Social values and their importance, Socialization through sports
- 2.4. Role of games and sports in National Integration and International Understanding

Unit – III: History of Physical Education LH - 12

- 3.1. Historical development of Physical Education and Sports in India: Pre-Independence period and post-Independence period
- 3.2. Ancient Olympic Games
- 3.3. Modern Olympic Games
- 3.4. Asian Games and Commonwealth Games

Unit – IV: Yoga Education LH - 18

- 4.1. Meaning and definition of the term Yoga, types, aim, objectives and importance of Yoga
- 4.2. History of Yoga
- 4.3. Astanga Yoga
- 4.4. Hatha Yoga

## Field Practical

- 1.. Learn and demonstrate the technique of Suryanamaskar
- 2.. Development of physical fitness through Callisthenics, Marching, Aerobic activities (any one)

## SEMESTER – 2/5

Generic Elective – 2: Management of Physical Education and Sports

Course Code: PEDG-GE-T-2

Total number of classes – 60

### Unit – I: Introduction LH - 12

- 1.1. Concept and definition of Sports Management
- 1.2. Importance of Sports Management
- 1.3. Principles of Sports Management
- 1.4. Sports Manager and his duties

### Unit – II: Tournaments LH - 18

- 2.1. Tournaments: Meaning and definition and types of tournaments (Knock-out, League, Combination, Challenge)
- 2.2. Procedure of drawing fixture
- 2.3. Methods of organising Annual Athletic Meet and Play Day
- 2.4. Methods of organising Intramural and Extramural competition

### Unit – III: Facilities and Equipment LH - 18

- 3.1. Methods of standard Athletic Track marking
- 3.2. Care and maintenance of playground and gymnasium
- 3.3. Importance, care and maintenance of sports equipment

### 3.4. Time Table: meaning, importance and factors affecting School's Physical Education Time Table

#### Unit – IV: Leadership LH - 12

- 4.1. Meaning and definition of leadership
- 4.2. Qualities of good leader in Physical Education
- 4.3. Types of leadership
- 4.4. Principles of leadership activities

#### Field Practical

Lay out, knowledge and officiating ability of

- 1.. Track and Field events (any two)
- 2.. Games: Football, Volleyball, Badminton, Kabaddi, Kho-Kho (any two)

#### SEMESTER – 2/5 (Practical)

##### Track and Field

##### Track Events

- 1.1. Starting Techniques: Standing start and Crouch start (its variations) use of Starting Block
- 1.2. Acceleration with proper running techniques
- 1.3. Finishing technique: Run Through, Forward Lunging and Shoulder Shrug
- 1.4. Relay Race: Starting, Baton Holding/Carrying, Baton Exchange in between zone, and Finishing

##### Field Events

- 2.1. Long Jump: Approach Run, Take-off, Flight in the air (Hang Style/Hitch Kick) and Landing
- 2.2 High Jump: Approach Run, Take-off, Bar Clearance (Straddle) and Landing
- 2.3. Shot Put: Holding the Shot, Placement, Initial Stance, Glide, Delivery Stance and Recovery (Parry O'Brien Technique)

2.4. Discus Throw: Holding the Discus, Initial Stance, Primary Swing, Turn, Release and Recovery (Rotation in the circle)

2.5. Javelin Throw: Grip, Carry, Release and Recovery (3/5 Impulse stride) Ball Games and Indigenous Games

## Football

### A. Fundamental skills

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

2.. Trapping: Trapping- the Rolling ball, and the Bouncing ball with sole of the foot

3.. Dribbling: Dribbling the ball with Instep of the foot, Dribbling the ball with Inner and Outer Instep of the foot

4.. Heading: In standing, running and jumping condition

5.. Throw-in: Standing throw-in and Running throw-in

6.. Feinting: With the lower limb and upper part of the body

7.. Tackling: Simple Tackling, Slide Tackling

8.. Goal Keeping: Collection of Ball, Ball clearance- kicking, throwing and deflecting

9.. Game practice with application of Rules and Regulations

## Volleyball

### A. Fundamental skills

1.. Service: Under arm service, Side arm service, Tennis service, Floating service

2.. Pass: Under arm pass, Overhead pass

3.. Spiking and Blocking

4.. Game practice with application of Rules and Regulations

## Badminton

### A. Fundamental skills

- 1.. Basic Knowledge: Various parts of the Racket and Grip
- 2.. Service: Short service, long service, Long-high service
- 3.. Shots: Overhead shot, Defensive clear shot, attacking clear shot, Drop shot, Net shot, Smash
- 4.. Game practice with application of Rules and Regulations

### B. Rules and their interpretations and duties of the officials

## Kabaddi

### A. Fundamental skills

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

2.. Skills of holding the raider: Various formations, catching from particular position, different catches, catching formation and techniques

3.. Additional skills in raiding: Escaping from various holds, techniques of escaping from chain formation, offense and defence

- 4.. Game practice with application of Rules and Regulations

## Kho Kho

### A. Fundamental skills

1.. Skills in Chasing: Sit on the box (Parallel & Bullet toe method), Get up from the box (Proximal & Distal foot method), Give Kho (Simple, Early, Late & Judgment), Pole Turn, Pole Dive, Tapping, Hammering, Rectification of foul

- 2.. Skills in running: Chain Play, Ring play and Chain & Ring mixed play

- 3.. Game practice with application of Rules and Regulations

SEMESTER – 3/6

Generic Elective – 3: Anatomy, Physiology and Exercise Physiology

Course Code: PEDG-GE-T-3

Unit – I: Introduction LH - 12

- 1.1. Meaning and definition of Anatomy, Physiology and Exercise Physiology
- 1.2. Importance of Anatomy, Physiology and Exercise Physiology in Physical Education
- 1.3. Elementary concept of cellular organelles: Mitochondrion, Endoplasmic reticulum, Lysosome, Glycogen
- 1.4. Tissue: types and function

Unit – II: Musculo-skeletal System LH - 18

- 2.1. Skeletal System- Structure of Skeletal System. Classification and location of bones and joints. Anatomical differences between male and female
- 2.2. Muscular System- Types of muscles. Location, structure and function of skeletal muscle
- 2.3. Types of muscular contraction
- 2.4. Effect of exercise and training on muscular system

Unit – III: Circulatory System LH - 18

- 3.1. Blood- Composition and function
- 3.2. Heart- Structure and functions. Mechanism of blood circulation through heart
- 3.3. Blood Pressure, Athletic Heart and Bradycardia
- 3.4. Effect of exercise and training on circulatory system

Unit – IV: Respiratory System LH - 12

- 4.1. Structure and function of Respiratory organs
- 4.2. Mechanism of Respiration
- 4.3. Vital Capacity, O<sub>2</sub> Debt and Second Wind
- 4.4. Effect of exercise and training on respiratory system

## Field Practical

- 1.. Measurement of BMI and WHR (Waist-to-hip ratio)
- 2.. Measurement of Heart rate, Blood Pressure, Respiratory Rate, and Peak Flow Expiratory Rate in resting and post exercise (any two)

## SEMESTER – 4/6

Generic Elective – 4: Health Education, Physical Fitness and Measurement in Physical Education

Course Code: PEDG-GE-T-4

### Unit – I: Introduction LH - 18

- 1.1. Concept, definition and dimension of Health
- 1.2. Definition, aim, objectives and principles of Health Education
- 1.3. Health Agencies- World Health Organization (WHO), United Nations Educational Scientific and Cultural Organization (UNESCO) and United Nations International Children’s Emergency Fund (UNICEF)
- 1.4. Nutrition- Nutritional requirements for daily living. Preparation of Balance Diet chart. Health disorders due to deficiency of Protein, Carbohydrate, Fat, Vitamins and Minerals

### Unit – II: Health and First-aid LH - 18

- 2.1. First aid- Meaning, definition, importance and golden rules of First-aid
- 2.2. Concept of sports injuries- Sprain, Strain, Wound, Fracture and Dislocation
- 2.3. Postural deformities- Causes and corrective exercise of Kyphosis, Lordosis, Scoliosis, Bow-legs, Knock Knees and Flat Foot
- 2.4. Hypo-kinetic Diseases and Physical Activities- Obesity, Diabetes and Asthma

### Unit – III: Measurement of Body Composition and Somatotype Assessment LH - 12

- 3.1. Body Mass Index (BMI)- Concept and method of measurement
- 3.2. Body Fat- Concept and method of measurement
- 3.3. Lean Body Mass (LBM)- Concept and method of measurement
- 3.4. Somatotype- Concept and method of measurement

## Unit – IV: Physical Fitness LH - 12

- 4.1. Physical Fitness- meaning, definition and Importance of Physical Fitness
- 4.2. Components of Physical Fitness
- 4.3. Health and Performance related Physical Fitness
- 4.4. Ageing- Physical activities and its importance

### Field Practical

- 1.. First-aid Practical- Triangular Bandage: Slings (Arm Sling, Collar & Cuff Sling), Roller Bandages: Simple Spiral, Reverse Spiral, Figure of Eight, Spica splint
- 2.. Assessment of somatotype, body fat percentage (any one)

## **COURSE OUTCOMES:**

### **SEM-1:**

1. Gives the basic knowledge to the students about physical education.
2. Developed the knowledge about aims and objectives of physical education.
3. Improved historical knowledge of physical education.
4. Improved basic knowledge of yoga.

### **SEM-2:**

1. Developed the concept of sports management.
2. Developed the skills of any kind of sports event organised.
3. Improved the knowledge about care and maintenance of different types of sports equipment.
4. Developed leadership qualities through sports.

### **SEM-3:**

1. Developed the basic knowledge of bones, muscles, cell and tissue of human body.
2. Improved knowledge about Muscular System, Circulatory System and Respiratory System.
3. Improved practical knowledge of track & field marking and rules, regulations & techniques of different track & field events.

**SEM-4:**

1. Improved basic knowledge of health and health education.
2. Developed the knowledge of prevention & control techniques of different healthrelated problems.
3. Improved the techniques of physical fitness, wellness and first- aid management.
4. Developed the concept & techniques of gymnastics and yoga.

**SEM-5:**

1. Improved knowledge of training, training method, training load, adaptation and training techniques in sports.
2. Developed the skills & techniques of different Indian games & racket sports.

**SEM-6:**

1. Developed the knowledge application of sports psychology in the field of physical education.
2. Developed the knowledge of implementation of different psychological factors in thefield of sports.
3. Developed the skills & techniques of different ball games.

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**Dumkal College**

Dumkal, Murshidabad

(Affiliated to the University of Kalyani)

**Department of Physics**

**Course Outcomes of**

**Physics Honours and Program/General Course (BA)**

(Under CBCS System)

**PROGRAM SPECIFIC OUTCOME**

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Course	Outcomes (After completion of these courses Students should be able to);
PHY-H-CC-T-01: Mathematical Physics - I	<p>CO1: Revise the knowledge of calculus and vector calculus, probability. These basic mathematical structures are essential in solving problems in various branches of Physics.</p> <p>CO2: Learn the curvilinear coordinates which have applications in problems with spherical and cylindrical symmetries.</p> <p>CO3: Learn the basic properties of differential equations, different types of differential equations viz., 1st order, 2nd order and partial differential equations and their correspondence to physical Quantities. They will also learn how to solve the differential equations.</p>
PHY-H-CC-P-01: Mathematical Physics - I	<p>CO1: Learn the basics of PYTHON programming theoretically and practically.</p> <p>CO2 : Get a basic idea about the way of solving problems using PYTHON programming.</p> <p>CO3 : Learn the use of PYTHON programming for a few numbers of Numerical techniques.</p>
PHY-H-CC-T-02 : Mechanics	<p>CO1 : Understand laws of motion and their applications. He / she will learn the concept of conservation of energy, momentum, angular momentum to apply them to basic problems.</p> <p>CO2 : Understand the analogy between</p>

	<p>translational and rotational dynamics, and application of both motions simultaneously in analyzing rolling with slipping.</p> <p>CO3 : Write the expression for the moment of inertia about the given axis of symmetry for different uniform mass distributions.</p> <p>CO4 : Understand the phenomena of collisions and ideas about center of mass and laboratory frames and their correlation.</p> <p>CO5 : Apply Kepler's law to describe the motion of planets and satellites in circular orbit, through the study of the law of Gravitation.</p> <p>CO6 : Explain the phenomena of simple harmonic motion and the properties of such systems.</p> <p>CO7 : Describe how fictitious forces arise in a non-inertial frame, e.g., why a person sitting in a merry-go-round experiences an outward pull.</p> <p>CO8 : Describe special relativistic effects and their effects on the mass and energy of a moving object.</p>
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PHY-H-CC-P-02 : Mechanics

precautions during the different experiments.

CO2 : Learn basics about the errors, their propagation and recording in the final result up to correct significant digits.

CO3 : Learn the linearization of data and the use of slope and intercept to determine unknown Quantities.

CO4 : Way of writing of scientific laboratory reports, which may include theoretical and practical significance of the experiment performed, apparatus description, relevant theory, necessary precautions to be taken during the experiment, proper recording of observations, data analysis, estimation of the error and explanation of its sources, correct recording of the result of the experiment, and proper referencing of the material taken from other sources (books, websites, research papers, etc.)

PHY-H-CC-T-03 : Electricity and Magnetism

CO1 : Demonstrate Gauss law for the electric field, and apply it to systems of point charges as well as line, surface, and volume distributions of charges.

CO2 : Explain and differentiate the vector (electric fields, Coulomb's law) and scalar (electric potential, electric potential energy) formalisms of electrostatics.

CO3 : Apply Gauss's law of electrostatics to solve a variety of problems.

CO4 : Articulate knowledge of electric current, resistance and capacitance in terms of electric field and electric potential.

CO5 : Demonstrate a working understanding of capacitors.

CO6 : Describe the magnetic field produced by magnetic dipoles and electric currents.

CO7 : Explain Faraday-Lenz and Maxwell laws to articulate the relationship between electric and magnetic fields.

CO8 : Understand the magnetic properties of materials and the phenomena of electromagnetic induction.

CO9 : Describe how magnetism is produced and list examples where its effects are observed.

CO10 : Apply Kirchhoff's rules to analyze AC circuits consisting of parallel and/or series combinations of voltage sources and resistors and to describe the graphical relationship of resistance, capacitor and inductor.

PHY-H-CC-P-03 : Electricity and Magnetism	<p>CO1 : The construction, functioning and uses of different electrical bridge circuits, and electrical devices like the ballistic galvanometer.</p> <p>CO2 : linearization of data and the use of slope and intercept to determine unknown quantities.</p> <p>CO3 : present their experimental data in a laboratory report.</p>

<p>PHY-H-CC-T-04 : Waves and Optics</p>	<p>CO1 : Recognize and use a mathematical oscillator equation and wave equation, and derive these equations for certain systems.</p> <p>CO2 : Apply basic knowledge of principles and theories about the behavior of light and the physical environment to conduct experiments.</p> <p>CO3 : Understand the principle of superposition of waves and formation of standing waves.</p> <p>CO4 : Explain several phenomena we can observe in everyday life that can be explained as wave phenomena.</p> <p>CO5 : Use the principles of wave motion and superposition to explain the Physics of polarization, interference and diffraction.</p> <p>CO6 : Understand the working of selected optical instruments like biprism, interferometer, diffraction grating, and holograms.</p>
<p>PHY-H-CC-P-04 : Waves and Optics</p>	<p>CO1 : Use of spectrometers and lasers, and necessary precautions during the experiments.</p> <p>CO2 : Sessions on the review of experimental data analysis, sources of error and their estimation in detail, writing of scientific laboratory reports including proper reporting of errors.</p>

	<p>CO3 : linearization of data and the use of slope and intercept to determine unknown quantities.</p> <p>CO4 : How to present their experimental data in a laboratory report.</p>
PHY-H-CC-T-05 : Mathematical Physics II	<p>CO1 : Learn about the special functions, such as the Hermite polynomial, the Legendre polynomial, the Laguerre polynomial and Bessel functions and their differential equations and their applications in various physical problems such as in quantum mechanics which they will learn in future courses in detail.</p> <p>CO2 : Learn the Fourier analysis of periodic functions and their applications in physical problems such as vibrating strings etc.</p> <p>CO3 : Acquire knowledge of methods to solve partial differential equations with the examples of important partial differential equations in Physics.</p>
PHY-H-CC-P-05 : Mathematical Physics II	<p>CO1 : Learn about different computational techniques used to solve physics problems.</p>
PHY-H-CC-T-06 : Thermal Physics	<p>CO1 : Comprehend the basic concepts of thermodynamics, the first and the second law of thermodynamics, the concept of entropy and the associated theorems, the thermodynamic potentials and their physical interpretations.</p>

	<p>CO2 : Learn about Maxwell's thermodynamic relations.</p> <p>CO3 : Learn the basic aspects of kinetic theory of gases, Maxwell-Boltzmann distribution law, equipartition of energies, mean free path of molecular collisions, viscosity, thermal conductivity, diffusion and Brownian motion.</p> <p>CO4 : Learn about the real gas equations, Van der Waals equation of state, the Joule-Thompson effect.</p>
<p>PHY-H-CC-P-06 : Thermal Physics</p>	<p>CO1 : construction and use of specific measurement instruments and apparatuses used in the thermal physics lab, including necessary precautions.</p> <p>CO2 : Analysis of experimental data, error estimation and writing scientific reports.</p>
<p>PHY-H-CC-T-07 : Digital Systems and applications</p>	<p>CO1 : Basic working of an oscilloscope including its different components and to employ the same to study different waveforms and to measure voltage, current, frequency and phase.</p> <p>CO2 : Secure first-hand idea of different components including both active and passive components to gain an insight into circuits using discrete components and also to learn about integrated circuits.</p> <p>CO3 : About analog systems and digital systems and their differences, fundamental logic gates,</p>

	<p>combinational as well as sequential and number systems.</p> <p>CO4 : Synthesis of Boolean functions, simplification and construction of digital circuits by employing Boolean algebra.</p> <p>CO5 : Sequential systems by choosing Flip-Flop as a building block-construct multivibrators, counters to provide a basic idea about memory including RAM, ROM and also about memory organization.</p> <p>CO6 : Microprocessor and assembly language programming with Intel <math>\mu</math>P 8085.</p>
PHY-H-CC-P-07 : Digital Systems and applications	<p>CO1 : Understand construction and use of CRO, and other experimental apparatuses used in the lab, including necessary precautions.</p> <p>CO2 : Learn about the basic components of digital electronics and circuit design.</p>
PHY-H-SEC-T-01 : Electrical circuits and Network theory	<p>CO1 : After the completion of the course the student will acquire necessary knowledge on multimeters, voltmeters, ammeters, electric circuit elements, dc power sources.</p> <p>With the knowledge of basic electronics and practical use of the measuring instruments, a student is able to troubleshoot and repair some of the electronic instruments used in our daily life.</p>
PHY-H-CC-T/P-08 : Mathematical Physics III	<p>CO1 : Learn about the complex numbers and their properties,</p>

	<p>functions of complex numbers and their properties such as analyticity, poles and residues. The students are expected to learn the residue theorem and its applications in evaluating definite integrals.</p> <p>CO2 : Learn about the Fourier transform, the inverse Fourier transform, their properties and their applications in physical problems. They are also expected to learn the Laplace transform, the inverse Laplace transforms, their properties and their applications in solving physical problems.</p> <p>CO3 : In the laboratory course, the students should apply their Python programming language to solve the following problems:</p> <ul style="list-style-type: none"> <li>(i) Solution first- and second- order ordinary differential equations with appropriate boundary conditions.</li> <li>(ii) Evaluation of the Gaussian integrals.</li> <li>(iii) Evaluation of a converging infinite series up to a desired accuracy.</li> <li>(iv) Evaluation of the Fourier coefficients of a given periodic function.</li> <li>(v) Plotting the Legendre polynomials and the Bessel functions of different orders and interpretations of the results.</li> <li>(vi) Least square fit of a given data to a graph.</li> </ul>
PHY-H-CC-T-09: Elements of modern physics	<p>CO1 : Learn main aspects of the inadequacies of classical mechanics and understand historical development of quantum mechanics and ability to discuss and interpret experiments that reveal the dual nature of matter.</p>

	<p>CO2 : Understand the theory of quantum measurements, wave packets and uncertainty principle.</p> <p>CO3 : Understand the central concepts of quantum mechanics: wave functions, momentum and energy operator, the Schrodinger equation, time dependent and time independent cases, probability density and the normalization techniques, skill development on problem solving e.g. one-dimensional rigid box, tunneling through potential barrier, step potential, rectangular barrier.</p> <p>CO4 : Understanding the properties of nuclei like density, size, binding energy, nuclear forces and structure of atomic nucleus, liquid drop model and nuclear shell model and mass formula.</p> <p>CO5 : Ability to calculate the decay rates and lifetime of radioactive decays like alpha, beta, gamma decay. Neutrinos and its properties and role in the theory of beta decay.</p> <p>CO6 : Understand fission and fusion well as nuclear processes to produce nuclear energy in nuclear reactor and stellar energy in stars.</p> <p>CO7 : Understand various interactions of electromagnetic radiation with matter. Electron positron pair creation.</p> <p>CO8 : Understand the spontaneous and stimulated emission of radiation, optical pumping and population inversion. Three level and four level</p>
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	lasers. Ruby laser and He-Ne laser in details.
PHY-H-CC-P-09: Elements of modern physics	<p>CO1: use of specific measurement instruments and experimental apparatuses used in the modern physics lab, including necessary precautions.</p> <p>CO2 : review of experimental data analysis, sources of error and their estimation in detail, writing of scientific laboratory reports including proper reporting of errors.</p>
PHY-H-CC-T-10: Analog systems and applications	<p>CO1 : N- and P- type semiconductors, mobility, drift velocity, fabrication of P-N junctions; forward and reverse biased junctions.</p> <p>CO2 : Application of PN junction for different types of rectifiers and voltage regulators.</p> <p>CO3 : NPN and PNP transistors and basic configurations namely common base, common emitter and common collector, and also about current and voltage gain.</p> <p>CO4 : Biasing and equivalent circuits, coupled amplifiers and feedback in amplifiers and oscillators.</p> <p>CO5 : Operational amplifiers and knowledge about different configurations namely inverting and non-inverting and applications of operational amplifiers in D to A and A to D conversions.</p>

	<p>CO6 : To characterize various devices namely PN junction diodes, LEDs, Zener diode, solar cells, PNP and NPN transistors. Also, construct amplifiers and oscillators using discrete components.</p> <p>CO7 : Demonstrate inverting and non-inverting amplifiers using op-amps.</p>
<p>PHY-H-CC-P-10: Analog systems and applications</p>	<p>CO1: construction and use of specific analogue devices and experimental apparatuses used in the lab, including necessary precautions.</p> <p>CO2: review of experimental data analysis, sources of error and their estimation in detail, writing of scientific laboratory reports including proper reporting of errors.</p>
<p>PHY-H-SEC-T-02 : Radiation safety</p>	<p>CO1 : Learn the basics of atomic and nuclear physics including the nuclear reactions to understand the production of radioisotopes useful in various practical applications.</p> <p>CO2 : Acquaint with different types of radiations and their interaction with matter.</p> <p>CO3: Acquire the knowledge of radiation measurements, quantities and units; and know the different types of radiation detectors.</p> <p>CO4: Understand the principles involved in radiation monitoring and protection; and also get familiar with the nuclear waste and its safe handling and disposal.</p>

	CO5: Familiar with the application of nuclear techniques in medical science, archeology, art and industry
PHY-H-CC-T-11 : Quantum mechanics and Applications	<p>CO1: Revision of this course will enable the student to get familiar with quantum mechanics formulation.</p> <p>CO2: After an exposition of inadequacies of classical mechanics in explaining microscopic phenomena, quantum theory formulation will be introduced through the Schrodinger equation.</p> <p>CO3: The interpretation of the wave function of quantum particles and probabilistic nature of its location and subtler points of quantum phenomena will be exposed to the student.</p> <p>CO4: Through understanding the behavior of quantum particle encountering a potential barrier, the student will get exposed to solving non-relativistic hydrogen atom, for its spectrum and eigenfunctions.</p> <p>CO5: Study of influence of electric and magnetic fields on atoms will help in understanding Stark effect and Zeeman Effect respectively.</p> <p>CO6: This basic course will form a firm basis to understand quantum many body problems.</p>
PHY-H-CC-T-11 : Quantum mechanics and Applications	<p>CO1 : Better understanding of various concepts of quantum mechanics</p> <p>CO2 : Solving problems related to quantum mechanics using Python in the laboratory course, with the exposure in computational programming in the computer lab, the student will be in a position to solve Schrodinger equation for ground state</p>

	<p>energy and wave functions of various simple quantum mechanical one-dimensional and three-dimensional Potentials.</p> <p>CO3 : The experiments using PYTHON will enable the student to appreciate nuances involved in the theory.</p>
<p>PHY-H-CC-T-12 : Solid state physics</p>	<p>CO1 : A brief idea about crystalline and amorphous substances, lattice, unit cell, miller indices, reciprocal lattice, concept of Brillouin zones and diffraction of X-rays by crystalline materials.</p> <p>CO2 : Knowledge of lattice vibrations, phonons and in depth of understanding of Einstein and Debye theory of specific heat of solids.</p> <p>CO3 : Knowledge of different types of magnetism varying from diamagnetism to ferromagnetism and hysteresis loops and energy loss.</p> <p>CO4 : An understanding about the dielectric and ferroelectric properties of materials.</p> <p>Understanding the band theory of solids and to differentiate insulators, conductors and Semiconductors.</p> <p>CO5 : Understanding the basic idea about superconductors and their classifications.</p> <p>CO6: To carry out experiments based on the theory that they have learned to measure various material properties in the laboratory</p>

<p>PHY-H-CC-P-12 : Solid state physics</p>	<p>CO1: Learning of the measurement of the magnetic susceptibility, dielectric constant, trace hysteresis loop. They will also employ four probe methods to measure electrical conductivity and the hall set up to determine the hall coefficient of a semiconductor.</p> <p>CO2: Operation of measuring instruments and experimental apparatuses used in the solid-state physics lab, including necessary precautions.</p>
<p>PHY-H-DSE-T-01 : Classical dynamics</p>	<p>CO1: Revision of the knowledge of the Newtonian, the Lagrangian and the Hamiltonian formulations of classical mechanics and their applications in appropriate physical problems. Learning about the small oscillation related problems.</p> <p>CO2: Recapitulating and learning of the special theory of relativity- postulates of the special theory of relativity, Lorentz transformations on space-time and other fourvectors, four-vector notations, space-time invariant length, length contraction, time dilation, mass-energy relation, Doppler effect, light cone and its significance, problems involving energy- momentum conservations.</p> <p>CO3 : Learning of the basics of fluid dynamics, streamline and turbulent flow, Reynolds's number, coefficient of viscosity and Poiseuille's equation.</p> <p>CO4 : Review of the retarded potentials, potentials due to a moving charge, Lienard Wiechert potentials, electric and magnetic fields due to a moving charge, power radiated, Larmor's formula and its relativistic generalization.</p>

PHY-H-DSE-T-02 : Nuclear and particle physics

CO1 : Learn the ground state properties of a nucleus – the constituents and their properties, mass number and atomic number, relation between the mass number and the radius and the mass number, average density, range of force, saturation property, stability curve, the concepts of packing fraction and binding energy, binding energy per nucleon vs. mass number graph, explanation of fusion and fission from the nature of the binding energy graph.

CO2 : Know about the nuclear models and their roles in explaining the ground state properties of the nucleus –(i) the liquid drop model, its justification so far as the nuclear properties are concerned, the semi-empirical mass formula, (ii) the shell model, evidence of shell structure, magic numbers, predictions of ground state spin and parity, theoretical deduction of the shell structure, consistency of the shell structure with the Pauli exclusion principles.

CO3 : Learn about the process of radioactivity, the radioactive decay law, the emission of alpha, beta and gamma rays, the properties of the constituents of these rays and the mechanisms of the emissions of these rays, outlines of Gamow's theory of alpha decay and Pauli's theory of beta decay with the neutrino hypothesis, the electron capture, the fine structure of alpha particle spectrum, the Geiger-Nuttall law, the radioactive series.

	<p>CO4: Learn the basic aspects of nuclear reactions, the Q-value of such reaction and its derivation from conservation laws, The reaction cross-sections, the types of nuclear reactions, direct and compound nuclear reactions, Rutherford scattering by Coulomb potential.</p> <p>CO5 : Learn some basic aspects of interaction of nuclear radiation with matter-interaction of gamma ray by photoelectric effect, Compton scattering and pair production, energy loss due to ionization, Cerenkov radiation.</p> <p>CO6 : Learn about the detectors of nuclear radiations- the Geiger-Mueller counter, the scintillation counter, the photo-multiplier tube, the solid state and semiconductor detectors.</p> <p>CO7 : The students are expected to learn about the principles and basic constructions of particle accelerators such as the Van-de-Graff generator, cyclotron, betatron and synchrotron. They should know about the accelerator facilities in India.</p> <p>CO8 : Gain knowledge on the basic aspects of particle Physics – the fundamental interactions, elementary and composite particles, the classifications of particles: leptons, hadrons (baryons and mesons), quarks, gauge bosons. The students should know about the quantum numbers of particles: energy, linear momentum, angular momentum, isospin, electric charge, colour charge, strangeness, lepton numbers, baryon number and the conservation laws associated with them.</p>
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PHY-H-CC-T-13 : Electromagnetic theory

CO1 : An understanding of the Maxwell's equations, role of displacement current, gauge transformations, scalar and vector potentials, Coulomb and Lorentz gauge, boundary conditions at the interface between different media.

CO2 : Applying Maxwell's equations to deduce wave equation, electromagnetic field energy, momentum and angular momentum density.

CO3 : Analyzing the phenomena of wavepropagation in the unbounded, bounded, vacuum, dielectric, guided and unguidedmedia.

CO4 : Understanding the laws of reflection and refraction and to calculate the reflectionand transmission coefficients at plane interface in bounded media.

CO5 : Understanding the linear, circular and elliptical polarization of em waves. Productionas well as detection of waves in the laboratory.

CO6 : Understanding propagation of em waves in anisotropic media, uniaxial and biaxial crystals phase retardation plates andtheir uses.

CO7 : Understanding the concept of optical rotation, theories of optical rotation and their experimental rotation, calculation of angle rotation and specific rotation.

CO8 : Understanding the features of planar optical waveguide and obtaining the Electricfield components, Eigenvalue equations, phase and group velocities in a dielectric waveguide.

CO9 : Understanding the fundamentals of propagation of electromagnetic waves through optical fibers and calculating numerical apertures for step and graded indices and transmission losses.

<p>PHY-H-CC-P-13 : Electromagnetic theory</p>	<p>CO1 : Construction and use of specific measurement instruments and experimental apparatuses used in the lab, with necessary precautions.</p> <p>CO2 : review of experimental data analysis, sources of error and their estimation in detail, writing of scientific laboratory reports including proper reporting of errors.</p>
<p>PHY-H-CC-T-14: Statistical Mechanics</p>	<p>CO1 : Understanding of the concepts of microstate, macrostate, ensemble, phase space, thermodynamic probability and partition function.</p> <p>CO2 : Understanding of the combinatoric studies of particles with their distinguishably or indistinguishably nature and conditions which lead to the three different distribution laws e.g. Maxwell-Boltzmann distribution, Bose-Einstein distribution and Fermi-Dirac distribution laws of particles and their derivation.</p> <p>CO3 : Comprehending and articulating the connection as well as dichotomy between classical statistical mechanics and quantum statistical mechanics.</p> <p>CO4 : Learning of application of the classical statistical mechanics to derive the law of equipartition of energy and specific heat.</p> <p>CO5 : Understanding of the Gibbs paradox, equipartition of energy and concept of negative temperature in a two level system.</p> <p>CO6 : Learning to derive classical radiation laws of black body radiation. Wiens law, Rayleigh Jeans law, ultraviolet catastrophe. Saha ionization formula.</p>

	<p>CO7: Learning to calculate the macroscopic properties of degenerate photon gas using BE distribution law, understand Bose-Einstein condensation law and liquid Helium. derivation of Planck's law Understanding of the concept of Fermi energy and Fermi level, calculate the macroscopic properties of completely and strongly degenerate Fermi gas, electronic contribution to specific heat of metals.</p> <p>CO8: Understanding of the application of F-D statistical distribution law to derive thermodynamic functions of a degenerate Fermi gas, electron gas in metals and their properties.</p> <p>CO9 : Calculating the electron degeneracy pressure and ability to understand the Chandrasekhar mass limit, stability of white dwarfs against gravitational collapse.</p>
PHY-H-CC-P-14: Statistical Mechanics	CO1 : Use of numerical simulations for solving the problems based on Statistical Mechanics.
PHY-H-DSE-T-03 : Communication electronics	<p>CO1 : Electromagnetic spectra and different frequency bands. Modulation, different types of modulation and about super heterodyne receivers.</p> <p>CO2: Concept of sampling, sampling theorem and multiplexing.</p> <p>CO3 : Digital transmission, encoding and decoding.</p> <p>CO4 : Satellite communication including uplinking and downlinking.</p> <p>CO5 : Mobile communication/telephony and concepts of cell telephony. 2G, 3G, 4G and 5G (Quantitative).</p>

	<p>CO6 :Apply the theory that they have learned in the theory class to gain hands on experience in building modulation and demodulation circuits; Transmitters and Receivers for AM and FM. Also to construct TDM, PAM, PWM, PPM and ASK, PSK and FSK modulator and verify their results.</p>
PHY-H-DSE-P-03 : Communication electronics	<p>CO1: Learn in depth concept modulation and how it is practically done in communication systems.</p> <p>CO2 : Get the practical idea about different way pulse modulation techniques.</p>
PHY-H-DSE-T/P-04 : Dissertation	<p>CO1 : Exposure to research methodology</p> <p>CO2 : Picking up skills relevant to dissertation/project</p> <p>CO3 : Development of creative ability and intellectual initiative</p> <p>CO4 : Developing the ability for scientific writing</p> <p>CO5 : Becoming conversant with ethical practices in acknowledging other sources, avoiding</p>

**Course Outcome : B.Sc. Physics (Generic Elective Courses)  
(CBCS)**

Course	Outcomes (After completion of these courses Students should be able to);
PHY-H-GE-T-01 : Mechanics	<p>CO1 : Understand laws of motion and their applications. He / she will learn the concept of conservation of energy, momentum, angular momentum to apply them to basic problems.</p> <p>CO2: Understand the analogy between translational and rotational dynamics, and application of both motions simultaneously in analyzing rolling with slipping.</p> <p>CO3 : Write the expression for the moment of inertia about the given axis of symmetry for different uniform mass distributions.</p> <p>CO4 : Understand the phenomena of collisions and ideas about center of mass and laboratory frames and their correlation.</p> <p>CO5 : Apply Kepler's law to describe the motion of planets and satellites in circular orbit, through the study of the law of Gravitation.</p> <p>CO6 : Explain the phenomena of simple harmonic motion and the properties of such systems.</p> <p>CO7 : Describe how fictitious forces arise in a non-inertial frame, e.g., why a person sitting in a merry-go-round experiences an outward pull.</p> <p>CO8 : Describe special relativistic effects and their effects on the mass and energy of a moving object.</p>

<p>PHY-H-GE-P-01 : Mechanics</p>	<p>CO1 : Learn use of Vernier calipers,screw gauge and traveling microscope, and necessary precautions during the different experiments.</p> <p>CO2 : Learn basics about the errors, their propagation and recording in the final result to correct significant digits.</p> <p>CO3 : Learn the linearization of data and the use of slope and intercept to determine unknown Quantities.</p> <p>CO4 : Way of writing of scientific laboratory reports, which may include theoretical and practical significance of the experiment performed, apparatus description, relevant theory,necessary precautions to be taken during the experiment, proper recording of observations, data analysis, estimation of the error and explanation of its sources, correct recording of the result of the experiment, and proper referencing of the material taken from other sources (books, websites, research papers, etc.)</p>
<p>PHY-H-GE-T-02 : Waves and Optics</p>	<p>CO1 : Recognize and use a mathematical oscillator equation and wave equation, and derive these equations for certain systems.</p> <p>CO2 : Apply basic knowledge of principles and theories about the behavior of light and the physical environment to conduct experiments.</p> <p>CO3 : Understand the principle of superposition of waves and formation of standing waves.</p> <p>CO4 : Explain several phenomena we can observe in everyday life that can be explained as wave phenomena. CO5 : Use the principles of wave motion and superposition to explain the Physics of polarisation, interference and diffraction.</p>

	<p>CO6 : Understand the working of selected optical instruments like biprism, interferometer, diffraction grating, and holograms.</p>
<p>PHY-H-GE-P-02: Waves and Optics</p>	<p>CO1 : Use of spectrometer and lasers, and necessary precautions during the experiments.</p> <p>CO2 : Sessions on the review of experimental data analysis, sources of error and their estimation in detail, writing of scientific laboratory reports including proper reporting of errors.</p> <p>CO3 : linearization of data and the use of slope and intercept to determine unknown quantities.</p> <p>CO4 : How to present their experimental data in a laboratory report.</p>

**Course Outcome B.Sc. Physics (General)**  
**(CBCS)**

Course	Outcomes (After completion of these courses Students should be able to);
PHY-G-CC-T-01 : Mechanics	<p>CO1 : Understand laws of motion and their applications. He / she will learn the concept of conservation of energy, momentum, angular momentum to apply them to basic problems.</p> <p>CO2 : Understand the analogy between translational and rotational dynamics, and application of both motions simultaneously in analyzing rolling with slipping.</p> <p>CO3 : Write the expression for the moment of inertia about the given axis of symmetry for different uniform mass distributions.</p> <p>CO4 : Understand the phenomena of collisions and ideas about center of mass and laboratory frames and their correlation.</p> <p>CO5 : Apply Kepler's law to describe the motion of planets and satellites in circular orbit, through the study of the law of Gravitation.</p> <p>CO6 : Explain the phenomena of simple harmonic motion and the properties of such systems.</p> <p>CO7: Describe how fictitious forces arise in a non-inertial frame, e.g., why a person sitting in a merry-go-round experiences an outward pull.</p>

	<p>CO8 : Describe special relativistic effects and their effects on the mass and energy of a moving object.</p>
<p>PHY-G-CC-P-01 : Mechanics</p>	<p>CO1 : Learn use of Vernier calipers, screw gauge and traveling microscope, and necessary precautions during the different experiments.</p> <p>CO2 : Learn basics about the errors, their propagation and recording in final result up to correct significant digits.</p> <p>CO3 : Learn the linearization of data and the use of slope and intercept to determine unknown Quantities.</p> <p>CO4 : Way of writing of scientific laboratory reports, which may include theoretical and practical significance of the experiment performed, apparatus description, relevant theory, necessary precautions to be taken during the experiment, proper recording of observations, data analysis, estimation of the error and explanation of its sources, correct recording of the result of the experiment, and proper referencing of the material taken from other sources (books, websites, research papers, etc.)</p>
<p>PHY-G-CC-T-02 : Digital Systems and applications</p>	<p>CO1 : Basic working of an oscilloscope including its different components and to employ the same to study different waveforms and to measure voltage, current, frequency and phase.</p>

	<p>CO2 : Secure first-hand idea of different components including both active and passive components to gain an insight into circuits using discrete components and also to learn about integrated circuits.</p> <p>CO3 : About analog systems and digital systems and their differences, fundamental logic gates, combinational as well as sequential and number systems.</p> <p>CO4 : Synthesis of Boolean functions, simplification and construction of digital circuits by employing Boolean algebra.</p> <p>CO5 : Sequential systems by choosing Flip-Flop as a building block-construct multivibrators, counters to provide a basic idea about memory including RAM, ROM and also about memory organization.</p> <p>CO6 : Microprocessor and assembly language programming with Intel <math>\mu</math>P 8085.</p>
PHY-G-CC-P-02 : Digital Systems and Applications	<p>CO1 : Understand construction and use of CRO, and other experimental apparatuses used in the lab, including necessary precautions.</p> <p>CO2 : Learn about the basic components of digital electronics and circuit design.</p>
PHY-G-SEC-T-01 : Electrical circuits and Network theory	After the completion of the course the student will acquire necessary knowledge on

	<p>multimeters, voltmeters, ammeters, electric circuit elements, dc power sources.</p> <p>With the knowledge of basic electronics and practical use of the measuring instruments, a student is able to troubleshoot and repair some of the electronic instruments used in our daily life.</p>
<p>PHY-G-CC-T-03 : Analog systems and applications</p>	<p>CO1 : N- and P- type semiconductors, mobility, drift velocity, fabrication of P-N junctions; forward and reverse biased junctions.</p> <p>CO2 : Application of PN junction for different type of rectifiers and voltage regulators.</p> <p>CO3 : NPN and PNP transistors and basic configurations namely common base, common emitter and common collector, and also about current and voltage gain.</p> <p>CO4 : Biasing and equivalent circuits, coupled amplifiers and feedback in amplifiers and oscillators.</p> <p>CO5 : Operational amplifiers and knowledge about different configurations namely inverting and non-inverting and applications of operational amplifiers in D to A and A to D conversions.</p> <p>CO6 : To characterize various devices namely PN junction diodes, LEDs, Zener diode, solar cells, PNP and NPN transistors. Also, construct amplifiers and oscillators using discrete components.</p>

	<p>CO7 : Demonstrate inverting and non-inverting amplifiers using op-amps.</p>
<p>PHY-G-CC-P-03 : Analog systems and Applications</p>	<p>CO1: construction and use of specific analogue devices and experimental apparatuses used in the lab, including necessary precautions.</p> <p>CO2: review of experimental data analysis, sources of error and their estimation in detail, writing of scientific laboratory reports including proper reporting of errors.</p>
<p>PHY-G-SEC-T-02 : Radiation safety</p>	<p>CO1 : Learn the basics of atomic and nuclear physics including the nuclear reactions to understand the production of radioisotopes useful in various practical applications.</p> <p>CO2 : Acquaint with different types of radiations and their interaction with matter.</p> <p>CO3: Acquire the knowledge of radiation measurements, quantities and units; and know the different types of radiation detectors.</p> <p>CO4: Understand the principles involved in radiation monitoring and protection; and also get familiar with the nuclear waste and, its safe handling and disposal.</p> <p>CO5: Familiar with the application of nuclear techniques in medical science, archeology, art and industry</p>

PHY-G-CC-P-04 : Solid State Physics

CO1 : A brief idea about crystalline and amorphous substances, lattice, unit cell, miller indices, reciprocal lattice, concept of Brillouin zones and diffraction of X-rays by crystalline materials.

CO2 : Knowledge of lattice vibrations, phonons and in depth of understanding of Einstein and Debye theory of specific heat of solids.

CO3 : Knowledge of different types of magnetism varying from diamagnetism to ferromagnetism and hysteresis loops and energy loss.

CO4 : An understanding about the dielectric and ferroelectric properties of materials.

Understanding the band theory of solids and to differentiate insulators, conductors and Semiconductors.

CO5 : Understanding the basic idea about superconductors and their classifications.

CO6: To carry out experiments based on the theory that they have learned to measure various material properties in the laboratory.

PHY-G-CC-P-04 : Solid State Physics	<p>CO1: Learning of the measurement of the magnetic susceptibility, dielectric constant, trace hysteresis loop. They will also employ four probe methods to measure electrical conductivity and the Hall set up to determine the Hall coefficient of a semiconductor.</p> <p>CO2: Operation of measuring instruments and experimental apparatuses used in the solid-state physics lab, including necessary precautions.</p>
PHY-G-DSE-T-02 : Nuclear and particle physics	<p>CO1 : Learn the ground state properties of a nucleus – the constituents and their properties, mass number and atomic number, relation between the mass number and the radius and the mass number, average density, range of force, saturation property, stability curve, the concepts of packing fraction and binding energy, binding energy per nucleon vs. mass number graph, explanation of fusion and fission from the nature of the binding energy graph.</p> <p>CO2 : Know about the nuclear models and their roles in explaining the ground state properties of the nucleus –(i) the liquid drop model, its justification so far as the nuclear properties are concerned, the semi-empirical mass formula, (ii) the shell model, evidence of shell structure, magic numbers, predictions of ground state spin and parity, theoretical deduction of the shell structure, consistency of the shell structure with the Pauli exclusion principles.</p> <p>CO3 : Learn about the process of radioactivity, the radioactive decay law, the emission of alpha, beta and gamma rays, the properties of the constituents of these rays and the mechanisms of the emissions of these rays, outlines of Gamow's theory of alpha decay and Pauli's theory of beta decay with the neutrino hypothesis, the electron capture, the fine structure of alpha particle</p>

	<p>spectrum, the Geiger-Nuttall law, the radioactive series.</p> <p>CO4: Learn the basic aspects of nuclear reactions, the Q-value of such reaction and its derivation from conservation laws, The reaction cross-sections, the types of nuclear reactions, direct and compound nuclear reactions, Rutherford scattering by Coulomb potential.</p> <p>CO5 : Learn some basic aspects of interaction of nuclear radiation with matter- interaction of gamma ray by photoelectric effect, Compton scattering and pair production, energy loss due to ionization, Cerenkov radiation.</p> <p>CO6 : Learn about the detectors of nuclear radiations- the Geiger-Mueller counter, the scintillation counter, the photo-multiplier tube, the solid state and semiconductor detectors.</p> <p>CO7 : The students are expected to learn about the principles and basic constructions of particle accelerators such as the Van-de-Graff generator, cyclotron, betatron and synchrotron. They should know about the accelerator facilities in India.</p> <p>CO8 : Gain knowledge on the basic aspects of particle Physics – the fundamental interactions, elementary and composite particles, the classifications of particles: leptons, hadrons (baryons and mesons), quarks, gauge bosons. The students should know about the quantum numbers of particles: energy, linear momentum, angular momentum, isospin, electric charge, colour charge, strangeness, lepton numbers, baryon number and the conservation laws associated with them.</p>
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<p>PHY-G-SEC-T-01: Electrical circuits and Network Skills</p>	<p>After the completion of the course the student will acquire necessary knowledge on multimeters, voltmeters, ammeters, electric circuit elements, dc power sources.</p> <p>With the knowledge of basic electronics and practical use of the measuring instruments, a student is able to troubleshoot and repair some of the electronic instruments used in our daily life.</p>
<p>PHY-G-SEC-T-03 : Basic Instrumentation Skill</p>	<p>CO-1: Imparting the knowledge of basic measurement and use multimeter.</p> <p>CO-2: To gain practical knowledge of the use of electronic voltmeters.</p> <p>CO-3: Imparting the basic knowledge of CRO.</p> <p>CO-4: To gain practical knowledge of digital instruments and digital multimeter.</p>
<p>PHY-G-SEC-T-04 : Renewable Energy and Energy Harvesting</p>	<p>CO1: The students are expected to learn not only the theories of the renewable sources of energy, but also to have hands-on experiences on them wherever possible. Some of the renewable sources of energy which should be studied here are: (i) off-shore wind energy, (ii) tidal energy, (iii) solar energy, (iv) biogas energy and (v) hydroelectricity.</p> <p>CO2: All these energy sources should be studied in detail.</p> <p>CO3 : Learn about piezoelectricity, carbon-captured technologies like cells, batteries.</p> <p>CO4 : The students should observe practical demonstrations of (i) training modules of solar energy, wind energy etc., (ii) Conversion of vibration into voltage using piezoelectric materials, (iv) conversion of thermal energy into voltage using thermoelectric modules.</p>

PHY-G-DSE-T-01 : Electricity and Magnetism

CO1 : Demonstrate Gauss law for the electric field, and apply it to systems of point charges as well as line, surface, and volume distributions of charges.

CO2 : Explain and differentiate the vector (electric fields, Coulomb's law) and scalar (electric potential, electric potential energy) formalisms of electrostatics.

CO3 : Apply Gauss's law of electrostatics to solve a variety of problems.

CO4 : Articulate knowledge of electric current, resistance and capacitance in terms of electric field and electric potential.

CO5 : Demonstrate a working understanding of capacitors.

CO6 : Describe the magnetic field produced by magnetic dipoles and electric currents.

CO7 : Explain Faraday-Lenz and Maxwell laws to articulate the relationship between electric and magnetic fields.

CO8 : Understand the magnetic properties of materials and the phenomena of electromagnetic Induction.

CO9 : Describe how magnetism is produced and list examples where its effects are observed

10) Apply Kirchhoff's rules to analyze AC circuits consisting of parallel and/or series combinations of voltage sources and resistors and to describe the graphical relationship of resistance, capacitor and inductor

PHY-G-DSE-P-01 : Electricity and Magnetism

CO1 : The construction, functioning and uses of different electrical bridge circuits, and electrical devices like the ballistic galvanometer.

CO2 : linearization of data and the use of slope and intercept to determine unknown quantities.

CO3 : How to present their experimental data in a laboratory report.

**Dumkal College**  
Dumkal, Murshidabad  
(Affiliated to the University of Kalyani)  
Department of Chemistry  
**Course Outcomes of**  
**Chemistry Honours and Program/General Course (B.SC)**  
(Under CBCS System)

**The learning outcome-based curriculum framework for B.Sc. degree in Chemistry is fundamental approach of learning a broad framework of chemical science and its application to our world.**

**The graduate students in chemistry are being upskilled with different equipment and instrumental knowledge which would empower them in their higher education, research field and industrial interface.**

**The curriculum induces critical thinking, basic psychology, scientific reasoning, moral ethical reasoning and lays emphasis on the objectivity and employability for the students.**

- ❖ The course helps to acquire chemistry knowledge which help further for higher studies and research in this field as well as develop students' ability and skill to acquire expertise over solving both theoretical and applied chemistry problems.
- ❖ Students will have a firm foundation in the fundamentals and application of current chemical and scientific theories including those in Analytical, Inorganic, Organic and Physical Chemistry.
- ❖ Able to carry-over the course with a broad and thorough knowledge in chemistry with chemical concepts, principles, and theories.
- ❖ Students will be able to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments and able to explain the synthesis and analysis.
- ❖ students will be able to understand the characterization of materials and understand the basic principle of equipment used in the chemistry laboratory.
- ❖ Students will be proficient in problem solving, critical thinking and analytical reasoning as applied to real life scientific problems.
- ❖ Course will enable them to explore new areas of research in both chemistry and allied fields of science and technology.
- ❖ Student are capable of expressing the subject through technical writing as well as through oral presentation

- ❖ Students will be a critical thinker and problem solver, Team player, Skilled projectmanager.
- ❖ Students will be empowered to explain why chemistry is an integral activity for addressing social, economic, and environmental problems.
- ❖ Enhance the ability to use computers for chemical simulation and computation.

➤ **Honours Course wise Credit Distribution and Outcome**

Course	Total No. of Papers	Total Credit						
		Theory	Practical	Core Competence	Critical Thinking	Analytical Reasoning	Research Skill	Team Work
Core Courses	14	56	28	√	√	√	√	√
Discipline Specific Elective	4	16	8	√	√	√	√	√
Generic Elective	4	16	8	√	X	√	X	√
Skill Enhancement	2	4	-	√	√	X	X	X

**CBCS 1<sup>st</sup> SEM (Honours)**

Course code	Course title	Course Outcome	Credit
CHEM-H-T-1 (Inorganic +Physical)	i) Extra nuclear structure of atom and Periodic properties, ii) Kinetic Theory and Gaseous state, iii) Chemical Thermodynamics - I	i) To familiarize students about the basic concept of atomic structure and its relation with the elements of modern periodic table. ii) To understand about concept of the Kinetic theory of gases and differentiate between real and ideal gases through different concepts. iii) To learn the concepts of 1 <sup>st</sup> law of thermodynamics and related state and path functions of different chemical processes.	4
CHEM-H-P-1	Inorganic Chemistry – IA & Physical Chemistry - IA	i) To illustrate the acid-base reactions of the different binary mixtures and idea about different standard solution, ii) To give knowledge about exothermic and endothermic reactions, iii) To provide Concept of pH using colour matching method.	2
CHEM-H-T-2	Theory: Basics of Organic Chemistry, Bonding and Physical Properties, General Treatment of Reaction Mechanism and Stereochemistry	i) To acquaint students with the fundamental of organic chemistry such as bonding, physical properties and reaction mechanism. ii) To understand geometries, chirality, symmetry of organic molecules and its relation to optical activity, relative and absolute configuration of the organic molecules.	4

CHEM-H-P-2	Organic Chemistry – I	<p>i) To learn the experiment separation of binary mixture based upon solubility determination of boiling points of different organic compounds</p> <p>ii) To learn specific chemical tests to identify different organic compounds.</p>	2
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### CBCS 2nd SEM Honours

Course code	Course title	Course Outcome	Credit
CHEM-H-T-3 (Inorganic +Physical)	<p>i) Redox reactions and Precipitation reactions, Acid-Base Concepts and Solvents.</p> <p>ii) Chemical Thermodynamics – II, Chemical kinetics</p>	<p>i) To acquire the knowledge on oxidation-reduction reactions and the conditions of precipitation.</p> <p>ii) To learn about the detail's idea regarding different concepts on acid base and HSAB theory as well as the idea regarding indicators and their applications in chemical reactions.</p> <p>iii) To illustrate the basic concepts of 2<sup>nd</sup> Law of thermodynamics and related state functions with the criterial concepts for spontaneity and equilibrium of the reactions.</p> <p>iv) To understand critically rate law of different types of reactions and dependence of rate constant on temperature, concentration etc.</p> <p>v) To introduce the concept of the homogeneous catalysis and their application on the biological reactions.</p>	4
CHEM-H-P-3	Inorganic Chemistry – IB & Physical Chemistry – IB	<p>i) Demonstrate redox reactions and teach estimation of different metals.</p> <p>ii) To familiarized with different orders of Chemical kinetics.</p>	2

CHEM-H-T-4	Theory: Stereochemistry, General Treatment of Reaction Mechanism, Substitution and Elimination Reactions	i) To provide students understanding on advance stereochemistry and confirmational analysis of different organic molecules. ii) To learn the basic concepts of reaction energetics and understand the mechanism of substitution and elimination reactions.	4
CHEM-H-P-4	Organic Chemistry – II	Preparation, purification, melting point determination and yield calculation for various organic compounds to enhance the skill of different methodology of organic synthesis.	2

#### CBCS 3rd SEM Honours

Course code	Course title	Course Outcome	Credit
CHEM-H-T-5 (Physical)	Transport processes, Applications of Thermodynamics – I, Foundation of Quantum Mechanics,	i) To inform students about the fluidic nature of matter and transport processes, conductance of difference solution. ii) To apprise students about various application of thermodynamics such as chemical equilibrium, chemical potential, idealist of the solution etc. iii) To introduce the basic concept of operators, wave function and degeneracy of energy level of quantum systems through the postulates of quantum mechanics.	4

CHEM-H-P-5	Physical Chemistry – II	i) To provide students knowledge about transport properties of solutions and electrolytes and chemical equilibria.	2
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CHEM-H-T-6	<p>i) Theory: Chemical Bonding – I, Chemical Bonding - II</p> <p>ii) Metal extraction and purification from ores and minerals</p>	<p>i) To give the details knowledge on bonding mainly the ionic and covalent bonding.</p> <p>ii) To learn the basic knowledge of meteorology.</p>	4
CHEM-H-P-6	Inorganic Chemistry – II	To provide the understanding on permanganometry and dichromatometry for estimation of metals from binary mixture.	2
CHEM-H-T-7	<p>Theory: Chemistry of alkenes and alkynes, Aromatic Substitution, Carbonyl and Related Compounds, Organometallics</p>	<p>i) To give the concept about alkenes, alkynes, Carbonyl and organometallics.</p> <p>ii) To familiarize with aromatic substitution mechanism.</p>	4
CHEM-H-P-7	Organic Chemistry – III	Identification and qualitative analysis of solid organic compounds.	2
CHEM-H-S – 1B	Basic Analytical Chemistry	<p>i) To enhance students' skill about basic analytics of different chemical compounds.</p> <p>ii) Certain instrumental demonstration also provided.</p>	2

**CBCS 4th SEM Honours**

Course code	Course title	Course Outcome	Credit
CHEM-H-T-8 (Physical)	Application of thermodynamics -ii, electrical properties of molecules, quantum chemistry	i) To enrich students with the knowledge of H-atom and H-like atom and solving Schrodinger equations. Also, to give the basic concept about LCAO-MO and HF-SCF theory ii) To update students with phase-equilibrium chemistry and electrical properties of any molecules.	4
CHEM-H-P-8	Physical Chemistry – III	i) To enable students about ionic equilibrium, potentiometric titration of different redox reactions, phase equilibrium etc. ii) Titrimetric knowledge about EMF measurements and pH values.	2
CHEM-H-T-9	Radioactivity and nuclear chemistry, Chemistry of s and p-block elements, Coordination Chemistry - I	i) To introduce the concept of radioactivity and co-ordination chemistry. ii) Chemical periodicity and concept about the subsequent elements: s and p-block	4
CHEM-H-P-9	Inorganic Chemistry – III	To teach students carryout different complexometric titration and to familiarized students with inorganic preparation.	2
CHEM-H-T-10	Nitrogen compounds, Rearrangements, The Logic of	i) To enable students with the knowledge of N-compounds and its rearrangement and organic spectroscopic method. ii) To understand the beginning of different C-	4
	Organic Synthesis, Organic Spectroscopy,	C bond formation and breaking required for designing synthetic route and it's viability.	
CHEM-H-P-10	Organic Chemistry – IV	To demonstrate about quantitative analysis of different organic molecules through various estimation methods	2

CHEMHS-2A	Pharmaceutical Chemistry	To enhance students skill abouts different drugs and pharmaceuticals and the basic knowledge of fermentation process has been incorporated.	2
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**CBCS 5th SEM Honours lesson Plan**

Course code	Course title	Course Outcome	Credit
HEM-H-T-11	Coordination Chemistry – II, Magnetochemistry, Chemistry of d-and f-block elements, Reaction Kinetics and Mechanism	i) To introduce students with the spectrochemical series and a details idea about the crystal field theory with a preliminary idea about ligand field theory. To study the concept of John Teller effect and its application in Z-in and Z-out complexes. Explain about the origin of colour and magnetic properties of the complexes. ii) To give introductory idea about various inorganic reaction mechanism through concept of labile-inert complex, trans-cis effect. iii) Elementary concept about the d and f block elements and their properties.	4
CHEM-H-P-11	Inorganic Chemistry – IV	i) To give idea about gravimetric estimations and applications of permanganometry, iodometry etc.	2

		ii) Inorganic preparation of complexes and its spectrophotometric analysis.	
CHEM-H-T-12	Theory: Molecular Spectroscopy, Photochemistry, Surface phenomenon,	<ul style="list-style-type: none"> <li>i) To infuse the knowledge of Rotational, Vibrational, Raman, NMR, ERS spectroscopy.</li> <li>ii) To develop understanding about the Law's abortion of light energy by different molecules and sequent photochemical reactions and chemical processes and its mechanism.</li> <li>iii) To give a brief idea about physical and chemical adsorption and origin of stability of colloids.</li> </ul>	4
CHEM-H-P-12	Physical Chemistry – IV	To give them experiences about different spectrophotometric and surface phenomenon experiment.	2
CHEM-H-TDS E-1B		<ul style="list-style-type: none"> <li>i) To learn the importance of inorganic materials in industrial zone.</li> <li>ii) Introductory idea about renewable energy, different catalysis and chemical explosive.</li> </ul>	4
CHEM-H-PDS E-1B		To give the students required expertise on different estimation processes of industrial materials.	2
CHEM-H-TDS E-2A	Qualitative and quantitative, Optical methods of analysis. Thermal and	Basic concepts of analytical chemistry and its applications.	4

	Electroanalytical methods of analysis. Separation techniques		
CHEM-H-PDS E-2A	Analytical Methods in Chemistry	<ul style="list-style-type: none"> <li>i) To give hands on experiences on different separation technique such as chromatography, solvent extraction, and ionexchange methods.</li> <li>ii) Spectrophotometric determinations of indicators and soil.</li> </ul>	2

**CBCS 6th SEM Honours**

Course code	Course title	Course Outcome	Credit
CHEM-H-T-13	Molecular Symmetry and Point group, (12 L) Bio-inorganic Chemistry, Organometallic Chemistry and Catalysis	<ul style="list-style-type: none"> <li>i) To give an elementary idea about application of symmetry on some simple inorganic molecules through the concept of point group.</li> <li>ii) Introduce the concept of bio-inorganic molecules available in nature and different biological processes.</li> <li>iii) To acquaint details idea about organometallic chemistry and its application in catalysis.</li> </ul>	4
CHEM-H-P-13	Inorganic Chemistry-V	To build up a concept of semi-micro qualitative analysis of different acid and basic radicals and their chemical reactions in different conditions.	2

CHEM-H-T -14	Carbocycles and Heterocycles, Cyclic Stereochemis- try, Pericyclic reactions, Carbohydrats, Carbohydrats, Biomolecule s	<ul style="list-style-type: none"> <li>i) To develop concept in diverse chemistry of heterocycles, carbocycles, Cyclic Stereochemistry and natural products.</li> <li>ii) To give a foundation leaning in pericyclic reactions through FMO approach.</li> </ul>	4
CHEM-H-P -14	Organic Chemistry-V	<ul style="list-style-type: none"> <li>i) To give a thorough experiments on chromatographic separations of different ammino acids, dyes, sugars etc.</li> <li>ii) Key idea of spectroscopic analysis of organic compounds of <sup>1</sup>H-NMR and IR spectroscopy of certain compounds.</li> </ul>	2
CHEM-H-T DSE-3	Crystal Structure, Statistical Thermodyna- mics, Special selected topics,	<ul style="list-style-type: none"> <li>i) To enrich students with the knowledge of details of crystal structure and its determination method of solid compounds.</li> <li>ii) To introduce concept of statistical thermodynamics and its applications.</li> <li>iii) To give knowledge about macromolecules and its formation kinetics.</li> </ul>	4
CHEM-H-P DSE-3	Advanced Physical Chemistry	To benefits students with the knowledge of computerapplications in aspects of solving various numerical problems of chemistry.	2

CHEM-H-T-DSE-4 and CHEM-H-P-DSE-4	Project Work	<p>i) To manifest the total CBCS curriculum knowledge by each student to plan and execute a specific work with necessary literature survey with some laboratory work</p> <p>ii) The outcome should be presented by each student in students to take the research work in their future carrier.</p>	4

➤ **Program Course wise Credit Distribution and Outcome**

Course	Total no of Papers	Total Credit		Core competence	Critical Thinking	Analytical Reasoning	Research Skill	Team Work
		Theory	Practical					
Core Courses	12	48	24	√	√	√	√	√
Discipline Specific Elective	6	24	12	√	√	√	√	√
Skill Enhancement	4	8	-	√	√	X	X	X

**CBCS 1<sup>st</sup> SEM Program and GE**

Course code	Course title	Course Outcome	Credit
CHEM-G-T-1	Atomic Structure, Chemical Periodicity, Acids and Bases, Redox Reactions, General	To give clear concepts about Atomic Structure, Chemical Periodicity, Acids and Bases, Redox Reactions, and elementary idea about stereochemistry	4

	Organic Chemistry & Aliphatic Hydrocarbons	substitution and elimination reactions and aliphatic hydrocarbons.	
CHEM-G-P-1	Inorganic Chemistry -I & Organic Chemistry-I	<p>i) To introduce estimation processes through Permanganometry, dichromatometry, iodometry and acid-base mixture.</p> <p>ii) To learn identification of single solid through Qualitative analysis.</p>	2

### CBCS 2nd SEM Program & GE

Course code	Course title	Course Outcome	Credit
CHEM-G-T-2	States of Matter & Chemical Kinetics, Chemical Bonding & Molecular Structure, P-Block	<p>i) To give a comprehensive idea about Kinetic theory of gases, liquids, solids and Chemical kinetics.</p> <p>ii) To give thorough idea about chemical bonding and molecular structure and properties of p-block elements.</p>	4
CHEM-G-P-2	Physical Chemistry – I & Inorganic Chemistry – II	<p>i) Experiments on kinetics, viscosity, surface tension through different apparatuses.</p> <p>ii) Qualitative semi-micro analysis of 3 radicals.</p>	2

### CBCS 3rd SEM Program

Course code	Course title	Course Outcome	Credit
CHEM-G-T	Chemical	i) To give clear idea about thermodynamics,	4
CHEM-G-T-3	Energetics, Equilibria, Organic Chemistry- II	chemical equilibria and ionic equilibria. i) To introduce elementary functional group approach for different reactions of aromatic hydrocarbons, organometallic compounds, aryl halides, alcohol, phenol, ethers and carbonyl compounds.	
CHEM-G-P-3	Physical Chemistry - II & Organic Chemistry - II	i) To study different experiments of thermochemistry, ionic equilibria and solubility. ii) Identification of few pure organic compounds.	2

### CBCS 4th SEM Program

Course code	Course title	Course Outcome	Credit
CHEM-G-T-4	Solutions, Phase Equilibria, Conductance, Electrochemistry, Transition Metal & Coordination Chemistry	i) To understand the transport property, phase equilibria, electrochemistry and concepts of solutions. ii) To introduce transition elements (3d) and its relations with the coordination chemistry and crystal field theory.	4
CHEM-G-P-4	Physical Chemistry - III & Inorganic Chemistry - III	i) Hands-on experiment on equilibrium, conductometric and potentiometric titration. ii) To give idea on Complexometric estimation and complex synthesis	2

### CBCS 5th SEM Program lesson Plan

Course code	Course title	Course Outcome	Credit
CHEM-G-T DSE-5	Analytical, Environmental and Industrial Chemistry	To give introductory idea about Analytical, Environmental and Industrial Chemistry	4
CHEM-G-P DSE-5	Analytical and Environmental Chemistry	Experiment on acid-base redox reaction to identify the pH range and estimation of hardness of water and strength of H <sub>2</sub> O <sub>2</sub> sample.	2

### CBCS 6th SEM Program lesson Plan

Course code	Course title	Course Outcome	Credit
CHEM-G-T DSE-2	Advanced Organic Chemistry and Industrial Chemistry	<ol style="list-style-type: none"><li>i) To take again the functional group approach for different organic reactions of carboxylic acids and their derivatives, diazonium salts, amino acids and carbohydrates</li><li>ii) To explain the basic concepts of different chemical products from industries.</li></ol>	4
CHEM-G-P DSE-2	Advanced Organic Chemistry & Industrial Chemistry	<ol style="list-style-type: none"><li>i) To learn certain nitration and condensation reactions and derive yield of the crude product.</li><li>ii) To learn experiment for estimation of different commercial products</li></ol>	2

# Dumkal College

Dumkal, Murshidabad

(Affiliated to the University of Kalyani)

Department of Mathematics

## Course Outcomes of Mathematics Honours and Program/General Course (B.SC) (Under CBCS System)

<b>PROGRAMME OUTCOME</b>	<p>Formulate and develop mathematical arguments in a logical manner. Also when there is a need for information, the student will be able to identify, locate, evaluate, and effectively use than information for handling issues or solving problems at hand. Acquire good knowledge and understanding in advanced areas of mathematics and its applications. More specifically-</p> <ul style="list-style-type: none"><li>• Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.</li><li>• A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.</li><li>• Ability to analyse a problem, identify and define the computing requirements, which may be appropriate to its solution.</li><li>• Introduction to various courses like group theory, ring theory, field theory, metric spaces, number theory.</li><li>• Enhancing students' overall development and to equip them with mathematical modelling abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.</li><li>• Ability to pursue advanced studies and research in pure and applied mathematical science.</li></ul>
<b>PROGRAMME SPECIFIC OUTCOME</b>	<p>Students will be able to apply critical thinking skills to solve problems that can be modelled mathematically, to critically interpret numerical and graphical data, to read and construct mathematical arguments and proofs, to use computer technology appropriately to solve problems and to promote understanding, to apply mathematical knowledge to a career related to mathematical sciences thus cultivating a proper attitude for higher learning in mathematics. Students will be able to</p> <ul style="list-style-type: none"><li>• Think in a critical manner.</li><li>• Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.</li></ul>

	<ul style="list-style-type: none"> <li>• Formulate and develop mathematical arguments in a logical manner.</li> <li>• Acquire good knowledge and understanding in advanced areas of mathematics and statistics, chosen by the student from the given courses.</li> <li>• Understand, formulate and use quantitative models arising in social science, Business and other contexts.</li> </ul>
<b>LEARNING OUTCOME</b>	Students will be well equipped to critically analyze a given problem, understand and build a mathematical model to represent the problem, solve the resulting equations and interpret the resulting solution. Students are well prepared for higher studies in their chosen field.
<b>COURSES</b>	<b>OUTCOMES</b> (On completion of the courses, the students will be able to understand-)
<b>MATH-H-CC-T-01</b> <b>Course title: Calculus &amp; Analytical Geometry</b>  After the completion of this course the students will be able to conceptualize the basic concepts about calculus and 2D, 3D Geometry.	<ul style="list-style-type: none"> <li>• Hyperbolic functions and its derivative, higher order derivatives, Leibnitz rule and its applications.</li> <li>• Pedal equations.</li> <li>• Curvature, radius of curvature, centre of curvature, circle of curvature</li> <li>• Asymptotes.</li> <li>• Singular points, concavity and inflection points.</li> <li>• Curve tracing in Cartesian coordinates, tracing in polar coordinates of standard curves.</li> <li>• L'Hospital's rule, applications in business, economics and life sciences.</li> <li>• Reduction formulae, derivations and illustrations of reduction formulae of different type.</li> <li>• Parametric equations, parameterizing a curve, arc length of a curve, arc length of parametric curves, area under a curve, area and volume of surface of revolution, techniques of sketching conics.</li> </ul>

	<ul style="list-style-type: none"> <li>● Transformation of coordinate axes, pair of straight lines, reflection properties of conics, canonical form second degree equations, classification of conics using the discriminant, polar equations of conics.</li> <li>● Straight lines in 3D, sphere, cylindrical surfaces. central conicoids, paraboloids, plane sections of conicoids, generating lines, classification of quadrics, illustrations of graphing standard quadric surfaces like cone, ellipsoid.</li> </ul>
<p><b>Course: MATH-H-CC-T-02</b>  <b>Course title: Algebra</b></p> <p>This course is designed to make students aware of knowledge of Classical Algebra which will be useful in solving real life problems. Also they will acquire knowledge about abstract concepts like Group Theory.</p>	<ul style="list-style-type: none"> <li>● Polar representation of complex numbers, <math>n</math>-th roots of unity, De Moivre's theorem for rational indices and its applications. Direct and inverse circular form of trigonometric and hyperbolic functions. Exponential &amp; Logarithm of a complex number.</li> <li>● Relation between roots and coefficients, transformation of equation, Descartes rule of signs, solution of cubic equation (Cardan's method).</li> <li>● Well-ordering property of positive integers, division algorithm, divisibility and Euclidean algorithm. Congruence relation between integers. Principles of mathematical induction, statement of fundamental theorem of arithmetic.</li> <li>● Equivalence relations and partitions. Functions, composition of functions, Invertible functions, one to one correspondence and cardinality of a set.</li> <li>● Permutations, cycle notation for permutations, even and odd permutations.</li> <li>● Definition and elementary properties of groups. Symmetries of a square, dihedral groups, quaternion groups (through matrices). Permutation group, alternating group, finite groups. The group of integers under addition modulo <math>n</math> and the group of units under multiplication modulo <math>n</math>.</li> <li>● Order of an element, order of a group, simple properties.</li> </ul>

	<ul style="list-style-type: none"> <li>● Orthogonal matrix and its properties. Rank of a matrix, inverse of a matrix, characterizations of invertible matrices. Row reduced and echelon forms, Normal form and congruence operations.</li> <li>● Solutions of systems of linear equations and their applications.</li> </ul>
<p><b>Course: MATH-H-GE-T-01, MATH-G-CC-T-01, MATH-H-GE-T-03</b>  <b>Course title: Algebra &amp; Analytical Geometry</b></p> <p>This particular course is designed for Generic Elective and Programme Courses to provide a vivid understanding of Complex Numbers, basic Linear and Abstract Algebra and Geometry.</p>	<ul style="list-style-type: none"> <li>● Complex numbers De Moivre's theorem and its applications. Exponential, Sine, Cosine and Logarithm of a complex number. Definition of <math>az</math>. Inverse circular and hyperbolic functions.</li> <li>● Polynomials: Fundamental theorem of algebra (Statement only). Polynomials with real coefficients, nature of roots of an equation (surd or complex roots occur in pairs). Statement of Descartes rule of signs and its applications. Relation between roots and coefficients, transformations of equations. Cardan's method of solution of a cubic equation.</li> <li>● Rank of a matrix: Determination of rank either by considering minors or by sweep-out process. Consistency and solution of a system of linear equations with not more than 3 variables by matrix method.</li> <li>● Equivalence relations and partitions. Functions, composition of functions, invertible functions, one to one correspondence and cardinality of a set</li> <li>● Definition and elementary properties of groups. Concepts of permutation Group, alternating group, finite groups. The group of integers under addition modulo <math>n</math>.</li> <li>● Order of an element, order of a group, subgroups and examples of subgroups.</li> <li>● Transformations of rectangular axes: Translation, rotation and their combinations. Invariants.</li> <li>● General equation of second degree in <math>x</math> and <math>y</math>: Reduction to canonical forms. Classification of conics.</li> <li>● Pair of straight lines: Condition that the general equation of 2nd degree may represent two straight lines. Point of intersection of two intersecting straight lines. Angle between two lines. Equation of two lines joining the origin to the points in which a line meets a conic.</li> <li>● Polar equation of straight lines and circles, polar equation of a conic refers to a focus as a pole, polar equation of chord joining two points, polar equations of tangents and normals.</li> </ul>

**Course: MATH-H-CC-T-03**

**Course title: Real Analysis**

After completion of this course, the students will be able to think about the basic proof techniques and fundamental definitions related to the real numbers system. They can demonstrate some of the fundamental theorems of analysis. The students will gradually develop Analysis skills in sets, sequences and infinite series of Real Numbers covered by the three respective units. Students will be able to understand the concept of real-valued functions, limit, continuity, and differentiability in detail. They can find expansions of real functions in series forms, a clear-cut idea on sequence and series of functions defined on a set. The students will become conversant with many of the important theorems of Differential Calculus after the completion of this Core Course.

- The natural numbers Peano's axioms.
- Review of algebraic and order properties of Real Numbers.
- Bounded above sets, bounded below sets, bounded sets, unbounded sets. L.U.B. (supremum) and G.L.B. (infimum) of a set and its properties. L.U.B. axiom or order completeness of Real Numbers.
- Idea of countable sets, uncountable sets and uncountability of Real Numbers. . Countability of Rational Numbers.
- The Archimedean property, density of rational (and irrational) numbers in Real Numbers.
- Intervals,  $\varepsilon$ -neighbourhood of a point in Real Numbers, interior points and open sets, limit points and closed sets, union and intersection of open and closed sets, isolated points, adherent point, derived set, closure of a set, interior of a set.
- Illustrations of Bolzano-Weierstrass theorem for sets. Upper and lower limits of a subset of Real Numbers
- Compact set in Real Numbers, basic properties of compact sets. Lindelöf covering theorem (statement only). Heine-Borel theorem and its application. Converse of Heine-Borel theorem.
- Sequences, bounded sequence, convergent sequence, limit of a sequence.
- Limit theorems. Sandwich theorem. Nested interval theorem.
- Monotone sequences, monotone convergence theorem.
- Subsequences, divergence criteria. Monotone subsequence theorem (statement only).
- Bolzano Weierstrass theorem for sequences.
- Cauchy sequence, Cauchy's convergence criterion, Cauchy's 1st and 2nd limit theorems.
- Infinite series, convergence and divergence of infinite series, Cauchy criterion.
- Tests for convergence: comparison test, limit comparison test, ratio test: D'Alembert's ratio test, Raabe's test, Cauchy's root test, Gauss test (Statement only), integral test, Cauchy's condensation test with examples.
- Alternating series, Leibnitz test. Absolute and conditional convergence.

**Course: MATH-H-CC-T-04**  
**Course title: Differential Equations**

On completion of this course, the student will be able to identify the type of a given differential equation and select and apply the appropriate analytical technique for finding the solution. The students will be well conversant with different types of differential equations.

- Differential equations and mathematical models.
  - General, particular, explicit, implicit and singular solutions of a differential equation.
  - Separable equations and equations reducible to this form.
  - Exact differential equations and integrating factors.
  - Linear equation and Bernoulli equations, special integrating factors and transformations.
- First order and higher
- degree differential equations, solvable for  $x, y$  and  $p$ , Clairaut's Equations general and singular solutions.
  - Lipschitz condition and Picard's Theorem (Statement only).
  - . General solution of homogeneous equation of second order, principle of superposition for homogeneous equation.
  - Wronskian: its properties and applications, linear homogeneous and non-homogeneous equations of higher order with constant coefficients.
- Euler's equation, method of undetermined coefficients.
  - Method of variation of parameters.
  - Systems of linear differential equations.
  - Types of linear systems.
  - Differential operators.
  - An operator method for linear systems with constant coefficients.
  - Basic Theory of linear systems in normal form.
  - Homogeneous linear systems with constant coefficients, two Equations in two unknown functions.
  - Equilibrium points.
  - Interpretation of the phase plane.
- Power series solution of a differential equation about an ordinary point, solution about a regular singular point.
- Partial differential equations – Basic concepts and definitions. Mathematical problems.
  - First- order equations: classification, construction and geometrical interpretation, Lagrange's method, Charpit's method.
  - Method of characteristics for obtaining general solution of quasi-linear equations.

	<ul style="list-style-type: none"> <li>• Canonical forms of first-order linear equations.</li> </ul> <p>Method of separation of variables for solving first order partial differential equations.</p>
<p><b>Course: MATH-H-GE-T-02, MATH-G- CC-T-02, MATH-H-GE-T-04</b></p>	<ul style="list-style-type: none"> <li>• Real-valued functions defined on an interval, limit and Continuity of a function. Algebra of limits. Differentiability of a function.</li> </ul>
<p><b>Course title: Calculus &amp; Differential Equations</b></p> <p>On Completion of this course the students will be able to:</p> <ul style="list-style-type: none"> <li>• Explain the relationship between the derivative of a function as a function and the notion of the derivative as the slope of the tangent line to a function at a point.</li> <li>• Compare and contrast the ideas of continuity and differentiability. To inculcate to solve algebraic equations and inequalities involving the sequence root and modulus function.</li> <li>• To able to calculate limits in indeterminate forms by a repeated use of L' Hospital rule.</li> <li>• To know the chain rule and use it to find derivatives of composite functions.</li> <li>• To find maxima and minima, critical points and inflection points of functions and to determine the concavity of curves.</li> <li>• To able to evaluate integrals of rational functions by partial fractions.</li> <li>• Distinguish between linear, nonlinear, partial and ordinary differential equations.</li> </ul>	<ul style="list-style-type: none"> <li>• Successive derivative Leibnitz's theorem and its application to problems.</li> <li>• Partial derivatives. Euler's theorem on homogeneous function of two and three variables.</li> <li>• Indeterminate Forms L'Hospital's Rule (Statement and Problems only).</li> <li>• Statement of Rolle's Theorem and its geometrical interpretation. Mean value theorems of Lagrange and Cauchy. Statements of Taylor's and Maclaurin's theorems with Lagrange's and Cauchy's forms of remainders. Taylor's and Maclaurin's infinite series of various functions.</li> <li>• Application of the principle of maxima and minima for a function of a single variable.</li> <li>• Reduction formulae, derivations and illustrations of reduction formulae</li> <li>• First order equations: (i) Exact equations and those reducible to such equations. (ii) Euler's and Bernoulli's equations (Linear). (iii) Clairaut's Equations General and Singular solutions.</li> <li>• Second order differential equation: (i) Method of variation of parameters, (ii) Method of undetermined coefficients.</li> </ul>

<ul style="list-style-type: none"> <li>• Solve basic application problems described by second order linear differential equations with constant coefficients.</li> <li>• Find power series solutions about ordinary points and singular points. Find the transforms of derivatives and integrals.</li> <li>• Obtain an approximate set of solution function values to a second order boundary value problem using a finite difference equation</li> </ul>	
<p><b>Course: MATH-H-CC-T-05</b>  <b>Course title: Theory of Real &amp; Vector Functions</b></p> <p>In this course students will learn about fundamental concepts of real analysis and vector functions and applications of different vector differential operators on them.</p>	<ul style="list-style-type: none"> <li>• Limits of functions (<math>\epsilon - \delta</math> approach). Sequential criterion for limits. Divergence criteria. Limit theorems, one sided limits. Infinite limits and limits at infinity.</li> <li>• Continuous functions, neighbourhood property. Sequential criterion for continuity and discontinuity. Algebra of continuous functions. Continuous functions on an interval,</li> <li>• Bolzano's Theorem, intermediate value theorem. Location of roots theorem, preservation of intervals theorem.</li> <li>• Uniform continuity, non-uniform continuity criteria, uniform continuity theorem.</li> <li>• Differentiability of a function at a point and in an interval.</li> <li>• Caratheodory's theorem.</li> <li>• Algebra of differentiable functions.</li> <li>• Darboux's theorem.</li> <li>• Rolle's theorem.</li> <li>• Lagrange's and Cauchy's mean value theorems.</li> <li>• Taylor's theorem with Lagrange's and Cauchy's forms of remainder.</li> <li>• application of Taylor's theorem to convex functions.</li> </ul>

	<ul style="list-style-type: none"> <li>● Applications of mean value theorem to inequalities and approximation of polynomials.</li> <li>● Relative extrema, interior extremum theorem.</li> <li>● Taylor's series and Maclaurin's series expansions of exponential and trigonometric functions.</li> <li>● Application of Taylor's theorem to inequalities.</li> <li>● Vector products.</li> <li>● Introduction to vector functions, operations with vector-valued functions.</li> <li>● Limits and continuity of vector functions.</li> <li>● Differentiation and integration of vector functions of one variable.</li> <li>● Gradient, divergence, curl of vector functions.</li> </ul>
<p><b>Course: MATH-H-CC-T-06</b>  <b>Course title: Group Theory-I</b></p> <p>On the completion of this course, the students will understand the basic concepts of Group Theory in Abstract/Modern Algebra.</p>	<ul style="list-style-type: none"> <li>● Subgroups, examples and properties of subgroups.</li> <li>● Product of two subgroups.</li> <li>● Cyclic group, examples and properties of cyclic group.</li> <li>● Classification of subgroups of cyclic groups.</li> <li>● Cosets and their properties.</li> <li>● Lagrange's theorem and consequences including Fermat's little theorem.</li> <li>● External direct product of a finite number of groups.</li> <li>● Centre of a group, centralizer, normalizer.</li> <li>● Normal subgroups.</li> <li>● Factor groups.</li> <li>● Cauchy's theorem for finite abelian groups.</li> </ul>
	<ul style="list-style-type: none"> <li>● Group homomorphisms, basic properties of homomorphisms.</li> <li>● Cayley's theorem.</li> <li>● Properties of isomorphisms.</li> <li>● First, second and third isomorphism theorems.</li> </ul>

<p><b>Course: MATH-H-CC-T-07</b>  <b>Course title: Numerical Methods (Theory) &amp; Numerical Methods Lab</b></p> <p>After completion of this course, the students will be able to apply numerical methods to obtain approximate solutions to mathematical problems, solve the nonlinear equations, system of linear equations and interpolation problems using numerical methods, examine the appropriate numerical differentiation and integration methods to solve problems, apply the numerical methods to solve algebraic as well as differential equations.</p>	<ul style="list-style-type: none"> <li>● Algorithms, convergence, errors, relative, absolute, round-off, truncation errors.</li> <li>● Interpolation, Lagrange and Newton's methods. Error bounds. Finite difference operators. Gregory forward and backward difference interpolation. Central difference interpolation formula: Stirling and Bessel interpolation</li> <li>● Numerical differentiation, methods based on interpolations, methods based on finite differences.</li> <li>● Numerical integration, Newton Cotes formula, Trapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th rule, Weddle's rule, Boole's rule. Midpoint rule, composite trapezoidal rule, composite Simpson's 1/3rd rule, Gauss quadrature formula.</li> <li>● Transcendental and polynomial equations, bisection method, Newton's method, secant method, Regula-Falsi method, fixed point iteration, Newton-Raphson method, rate of convergence of these methods.</li> <li>● System of linear algebraic equations, Gaussian elimination and Gauss Jordan methods, Gauss Jacobi method, Gauss Seidel method and their convergence analysis, LU decomposition</li> <li>● The algebraic eigenvalue problem, power method.</li> <li>● Approximation, least square polynomial approximation.</li> <li>● Ordinary differential equations: The method of successive approximations, Euler's method, the modified Euler method, Runge-Kutta methods of orders two and four.</li> </ul>
<p><b>Course: MATH-H-SEC-T-1A</b>  <b>Course title: Programming in 'C'</b></p> <p>For any of the CAS (Computer aided software), students are introduced to Datatypes-simple data types, floating datatypes, character data types, arithmetic operators and operator precedence, variables and constant declarations, expressions, input/output, relational operators, logical operators and logical expressions, control statements and loop statements, Arrays. The students become expert in solving different numerical problems (listed below) by using computer programming techniques of C.</p>	<ul style="list-style-type: none"> <li>● Brief historical development. Computer generation. Basic structure and elementary ideas of computer systems, operating systems, hardware and software.</li> <li>● Positional number systems: Binary, octal, decimal, hexadecimal systems. Binary arithmetic.</li> <li>● BIT, BYTE, WORD. Coding of data -ASCII, EBCDIC, etc.</li> <li>● Algorithms and flow chart: Important features, ideas about complexities of algorithms. Application in simple problems.</li> <li>● Programming language and importance of 'C' programming.</li> <li>● Constants, variables and data type of 'C'-Program: Character set. Constants and variables data types, expression, assignment statements, declaration.</li> <li>● Operation and expressions: Arithmetic operators, relational operators, logical operators.</li> <li>● Decision making and branching: Decision making with if statement, if-else statement, nesting if statement, switch statement, break and continue statement.</li> <li>● Control statements: While statement, do-while statement, for statement.</li> <li>● Arrays: One-dimension, two-dimensional and multidimensional arrays, declaration of arrays, initialization of one and multi-dimensional arrays.</li> <li>● User-defined Functions: Definition of functions, scope of variables, return values</li> </ul>

	and their types, function declaration, function call by value, nesting of functions, passing of arrays to functions, recurrence of function.
<p><b>Course: MATH-G-CC-T-03</b>  <b>Course title: Real Analysis</b></p> <p>After completing the course students are expected to be able to:  Describe the basic difference between the rational and real numbers. Give the definition of concepts related to metric spaces such as continuity, compactness, convergent etc.  Give the essence of the proof of Bolzano Weierstrass theorem, the contraction theorem as well as existence of convergent subsequence using equicontinuity.  Evaluate the limits of wide class of real sequences.  Determine whether or not real series are convergent by comparison with standard series or using the ratio test. Understand and perform simple proofs. Students will be able to demonstrate basic knowledge of key topics in classical real analysis.  The course provides the basic for further studies with in function analysis, topology &amp; function Theory. They will also know about sequence and series and their convergence.</p>	<ul style="list-style-type: none"> <li>● Review of algebraic and order properties of <math>\mathbb{R}</math>.</li> <li>● Idea of countable sets, uncountable sets and uncountability of <math>\mathbb{R}</math>. Countability of <math>\mathbb{Q}</math>.</li> <li>● Bounded above sets, bounded below sets, bounded sets, unbounded sets. Suprema and infima.</li> <li>● Completeness property of <math>\mathbb{R}</math> and its equivalent properties.</li> </ul> <p>The Archimedean property, density of rational (and Irrational) numbers in <math>\mathbb{R}</math>, intervals.</p> <ul style="list-style-type: none"> <li>● Intervals, <math>\epsilon</math>-neighborhood of a point in <math>\mathbb{R}</math>, Interior points, Limit points of a set, isolated points, open set, closed set, union and intersection of open and closed sets. derived set, Closure of a set, Interior of a set.</li> <li>● Bolzano-Weierstrass theorem for sets.</li> <li>● Sequences, bounded sequence, convergent sequence, Sandwich theorem.</li> <li>● Cauchy's convergence criterion for sequences. Cauchy's theorem on limits</li> <li>● Monotone sequences, monotone convergence theorem</li> <li>● Infinite series, Convergence and divergence of infinite series, Cauchy's criterion.</li> <li>● Series of positive terms, Geometric Series, p-Series.</li> <li>● Tests for convergence: comparison test, limit comparison test, ratio test: D'Alembert's ratio test, Raabe's test, Cauchy's root test.</li> <li>● Alternating series, Leibnitz test (without proof), definition and examples of Absolute and conditional convergence.</li> </ul> <p>Power series and radius of convergence</p>
<p><b>Course: MATH-G-SEC-T-1B</b>  <b>Course title: Vector Calculus</b></p> <p>Vector calculus motivates the study of vector differentiation and integration in two and three dimensional spaces. It is widely accepted as a prerequisite in various fields of science and engineering. This course intends to solve practical problems wherever applicable.</p>	<ul style="list-style-type: none"> <li>● Differentiation and partial differentiation of a vector function. Derivative of sum, dot product and cross product of two vectors.</li> <li>● Gradient, divergence and curl with applications.</li> <li>● Vector integration: Line, surface and volume integrals.</li> </ul> <p>Green's theorem (statement only), surface integrals, integrals over parametrically defined surfaces. Stoke's theorem (statement only), divergence theorem (statement only). Applications of Green's, Stoke's and divergence theorems.</p>

<p><b>Course: MATH-H-CC-T-08</b>  <b>Course title: Ring Theory &amp; Linear Algebra</b></p> <p>After completion of this course, the students will mainly be able to</p> <ul style="list-style-type: none"> <li>• Develop a concept on Ring Theory of Abstract Algebra in details.</li> <li>• Understand vector spaces over a field and subspaces and apply their Properties.</li> <li>• Understand linear independence and dependence.</li> <li>• Find the basis and dimension of a vector space, and understand the Change of basis.</li> <li>• Compute linear transformations, kernel and range, and inverse linear Transformations, and find matrices of general linear transformations.</li> <li>• Find eigenvalues and eigenvectors of a matrix and of linear Transformation.</li> <li>• The Cayley-Hamilton Theorem and its use in finding the inverse of a matrix</li> <li>• Understand various concepts of Abstract &amp; Linear Algebra.</li> </ul>	<ul style="list-style-type: none"> <li>• Definition and examples of rings. Properties of rings.</li> <li>• Subrings.</li> <li>• Integral domains and fields. Characteristics of a ring.</li> <li>• Ideal, ideal generated by a subset of a ring.</li> <li>• Factor rings.</li> <li>• Operations on ideals.</li> <li>• Prime and maximal ideals.</li> <li>• Ring homomorphisms, properties of ring homomorphisms.</li> <li>• Isomorphism theorems I, II and III.</li> <li>• Field of quotients.</li> <li>• Concept of Vector space over a field: Examples, concepts of Linear combinations, linear dependence and independence of a finite number of vectors.</li> <li>• Sub-space, concepts of generators and basis of a finite dimensional vector space.</li> <li>• Replacement theorem. Extension theorem. Deletion theorem and their applications.</li> <li>• Row space, column space.</li> <li>• Euclidean Spaces. Orthogonal and orthonormal vectors. Gram-Schmidt process of orthogonalization.</li> <li>• Linear transformations. Null space. Range, rank and nullity of a linear transformation, matrix representation of a linear transformation, algebra of linear transformations.</li> <li>• Eigenvalues, eigen vectors and characteristic equation of a matrix. Matrix polynomials, Cayley-Hamilton theorem and its use in finding the inverse of a matrix.</li> <li>• Diagonalization, Canonical forms.</li> </ul>
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<p><b>Course: MATH-H-CC-T-09</b>  <b>Course title: Multivariate Calculus &amp; Tensor Analysis</b></p> <p>After completion of this unit of the course which covers the following topics on multiple integrals, line integrals etc., the student will be able to apply these concepts to solve many real-life problems that may arise in different fields.</p>	<ul style="list-style-type: none"> <li>● Functions of several variables, limit and continuity of functions of two or more variables.</li> <li>● Differentiability and total differentiability. Partial differentiation.</li> <li>● Sufficient condition for differentiability. Schwarz Theorems, Young's Theorems.</li> <li>● Chain rule for one and two independent parameters.</li> <li>● Homogeneous function and Euler's theorem on homogeneous functions and its converse.</li> <li>● Jacobians and functional dependence.</li> <li>● Extrema of functions of two variables, method of Lagrange multipliers, constrained optimization problems.</li> <li>● Double integration over a rectangular region. Double integration over non-rectangular regions. Double integrals in polar coordinates.</li> <li>● Triple integrals. Triple integral over parallelepiped and solid regions. Volume by triple integrals, cylindrical and spherical coordinates.</li> <li>● Change of variables in double integrals and triple integrals.</li> <li>● Directional derivatives. The gradient, maximal and normal property of the gradient.</li> <li>● Line integrals, applications of line integrals: Mass and work. Fundamental theorem for line integrals, conservative vector fields, independence of path.</li> <li>● Green's theorem, surface integrals, integrals over parametrically defined surfaces. Stoke's theorem, The divergence theorem. Applications of Green's, Stoke's and divergence theorems.</li> <li>● A tensor as a generalized concept of a vector and its generalization. Space of <math>n</math>-dimension. Transformation of coordinates. Summation convention.</li> <li>● Definition of scalar or invariant. Contravariant, covariant vectors and tensors, mixed tensors of arbitrary order. Kronecker delta.</li> <li>● Equality of tensors, addition, subtraction of two tensors.</li> </ul>
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	<ul style="list-style-type: none"> <li>● Outer product of tensors, contraction and inner product of tensors.</li> <li>● Symmetric and skew symmetric tensors.</li> <li>● Quotient law, reciprocal tensor of a tensor.</li> <li>● Metric tensor, Christoffel symbol, covariant derivative.</li> </ul>
<p><b>Course: MATH-H-CC-T-10</b>  <b>Course title: Linear Programming Problems &amp; Game Theory</b></p> <p>The objective of this course is to study basic theory of Linear Programming, Integer Programming and Two-Person Zero-Sum Games with economic applications. The emphasis is on the formulation of the mathematical model, and also on the methods for solving linear and integer programming problems. Students will get knowledge on the basic theory and some models of Linear Programming, Integer Programming and Game Theory.</p>	<ul style="list-style-type: none"> <li>● Introduction to linear programming problems. Mathematical formulation of LPP. Graphical solution.</li> <li>● Convex sets. Basic solutions (B.S.) and non-basic solutions. Reduction of B.F.S from B.S.</li> <li>● Theory of simplex method. Optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables, two-phase method. Big-M method and their comparison.</li> <li>● Duality, formulation of the dual problem, primal-dual relationships, economic interpretation of the dual.</li> <li>● Transportation problem and its mathematical formulation, northwest-corner method, least cost method and Vogel approximation method for determination of initial basic solution. Algorithms for solving transportation problems.</li> <li>● Assignment problem and its mathematical formulation, Hungarian method for solving assignment problems.</li> <li>● Travelling Salesman Problems.</li> <li>● Game theory: Formulation of two-person zero sum games.</li> <li>● Solving two persons zero sum games. Games with mixed strategies. Graphical solution procedure.</li> <li>● Solving game using simplex algorithm.</li> </ul>

<p><b>Course: MATH-G-CC-T-04</b>  <b>Course title: Linear Programming Problems &amp; Game Theory</b></p> <p>This course studies the fundamentals of Linear Programming: the simplex algorithm, duality theory and matrix games. We will cover the whole syllabus including the study of games: cooperative and non-cooperative games, zero sum games, non-zero sum games and more.</p>	<ul style="list-style-type: none"> <li>● Introduction to linear programming problems, Graphical solution of LPP.</li> <li>● Convex sets. Basic solutions and non-basic solutions. Reduction of B.F.S from B.S.</li> <li>● Simplex method, two-phase method, Big- method and their comparison.</li> <li>● Duality, formulation of the dual problem, primal-dual relationships, economic interpretation of the dual.</li> <li>● Transportation problem and its mathematical formulation, northwest-corner method, least cost method and Vogel's approximation method for determination of initial basic solution. Algorithms for solving transportation problems.</li> <li>● Assignment problem and its mathematical formulation, Hungarian method for solving assignment problem.</li> <li>● Game theory: formulation of two-person zero sum games.</li> <li>● Solving two-person zero sum games. Games with mixed strategies. Graphical solution procedure.</li> <li>● Solving game Using Simplex Algorithm.</li> </ul>
<p><b>Course: MATH-G-SEC-T-2A</b>  <b>Course title: Graph Theory</b></p> <p>This is a standard course in graph theory, assuming little introductory knowledge of graphs. It aims to present all usual basic concepts of graph theory, graph properties (with simplified proofs) and formulations of typical graph problems. This is also supplemented with some abstract-level algorithms for the presented problems, and with some advanced graph theory topics. At the end of the course, successful students shall understand in depth and tell all the basic terms of graph theory; be able to reproduce the proofs of some fundamental statements on graphs; be able to solve new graph problems; and be ready to apply this knowledge in (especially) computer science applications.</p>	<ul style="list-style-type: none"> <li>● Definition, examples and basic properties of graphs, pseudo graphs, complete graphs, bi-partite graphs, isomorphism of graphs.</li> <li>● Eulerian circuits, Eulerian graphs, semi-Eulerian graphs, Hamiltonian cycles.</li> <li>● Representation of a graph by matrix, the adjacency matrix, incidence matrix, weighted graph.</li> <li>● Travelling salesman's problem, shortest path, Tree and their properties, spanning tree, Dijkstra's algorithm, Warshall algorithm.</li> </ul>

<p><b>Course: MATH-H-SEC-T-2A</b>  <b>Course title: Logic &amp; Boolean Algebra</b></p> <p>This course is designed to introduce basic concepts of Logic and Boolean Algebra to undergraduate students. After completion students will be able to use logic and Boolean algebra to solve problems.</p> <ul style="list-style-type: none"> <li>• Use truth tables and laws of identity, distributive, commutative, and domination.</li> <li>• Simplify and prove Boolean expressions</li> <li>• Compute sum of products and product of sum expansions.</li> <li>• Convert Boolean expressions to logic gates and vice-versa.</li> </ul> <p>Will learn about different lattices and Boolean algebra.</p>	<ul style="list-style-type: none"> <li>• Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contrapositive and inverse propositions and precedence of logical operators.</li> <li>• Propositional equivalence, Logical equivalences.</li> <li>• Predicates and quantifiers: Introduction, quantifiers, binding variables and negations.</li> <li>• Definition, examples and basic properties of ordered sets, maps between ordered sets, duality principle.</li> <li>• Lattices as ordered sets, lattices as algebraic structures, sublattices, products and homomorphisms.</li> <li>• Definition, examples and properties of modular and distributive lattices, Boolean algebras, Boolean polynomials, minimal and maximal forms of Boolean polynomials.</li> </ul> <p>Quinn-McCluskey method, Karnaugh diagrams, logic gates, switching circuits and applications of switching circuits.</p>
<p><b>Course: MATH-H-CC-T-11</b>  <b>Course title: Partial Differential Equations &amp; Applications</b></p> <p>This course aims to solve real life problems associated with PDEs</p>	<ul style="list-style-type: none"> <li>• Partial differential equations – Basic concepts and definitions. Mathematical problems. First-order equations: classification, construction and geometrical interpretation. Method of characteristics for obtaining general solution of quasi linear equations. Canonical forms of first-order linear equations. Method of separation</li> <li>• Derivation of heat equation, wave equation and Laplace equation. Classification of second order linear equations as hyperbolic, parabolic or elliptic. Reduction of second order linear equations to canonical forms.</li> <li>• The Cauchy problem, Cauchy-Kowalewskaya theorem, Cauchy problem of an infinite string. Initial boundary value problems. Semi-infinite string with a fixed end, semi-infinite string with a free end. Equations with non-</li> </ul> <p>The Cauchy problem, Cauchy-Kowalewskaya theorem, Cauchy problem of an infinite string. Initial boundary value problems. Semi-infinite string with a fixed end, semi-infinite string with a free end. Equations with non-homogeneous boundary conditions. Non-homogeneous wave equation. Method of separation of variables, solving the vibrating string problem. Solving the heat conduction problem of variables for solving first order partial differential equations.</p>
<p><b>Course: MATH-H-CC-T-12</b>  <b>Course title: Group Theory II</b></p> <p>After completion of this course, the students will be able to demonstrate the mathematical maturity of understanding the advanced aspects of Group Theory.</p>	<ul style="list-style-type: none"> <li>• Automorphism, inner automorphism, automorphism groups, automorphism groups of finite and infinite cyclic groups, applications of factor groups to automorphism groups, Characteristic subgroups, Commutator subgroup and its properties.</li> <li>• Properties of external direct products, the group of units modulo <math>n</math> as an external direct product, internal direct products, Fundamental theorem of finite abelian group</li> </ul>

	<ul style="list-style-type: none"> <li>• Groups acting on themselves by conjugation, class equation and consequences, conjugacy in <math>S_n</math>, p-groups, Sylow's theorems and consequences, Cauchy's theorem, Simplicity of <math>A_n</math> for <math>n \geq 5</math>, non-simplicity tests.</li> </ul>
<p><b>Course: MATH-H-DSE-T-1A</b>  <b>Course title: Linear Programming</b></p>	<ul style="list-style-type: none"> <li>• Introduction to linear programming problem. Theory of simplex method, graphical solution, convex sets, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables, two-phase method. Big-M method and their comparison.</li> <li>• Duality, formulation of the dual problem, primal-dual relationships, economic interpretation of the dual. Transportation problem and its mathematical formulation, northwest-corner method, least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem, assignment problem and its mathematical formulation, Hungarian method for solving assignment problem.</li> </ul> <p>Game theory: formulation of two persons zero sum games, solving two-person zero sum games, games with mixed strategies, graphical solution procedure, linear programming solution of games.</p>
<p><b>Course: MATH-H-DSE-T-2A</b>  <b>Course title: Probability and Statistics</b></p> <p>The main objective of this course is to provide students with the foundations of probabilistic and statistical analysis mostly used in varied applications in engineering and science like disease modeling, climate prediction and computer networks etc.</p>	<ul style="list-style-type: none"> <li>• Sample space, probability axioms, real random variables (discrete and continuous), cumulative distribution function, probability mass/density functions, mathematical expectation, moments, moment generating function, characteristic function, discrete distributions: uniform, binomial, Poisson, geometric, negative binomial, continuous distributions: uniform, normal, exponential.</li> <li>• Joint cumulative distribution function and its properties, joint probability density functions, marginal and conditional distributions, expectation of function of two random variables, conditional expectations, independent random variables, bivariate normal distribution, correlation coefficient.</li> <li>• Chebyshev's inequality, statement and interpretation of (weak) law of large numbers and strong law of large numbers. Central limit theorem for independent and identically distributed random variables with finite variance.</li> </ul> <p>Random Samples, Sampling Distributions, Estimation of parameters, Testing of hypothesis.</p>

<p><b>MATH-G-DSE-T-1A</b>  <b>Course title: Matrices and Linear Algebra</b></p>	<ul style="list-style-type: none"> <li>• Types of matrices. Rank of a matrix. Invariance of rank under elementary transformations. Reduction to normal form, Solutions of linear homogeneous and non-homogeneous equations with number of equations and unknowns upto four.</li> <li>• Matrices in diagonal form. Reduction to diagonal form upto matrices of order 3. Computation of matrix inverses using elementary row operations. Rank of matrix. Solutions of a system of linear equations using matrices.</li> <li>• Illustrative examples of above concepts from Geometry, Physics, Chemistry, Combinatorics and Statistics.</li> <li>• Vector spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces.</li> <li>• Linear transformations, null space, range, rank and nullity of a linear transformation, matrix representation of a linear transformation, algebra of linear transformations. Dual Space, Dual Basis, Double Dual, Eigen values and Eigen vectors, Characteristic Polynomial, Isomorphisms, Isomorphism</li> </ul>
<p><b>Course: MATH-G-SEC-T-3B</b>  <b>Course title: Vector Calculus</b></p>	<ul style="list-style-type: none"> <li>• Differentiation and partial differentiation of a vector function. Derivative of sum, dot product and cross product of two vectors.</li> <li>• Gradient, divergence and curl with applications</li> </ul> <p>Vector integration. Line, Surface and Volume integrals.</p>
<p><b>Course: MATH-H-CC-T-13</b>  <b>Course title: Metric Spaces and Complex Analysis</b></p> <p>On successful completion of the course students will be able to develop conceptual understanding of metric spaces and complex analysis. The students will be able to demonstrate understanding of the basic concepts and fundamental definitions underlying complex analysis. They can prove and explain concepts of series and integration of complex functions and clearly understand problem-solving using complex analysis, techniques.</p>	<ul style="list-style-type: none"> <li>• Metric spaces: sequences in metric spaces, Cauchy sequences. Complete metric spaces, Cantor's theorem.</li> <li>• Continuous mappings, sequential criterion and other characterizations of continuity. Uniform continuity. Compactness and connectedness in metric spaces. Compactness: Sequential compactness, Heine-Borel property, totally bounded spaces, finite intersection property, and continuous functions on compact sets. Homeomorphism..</li> <li>• Limits, limits involving the point at infinity, continuity. Properties of complex numbers, regions in the complex plane, functions of complex variable, mappings. Derivatives, differentiation formulas, Cauchy-Riemann equations, sufficient conditions for differentiability.</li> </ul> <p>Analytic functions, examples of analytic functions, exponential function, logarithmic function, trigonometric function, derivatives of functions, and definite integrals of functions. Contours, Contour integrals and its examples, upper bounds for moduli of contour integrals. Cauchy- Goursat theorem, Cauchy integral formula.</p>

<p><b>Course: MATH-H-CC-T-14</b>  <b>Course title: Ring Theory and Linear Algebra II</b></p>	<ul style="list-style-type: none"> <li>• Ring homomorphisms, properties of ring homomorphisms. Isomorphism theorems I, II and III, field of quotients. Polynomial rings over commutative rings, division algorithm and consequences, principal ideal domains, factorization of polynomials, reducibility tests, irreducibility tests, Eisenstein criterion, and unique factorization in <math>\mathbb{Z}[x]</math>.</li> <li>• Dual spaces, dual basis, double dual, transpose of a linear transformation and its matrix in the dual basis, annihilators. Eigen spaces of a linear operator.</li> </ul> <p>Diagonalizability, invariant subspaces and Cayley-Hamilton theorem, the minimal polynomial for a linear operator, canonical forms, Inner product spaces and norms, Gram-Schmidt orthogonalisation process, orthogonal complements.</p>
<p><b>Course: MATH-H-DSE-T-3B</b>  <b>Course title: Number Theory</b></p>	<ul style="list-style-type: none"> <li>• Linear diophantine equation, prime counting function, statement of prime number theorem, Goldbach conjecture, linear congruences, complete set of residues. Chinese remainder theorem, Fermat's little theorem, Wilson's theorem.</li> <li>• Number theoretic functions, sum and number of divisors, totally multiplicative functions, definition and properties of the Dirichlet product, the Mobius Inversion formula, the greatest integer function, Euler's phi-function, Euler's theorem, reduced set of residues, some properties of Euler's phi-function.</li> <li>• Order of an integer modulo <math>n</math>, primitive roots for primes, composite numbers having primitive roots, Euler's criterion, the Legendre symbol and its properties, quadratic reciprocity, quadratic congruences with composite moduli. Public key encryption, RSA encryption and decryption, the equation <math>x^2 + y^2 = z^2</math>, Fermat's Last theorem.</li> </ul>
<p><b>Course: MATH-H-DSE-T-4A</b>  <b>Course title: Mechanics</b></p> <p>After completion of this course, the students will be able to learn and explain different concepts on Mechanics including Statics.</p>	<ul style="list-style-type: none"> <li>• Co-planar forces. Astatic equilibrium. Friction. Equilibrium of a particle on a rough curve. Virtual work.. Forces in three dimensions. General conditions of equilibrium. Centre of gravity for different bodies. Stable and unstable equilibrium.</li> <li>• Central force. Constrained motion, varying mass, tangent and normal components of acceleration, modelling ballistics and planetary motion, Kepler's second law.</li> <li>• Equations of motion referred to a set of rotating axes. Motion of a projectile in a resisting medium. Stability of nearly circular orbits. Motion under the inverse square law. Slightly disturbed orbits. Motion of artificial satellites. Motion of a particle in three dimensions. Motion on a smooth sphere, cone, and on any surface of revolution.</li> </ul> <p>Degrees of freedom. Moments and products of inertia. Momental Ellipsoid. Principal axes. D'Alembert's Principle. Motion about a fixed axis. Compound pendulum. Motion of a rigid body in two dimensions under finite and impulsive forces. Conservation of momentum and energy.</p>

<p><b>Course: MATH-G-DSE-T-2A</b>  <b>Course title: Linear Programming</b></p>	<ul style="list-style-type: none"> <li>● Introduction to linear programming problems. Theory of simplex method, graphical solution, convex sets, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables, two-phase method. Big-M method and their comparison.</li> <li>● Duality, formulation of the dual problem, primal-dual relationships, economic interpretation of the dual. Transportation problem and its mathematical formulation, northwest-corner method, least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem, assignment problem and its mathematical formulation, Hungarian method for solving assignment problem.</li> <li>● Game theory: formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies, graphical solution procedure, linear programming solution of games.</li> </ul>
<p><b>Course: MATH-G-SEC-T-4A</b>  <b>Course title: Probability and Statistics</b></p> <p>After completion of this course, the students will be able to understand &amp; apply the concepts of probability &amp; statistics.</p>	<ul style="list-style-type: none"> <li>● Sample space, probability axioms, real random variables (discrete and continuous), cumulative distribution function, probability mass/density functions, mathematical expectation, moments, moment generating function, characteristic function, discrete distributions: uniform, binomial, Poisson, continuous distributions: uniform, normal, exponential.</li> <li>● Joint cumulative distribution function and its properties, joint probability density functions, marginal and conditional distributions, expectation of function of two random variables, conditional expectations, independent random variables.</li> </ul>

**Dumkal College,**  
**Dumkal, Murshidabad**  
**Under the University of Kalyani**  
**Department of Geography**  
**Course Outcomes of Geography Honours and**  
**Programme/General Course (B.A. & B.SC.)**  
**(Under CBCS System)**

Geography is the study of space, time, areal differentiation and the logical relationships between inhabitants and their environments. Main aims of Geographers are to look at both the physical properties of Earth's surface and the human societies spread across it. They also inspect how human culture interacts with the natural environment and the way those locations and places can have an impact on people. Geography seeks to understand where things are located, why they are there, and who act, where act and how they act for their self-survive with changes of time. Philosophy of geography studies the diverse environments and spaces of Earth's surface and their interactions. It seeks to answer of the set of questions i . e . , where things are located, why they are there, and who act, where act and how they act? Present now, geography study on human beings from different aspects for perceiving human behavior, response to nature, geopolitics, etc.

**Syllabus in Geography following Choice Based Credit System (CBCS):**

**INTRODUCTION:** In conformity with up-to-date directives from the University Grants Commission, the undergraduate syllabus for Geography is reframed into Choice Based Credit System largely following the model syllabus prepared by the West Bengal State Council of Higher Education.

The main objective of this new curriculum is to give the students a holistic understanding of the subject, putting equal weightage to the core content and techniques used in Geography. The syllabus tries to give equal importance to the two main branches of Geography: Physical and Human.

The principal goal of the syllabus is to enable the students to secure a job at the end of the undergraduate programme. Keeping this in mind and in tune with the changing nature of Geography, adequate emphasis is rendered on applied aspects of the subject such as emerging techniques of mapping and field-based data generation, especially in the honours course. The syllabus emphasizes on development of basic skills of the subject, so that everyone need not go for higher studies in search of professional engagement or employment.

**LEARNING OUTCOMES:** This syllabus is designed to impart basic knowledge on geography as a spatial science and train the undergraduates to secure employment in the sectors of geospatial analysis, development and planning, mapping and surveying.

## **Syllabus at a Glance:**

### **Honours Course: Core Subjects**

**GEO/H/CC/T/01 – Geotectonic and Geomorphology-**

**GEO/H/CC/T&P/02 – Cartographic Techniques  
and Geological Map Study**

**GEO/H/CC/T/03 – Human Geography**

**GEO/H/CC/T&P/04 – Cartograms, Thematic Mapping and  
Surveying**

**GEO/H/CC/T/05 – Climatology**

**GEO/H/CC/T&P/06 – Statistical Methods in Geography**

**GEO/H/CC/T/07- Geography of India**

**GEO/H/CC/T/08– Regional Planning and Development**

**GEO/H/CC/T/09- Economic Geography**

**GEO/H/CC/T&P/10- Environmental Geography**

**GEO/H/CC/T&P/11 – Research Methodology and**

**Fieldwork**

**GEO/H/CC/T&P/12 – Remote Sensing &GIS**

**GEO/H/CC/T/13 – Evolution of Geographical Thought**

**GEO/H/CC/T&P/14 – Disaster Management**

### **Honours Course: Choices for Four Discipline Specific Electives (DSE)**

**GEO/H/DSE/T/01/A –Settlement Geography**

**GEO/H/DSE/T/02/A – Population Geography**

**GEO/H/DSE/T/03/A -Resource Geography**

**GEO/H/DSE/T/04/A-Soil and Biogeography geography**

### **Honours Course: Choices for Two Skill Enhancement Courses (SEC)**

**GEO/H/SEC/P/01/A – Computer Basic and  
Computer Application**

**GEO/H/SEC/P/02/A – Advance Spatial Statistical  
techniques**

### **General Course: Core Subjects**

**GEO/G/CC/T&P/01- Geotectonic and  
geomorphology and Scale and Cartography**

**GEO/G/CC/T&P/02 –Climatology, Soil and  
Bio Geography and Surveying and leveling**

**GEO/G/CC/T&P/03- Human Geography  
and Map projection and Map Interpretation**

**GEO/G/CC/T&P/04- Environmental  
Geography and Field Work**

General Course: Choices for Two Discipline Specific Electives (DSE)

**GEO/G/DSE/T/01/A- Geography of India**

**GEO/G/DSE/T/02/A- Disaster Management**

General Course: Choices for Four Skill Enhancement Courses (SEC)

**GEO/G/SEC/P/01/B – Computer Basic and  
Computer Application**

**GEO/G/SEC/P/02/A – Advance Spatial Statistical  
techniques**

**GEO/G/SEC/P/03/ B –Collection, Mapping and Interpretation of Climatic Data**

**GEO/G/SEC/P/04/ B –Rock and Minerals and Their Megascopic Identification**

**Generic Elective: (GE)**

GEO/H/GE/T/01/A– Disaster Management

GEO/H/GE/T/02/ B –Regional

Development GEO/H/GE/T/03/ B –Rural

Development GEO/H/GE/T/04/Sustainable

Development

## COURSE OUTCOMES (Honours)

Following are the course outcomes of the different papers presented below. After ending of the course the student will be capable to:

Course Code	Course Title	Credits	Course Outcomes
GEO/H/C C/T/01	Geotectonics and Geomorphology	6	<ul style="list-style-type: none"> <li>• Understand the theories and fundamental concepts of Geotectonic and Geomorphology. Understand earth's tectonic and structural evolution. Gain knowledge about earth's interior. Develop an idea about concept of plate tectonics, and resultant landforms.</li> <li>• Acquire knowledge about types of folds and faults and earthquakes, volcanoes and associated landforms.</li> <li>• Understanding crustal mobility and tectonics; with special emphasis on their role in landform development.</li> <li>• Overview and critical appraisal of landform development models.</li> <li>• Ability to record temperature, pressure, humidity and rainfall</li> <li>• Develop the skills of identification of features and correlation between them.</li> <li>• Do field surveys using appropriate techniques.</li> <li>• Identification of rocks and minerals.</li> </ul>
GEO/H/C C/T&P/ 02	Cartographic Techniques	4+2=6	<ul style="list-style-type: none"> <li>• Understand and prepare different kinds of maps.</li> <li>• Recognize basic themes of map making.</li> <li>• Development of observation skills.</li> </ul>
GEO/H/C C/T/03	Human Geography	6	<ul style="list-style-type: none"> <li>• Gain knowledge about major themes of human Geography.</li> <li>• Acquire knowledge on the history and evolution of humans.</li> <li>• Understand the approaches and processes of Human Geography as well as the diverse patterns of habitat and adaptations.</li> <li>• Develop an idea about space and society</li> </ul>

GEO/H/C C/T&P/ 04	Thematic Mapping and Surveying	4+2=6	<ul style="list-style-type: none"> <li>• Comprehend the concept of scales and representation of data through cartograms.</li> <li>• Interpret geological and weather maps.</li> <li>• Learn the usages of survey instruments.</li> <li>• Brings direct interaction of different types of surveying instruments like Dumpy level and Theodolite with environment.</li> <li>• Develop an idea about different types of thematic mapping techniques.</li> </ul>
<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>	<b>Course Outcomes</b>
GEO/H/C C/T/05	Climatology	6	<ul style="list-style-type: none"> <li>• Understand the elements of weather and climate, different atmospheric phenomena and climate change.</li> <li>• Learn to associate climate with other environmental and human issues. Approaches to climate classification.</li> <li>• To analyze the dynamics of the Earth's atmosphere and global climate. Assessing the role of man in global climate change.</li> <li>• Prepare various climatic maps and charts and interpret them.</li> <li>• Learn to use of various meteorological instruments.</li> <li>• Learn the interaction between the atmosphere and the earth's surface. Understand the importance of the atmospheric pressure and winds.</li> <li>• Understand how atmospheric moisture works.</li> </ul>
GEO/H/C C/T&P/ 06	Statistical Method in Geography	4+2=6	<ul style="list-style-type: none"> <li><input type="checkbox"/> e Learn the significance of statistics in geography. Understand the importance of use of data in geography</li> <li><input type="checkbox"/> Recognize the importance and application of Statistics in Geography</li> <li><input type="checkbox"/> Interpret statistical data for a holistic understanding of geographical phenomena.</li> </ul> <p>Know about different types of sampling.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Develop an idea about theoretical distribution.</li> <li><input type="checkbox"/> Learn to use tabulation of data.</li> </ul> <p>Gain knowledge about association and correlation.</p>

GEO/H/C C/T/07	Geography of India	6	<ul style="list-style-type: none"> <li>• Analyse the concepts of Hydrology and Oceanography</li> <li>• Emphasizing the significance of groundwater quality and its circulation</li> <li>• Evaluate the role of the global hydrological cycle.</li> <li>• Studying the behavior and characteristics of the global oceans.</li> <li>• Realize the importance of water conservation.</li> <li>• Identify marine resources and characteristics of ocean waters.</li> </ul> <p>Interpret hydrological and rainfall dispersion graphs and diagrams.</p>
<b>Course Code      Course Title      Credits      Course Outcomes</b>			
GEO/H /SEC/P /01/A	Computer Basic and Computer Application	2	<ul style="list-style-type: none"> <li>• Students will learn basic concept on computer</li> <li>• Attainment of knowledge on numeric and binary number system in computer technology</li> <li>• Microsoft excels, PowerPoint, Word etc of computer applications will be more helpful for representation of different geographical concept.</li> <li>• Different cartographic techniques can be shown with the help of computer applications for best understanding</li> </ul>
GEO/H/C C/T/08	Regional Planning and Development	6	<ul style="list-style-type: none"> <li><input type="checkbox"/> Understand and identify regions as an integral part of geographical study.</li> <li><input type="checkbox"/> Appreciate the varied aspects of development and regional disparity, in order to formulate measures of balanced development.</li> <li><input type="checkbox"/> Analyzing the concept of regions and regionalization. Studying typical physiographic, planning, arid and biotic regions of India. Understanding the detailed geography of India.</li> <li><input type="checkbox"/> Gain knowledge about definition of region, evolution and types of regional planning. Develop an idea about choice of a region for planning.</li> <li><input type="checkbox"/> Build an idea about theories and models for regional planning. Know about measuring development indicators.</li> <li><input type="checkbox"/> They can know about delineation of formal regions by weighted index method and also delineation of functional regions by breaking point analysis.</li> <li><input type="checkbox"/> Gain knowledge about measuring inequality by</li> <li><input type="checkbox"/> Location Quotient, and also measuring regional disparity by Sopher Index</li> </ul>

GEO/H/C C/T/09	Economic Geography	6	<ul style="list-style-type: none"> <li><input type="checkbox"/> Understand the concept of economic activity, factors affecting location of economic activity. Gain knowledge about different types of Economic activities</li> <li><input type="checkbox"/> Assess the significance of Economic Geography, the concept of economic man and theories of choice.</li> <li><input type="checkbox"/> Analyze the factors of location of agriculture and industries.</li> <li><input type="checkbox"/> Understand the evolution of varied types of economic activities.</li> <li><input type="checkbox"/> Map and interpret data on production, economic indices, transport network and flows.</li> </ul>
GEO/H/CC/T &P/10	Environmental Geography	4+2=6	<ul style="list-style-type: none"> <li>• Gain comprehensive Knowledge about man- environment relationship.</li> <li>• They will attain a holistic approach about environment.</li> <li>• Student will gather constructive and sustainable knowledge on different aspect of environment from geographical point of view.</li> <li>• They will be capable to examine environment health trough soil sample test, air quality assessment etc.</li> </ul>

<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>	<b>Course Outcomes</b>
GEO/H/C C/T&P/ 11 –	Research Methodology and Fieldwork	4+2=6	<ul style="list-style-type: none"> <li>• Have expertise in identification of area of study, methodology, quantitative and qualitative analysis, and conclusions to be drawn about the area – fundamental to geographical research.</li> <li>• Handle logistics and other emergencies on field.</li> <li>• Develop skills in photography, mapping and video recording.</li> </ul>
GEO/H /SEC/P /02/A	Advance Spatial Statistical techniques	2	<ul style="list-style-type: none"> <li>• Understand the concept of different advance spatial statistical techniques to analyze geographical data.</li> <li>• Develop skills on application of different techniques for analyzing geographical data for better evaluation and decision making.</li> <li>• Computer based statistical software will be more helpful for computing, analyzing data and its interpretation also.</li> <li>• Students will be able to make out about different aspect of statistical techniques which will be more helpful for socio economic data analysis.</li> </ul>
<b>Course Code</b>	<b>Course Title</b>	<b>Credits</b>	<b>Course Outcomes</b>
GEO/H/C C/T&P/ 12	Remote Sensing, GIS	4+2=6	<ul style="list-style-type: none"> <li>• Have knowledge of the principles of remote sensing, sensor resolutions and image referencing schemes.</li> </ul>

			<ul style="list-style-type: none"> <li>• Interpret satellite imagery and understand the preparation of false color composites from them.</li> <li>• Training in the use Geographic Information System (GIS) software for contemporary mapping skills.</li> <li>• Analyzing and interpreting remotely sensed satellite images and aerial photographs in order to understand topographical and cultural variations on the Earth's surface.</li> <li>• Conducting field excursions and preparation of field report on research on problem in different areas of India</li> <li>• Apply GIS to the preparation of thematic maps.</li> <li>• Use GNSS.</li> </ul>

GEO/H/C C/T/13	Evolution of Geographical Thought	6	<ul style="list-style-type: none"> <li>• Perceive the evolution of the philosophy of Geography.</li> <li>• Appreciate the contribution of the thinkers in Geography.</li> <li>• Give power point presentations on different schools of geographical thought.</li> <li>• Discussing the evolution of geographical thought from ancient to modern times.</li> <li>• Establishing relationship of Geography with other disciplines and man-environment relationships.</li> <li>• Analyzing modern and contemporary principles of Empiricism, Positivism, Structuralism, Human and Behavioral Approaches in Geography</li> </ul>
GEO/H/C C/T&P/ 14	Hazard Management	4+2=6	<ul style="list-style-type: none"> <li>• Understand the nature of hazards and disasters.</li> <li>• Assess risk, perception and vulnerability with respect to hazards.</li> <li>• Prepare hazard zonation maps.</li> <li>• Assessing the nature, impact and management of major natural and man-made hazards affecting the Indian subcontinent.</li> </ul>

## COURSE OUTCOMES

### (DISCIPLINE SPECIFIC ELECTIVES)

Course Code	Course Title	Credits	Course Outcomes
GEO/ H/DS E/T/01/A	Cultural and Settlement Geography	6	<ul style="list-style-type: none"> <li>• Understand the scope and content of cultural geography</li> <li>• Trace the development of cultural geography in relation to allied disciplines</li> <li>• Understand the concept of cultural hearth and realm, cultural diffusion, diffusion of religion</li> <li>• Develop an understanding of cultural segregation and cultural diversity, technology and development</li> <li>• Learn about the various races and racial groups of the world</li> <li>• Identify the cultural regions of India</li> <li>• Acquire knowledge about Rural settlements- Definition, nature and characteristics</li> <li>• Analyze the morphology of rural settlements</li> <li>• Learn the rural house types, census categories of rural settlements and idea of social segregation</li> <li>• Learn the census definition and categories of urban settlements</li> <li>• Analyze the urban morphology models of Burgess, Hoyt, Harris and Ullman</li> <li>• Differentiate between city-region and conurbation</li> <li>• Analyze the functional classification of cities</li> <li>• Develop the skill of mapping language distribution of India</li> <li>• Learn to plot proportional squares to illustrate housing distribution</li> <li>• Acquire the skill of identifying rural settlement types from topographical sheet</li>   <li>• Understand Social Area Analysis of a city based on Shevky and Bell</li> <li>• Acquired knowledge about population dynamics</li> <li>• Knowledge on different aspect of population's society, growth, sex, fertility, mortality, migration, population policies, gender disparity, etc will be developed among students.</li> <li>• Issues related to population in human society will be more perceptible among students</li> <li>• Capability of pupils shall be fruitful to identify problems in society and its probable solutions also.</li> </ul>

GEO/H/D SE/T/02/A	Population Geography	6	<ul style="list-style-type: none"> <li>• Acquired knowledge about population dynamics</li> <li>• Knowledge on different aspect of population’s society, growth, sex, fertility, mortality, migration, population policies, gender disparity, etc will be developed among students.</li> <li>• Issues related to population in human society will be more perceptible among students</li> </ul> <p>Capability of pupils shall be fruitful to identify problems insociety and its probable solutions also.</p>
G EO/H/D SE/T/03/A	Resource Geography	6	<ul style="list-style-type: none"> <li><input type="checkbox"/> Understand the concept and classification of resources</li> <li><input type="checkbox"/> Understand the approaches to resource utilization</li> <li><input type="checkbox"/> Appreciate the significance of resources</li> <li><input type="checkbox"/> Assess the pressure on resources</li> <li><input type="checkbox"/> Analyze the problems of resource3 depletion with special reference to forests, water and fossil fuels</li> <li><input type="checkbox"/> Understand the concept of Sustainable Resource development</li> <li><input type="checkbox"/> Understand the distribution, utilization, problems and management of metallic and non-metallic mineral resources</li> <li><input type="checkbox"/> Analyze the contemporary energy crisis and assess the future scenario</li> <li><input type="checkbox"/> Understand the concept of Limits to Growth, resource sharing and sustainable use of resources</li> <li><input type="checkbox"/> Develop the skill of mapping forest cover from satellite images</li> <li><input type="checkbox"/> Develop the skill of mapping water bodies from satellite images</li> <li><input type="checkbox"/> Analyze the decadal changes in state-wise production of coal and iron ore</li> </ul> <p>Learn to compute HDI</p>
GEO/H/D SE/T/04/A	Soil and Biogeography	6	<ul style="list-style-type: none"> <li><input type="checkbox"/> Have knowledge about the character and profile of different soil types.</li> <li><input type="checkbox"/> Understand the impact of man as an active agent of soil transformation, erosion and degradation.</li> <li><input type="checkbox"/> Recognize land capability and classify it.</li> <li><input type="checkbox"/> Explaining the Pedological and Edaphological Approaches to Soil Studies - Processes of soil formation, types of soil, and principles of soil and land classification;and management.</li> <li><input type="checkbox"/> Understand the varied ecosystems and classify them.</li> <li><input type="checkbox"/> Recognize the significance of biogeochemical cyclesand biodiversity.</li> <li><input type="checkbox"/> Comprehend the devastating impact of deforestation. Identify soil types and derive their pH.</li> </ul>

## Program Outcomes

- ❖ To understand the scope and evolution of the diverse discipline of Geography.
- ❖ Recognize, synthesize and evaluate diverse sources of knowledge, arguments and approaches pertinent to exploring human-environment problems. Explain societal relevance of geographical knowledge and apply it to real world human-environment issues.
- ❖ Appreciate and reflect critically on the importance of holistic and interpretative human-environment perspectives.
- ❖ An understanding and acknowledgment of the threats that endanger the earth's natural systems. This helps in further realization of the significance of anthropogenic causes of many of the disasters and threats that put life on this planet on the edge.
- ❖ Development of knowledge, skills and holistic understanding of the discipline among students. Encouragement of scientific mode of thinking and scientific method of enquiry in students. This goal is achieved through the regular field excursions conducted by the Department to various parts of India extensively and the writing of a report/thesis on it.
- ❖ Students become equipped with the ability to respond to both natural and man-made disasters and acquire management skills. This is attained through the curriculum by studying and analyzing hazards, disasters, their impact and management.
- ❖ Ability to undertake research in interdisciplinary studies and problems or issues beyond the realm of what strictly comes under the purview of geography. This is possible because of the varied nature of the curriculum that encompasses the study and analyses of concepts of sub-disciplines and allied disciplines of Geology, Seismology, Pedology, Environmental Studies, Disaster Management, Resource Management and Conservation, Regional Planning and Development Studies etc.

## Programme Specific Outcomes

- Student will gain the knowledge of physical geography. They will gather knowledge about the fundamental concepts of Geography and will have a general understanding about the geomorphologic and geotectonic process and formation. Imbibing knowledge, skills and holistic understanding of the Earth, atmosphere, oceans and the planet through analysis of landform development; crustal mobility and tectonics, climate change.
- Associating landforms with structure and process; establishing man-environment relationships; and exploring the place and role of Geography vis-a-vis other social and earth sciences. Students can easily correlate the knowledge of physical geography with the human geography. They will analyze the problems of physical as well as cultural environments of both rural and urban areas. Moreover they will try to find out the possible measures to solve those problems
- Developing a sustainable approach towards the ecosystem and the biosphere with a view to conserve natural systems and maintain ecological balance.
- The physical environment, human societies and local and/or global economic systems are integrated to the principles of sustainable development

- Inculcating a tolerant mindset and attitude towards the vast socio-cultural diversity of India by studying and discussing contemporary concepts of social and cultural geography. Explaining and analyzing the regional diversity of India through interpretation of natural and planning regions.
- Analyzing the differential patterns of the human habitation of the Earth, through studies of human settlements and population dynamics. Understanding and accounting for regional disparities, poverty, unemployment and the impacts of globalization
- Understanding the history of the subject; over viewing ancient and contemporary geographical thought and its relationship with modern concepts of empiricism, positivism, radicalism, behaviouralism , idealism etc.
- Sensitization and awareness about the hazards and disasters to which the subcontinent is vulnerable; and their management.
- As a student of the Course they will enrich their observation power through field experience and in future this will be helpful for identifying the socio- environmental problems of their community.
- Training in practical techniques of mapping, cartography, software, interpretation of maps, photographs and images etc; so as to understand the spatial variation of phenomena on the Earth's surface. They will learn how to prepare map based on GIS by using the modern geographical map making techniques.

**Dumkal College**  
Dumkal, Murshidabad  
(Affiliated to the University of Kalyani)  
Department of Economics  
**Course Outcomes of**  
**Economics(GE) for Students with Honours in Other Subjects**  
(Under CBCS System)

**Course Outcomes of Economics (Generic Elective)**

**Semester-wise break-up of Generic Elective for students having Honours in subjects other than Economics**

SemesterI	GenericElectiveCourseI(GE-I)	Code:(ECO-GE-1-1-TH-TU)
SemesterII	GenericElectiveCourseII(GE-II)	Code:(ECO-GE-2-2-TH-TU)
SemesterIII	GenericElectiveCourseIII(GE-III)	Code:(ECO-GE-2-2-TH-TU)
SemesterIV	GenericElectiveCourseIV(GE-IV)	Code:(ECO-GE-2-2-TH-TU)

**C. Generic elective courses (GE): 1. ECON—H -GE- T -01: Introductory Microeconomics**

**Course title: Introductory Microeconomics**

**COURSE OBJECTIVES:** The objective of the Introductory Microeconomics course is to provide students with a comprehensive understanding of the fundamental principles that govern the behavior of individual consumers, firms, and markets within the economy. Through this course, students will develop a strong foundation in microeconomic theory, enabling them to analyze and comprehend the intricate interactions between economic agents and their decision-making processes.

**COURSE CONTENT:** Exploring the subject matter of Economics. Why study economics? Scope and method of economics; the economic themes: scarcity and efficiency; thinking like an economist: the question of what to produce, how to produce and how to distribute output; marginal benefits and marginal costs; opportunity cost (private and social); the basic competitive model; prices. Supply and Demand: How Markets Work, Markets and Welfare Elementary theory of demand: determinants of household demand, market demand, and shifts in the market demand curve Elementary theory of supply: factors influencing supply, derivation of the supply curve, and shifts in the supply curve The elementary theory of market price: determination of equilibrium price in a competitive market; the effect of shifts in demand and supply; the excess demand function: Existence, uniqueness, and stability of equilibrium; consumer surplus and producer surplus; Elasticities and their applications. The Households The consumption decision – budget constraint, consumption and income and price changes, demand for all other goods and price changes; description of preferences – most preferred bundle and its properties; consumers' optimum choice. The Firm and Perfect Market Structure Defining a firm – firm's legal forms; profit maximization hypothesis, Technology-general concept of production function; returns to factor and returns to scale, isoquants and diminishing rate of factor substitution – elasticity of substitution. Short run and long run costs; cost curves in the short run and long run; relation between short run and long run costs.

## **2. ECON—H -GE- T -02: Introductory Macroeconomics**

### **Course Title: Introductory Macroeconomics**

**COURSE OBJECTIVES:** The primary objective of the Introductory Macroeconomics course is to equip students with a comprehensive understanding of the key principles that underlie the functioning of national economies. This course aims to provide students with a solid foundation in macroeconomic theory, enabling them to analyze and interpret the overall performance, growth, and stability of economies on a broader scale.

**COURSE CONTENT:** 11 National Income Accounting, unemployment and open economy issues What is Macroeconomics? Circular flow of income, closed and open economy. Macroeconomic data- National Income accounting and cost of living; Concept of Growth- role of savings, investment, Open Economy-; Concept of unemployment- Types and their characteristics. Income Determination in the short-run Simple Keynesian System: Multipliers; equilibrium in both closed and open economy and stability; autonomous expenditure, balanced budget, and net exports; paradox of thrift. IS-LM Model – concept of equilibrium, Money and Inflation Monetary system- definition and functions of money and determinants of money supply; inflation and its costs.

## **3. ECON-H-GE-T-3A: Intermediate Microeconomics – I**

### **Course Title: Intermediate Microeconomics – I**

**COURSE OBJECTIVES:** The objective of the Intermediate Microeconomics course is to provide students with a deeper understanding of the fundamental principles that govern individual consumer and producer behavior within the framework of a market economy. Building upon the foundational concepts introduced in introductory microeconomics, this course aims to equip students with advanced analytical tools and theoretical insights necessary for comprehending and analyzing more complex economic interactions.

**COURSE CONTENT:** Consumer Theory Cardinal utility; Preference; ordering and properties of ordinal utility; existence of utility functions, different utility functions and their properties, compensating and equivalent variation, Slutsky equation; consumption-leisure choice and labour supply; choice under uncertainty (expected utility and risk aversion), inter-temporal choice and savings decision; revealed preference approach. Production and Costs Technology – general concept of production function; returns to factor and returns to scale, isoquants and diminishing rate of factor substitution – elasticity of substitution – some examples of technology (fixed proportion, perfect substitute, Cobb-Douglas Production Function, CES Production Function), General concept of homogeneous and homothetic production function and their properties; production with one and more variable inputs; isocost line and firm's equilibrium and expansion paths; short run and long run costs; cost curves in the short run and long run: relation between short run and long run costs. Competitive Equilibrium Short run and long run equilibrium; determination of the supply curve of the firm and the industry: with reference to external economies and diseconomies of scale. Input market in perfect competition Derived demand for input, marginal product and marginal revenue product, input demand for competitive firm and competitive industry, returns to scale and product exhaustion.

### **3. ECON-H-GE-T-3B: Intermediate Macroeconomics – I**

#### **Course Title: Intermediate Macroeconomics – I**

**COURSE OBJECTIVES:** The objective of the Intermediate Macroeconomics course is to provide students with an in-depth exploration of the fundamental principles that underlie the functioning of economies on a national and global scale. Building upon the foundational concepts introduced in introductory macroeconomics, this course aims to equip students with advanced analytical tools and theoretical insights necessary for understanding and analyzing complex macroeconomic phenomena and policy implications.

**COURSE CONTENT:** Income Determination in the short-run IS-LM Model - equilibrium, stability and comparative statics; effects of fiscal and monetary policies, real balance effects; Aggregate Demand and Aggregate Supply Derivation of aggregate demand assuming price flexibility; Derivation of aggregate supply curves both in the presence and absence of wage rigidity; equilibrium, stability, and comparative statics-effects of monetary and fiscal policies; Unemployment and its causes- possible solutions, including real balance effect and wage cut policy. Inflation, Unemployment and Expectations What is inflation? Types and cost of Inflation. Inflation and unemployment trade-off Short run and long- run Phillips curve under adaptive expectations-outcome under rational expectations (non-rigorous).

### **4. ECON-H-GE-T-4A: Intermediate Microeconomics – II**

#### **Course Title: Intermediate Microeconomics – II**

**COURSE CONTENT:** General Equilibrium, Efficiency, and Welfare a) Exchange Economy, Consumption Allocation and Pareto Optimality; Edgeworth box and contract curve; Equilibrium and efficiency under pure exchange. b) Pareto efficiency with production: concepts of PPF, SIC, and resource allocation; c) Perfect competition, Pareto efficiency and market failure (externalities and public good); property right and Coase Theorem. Market Structure a) Monopoly; pricing with market power; degree of monopoly; price discrimination-different degrees; multiplant monopoly; peak-load pricing; two-part tariff; monopolistic competition. b) Oligopoly; Non collusive. (Cournot Equilibrium, Bertrand Equilibrium, Stackelberg Equilibrium, Kinked Demand Curve) ; concept of collusion and cartels; Input Market under Imperfect Competition Monopsony, bilateral monopoly in labour market; Externalities; public goods and markets with asymmetric information.

### **4. ECON-H-GE-T-4B: Intermediate Macroeconomics – II**

#### **ECON-H-GE-T-9 Course Title: Intermediate Macroeconomics – II**

**COURSE CONTENT:** Schools of Macroeconomic Thoughts Classical System: Say's law and quantity theory; Classical dichotomy and neutrality of money; Keynesian vs classical system. Macroeconomic Foundations Consumption: Keynesian consumption function; Fisher's theory of optimal intertemporal choice; life-cycle and permanent income hypotheses; Dusenberry's relative income hypothesis; Investment: MEC and MEI- Acceleration principle- fixed and variable. Demand for money: Regressive expectations and Tobin's portfolio choice models; Baumol's inventory theoretic money demand. Monetary Policy Government debt and Ricardian equivalence; high-powered money; money multiplier analysis; monetary policy – OMO, Bank rate, variable reserve ratio, repo and reverse repo. Economic Growth Harrod- Domar model and Solow one sector growth model; golden rule; dynamic efficiency, technological progress.

#### **Course Outcomes**

By the end of the course, students will be able to:

**Grasp Core Concepts:** Understand the basic concepts of microeconomics, including supply and demand, elasticity, consumer choice, production, costs, and market structures.

**Analyze Individual Behavior:** Examine how individuals make decisions based on utility maximization, rational choice, and constraints, and predict their responses to changes in prices, incomes, and other factors.

**Explore Firm Strategies:** Comprehend the strategies that firms employ to maximize profits, considering production costs, pricing decisions, and output levels in different market environments.

**Evaluate Market Equilibrium:** Analyze the interplay of supply and demand to determine market equilibrium, and predict the effects of shifts in supply and demand on prices and quantities traded.

**Understand Market Structures:** Differentiate between various market structures such as perfect competition, monopoly, monopolistic competition, and oligopoly, and assess their implications for efficiency, competition, and pricing.

**Study Welfare Economics:** Examine concepts of consumer and producer surplus, efficiency, and market failures, and evaluate the role of government intervention through policies like taxation, subsidies, and price controls.

**Apply Microeconomic Analysis:** Apply microeconomic principles to real-world scenarios, including labor markets, environmental economics, healthcare, and international trade, to make informed decisions and predictions.

**Enhance Critical Thinking:** Develop critical thinking skills by analyzing complex economic situations, understanding trade-offs, and identifying unintended consequences of various economic actions.

**Quantitative Analysis:** Utilize basic mathematical and graphical tools to illustrate economic concepts, interpret data, and solve microeconomic problems.

**Communicate Economic Ideas:** Effectively communicate economic ideas, arguments, and analysis using clear and concise language, both in written and oral formats.

**Foster Lifelong Learning:** Cultivate a curiosity for economic phenomena and provide a foundation for continuous learning in economics and related fields.

By achieving these learning objectives, students will gain a profound understanding of microeconomic principles, enabling them to interpret economic events, make informed decisions, and engage in discussions about economic policies and their implications.

## **ECO–GEII      Introductory Macroeconomics**

By the end of the course, students will be able to:

**Grasp Macroeconomic Concepts:** Understand fundamental concepts such as gross domestic product (GDP), inflation, unemployment, aggregate demand and supply, and economic growth.

**Analyze Economic Performance:** Evaluate the economic performance of a nation by interpreting key macroeconomic indicators and their implications for the overall health of the economy.

**Explore Fiscal and Monetary Policies:** Examine the role of fiscal policy (government spending and taxation) and monetary policy (central bank actions) in influencing economic activity, employment, and inflation.

**Understand Aggregate Demand and Supply:** Analyze the determinants of aggregate demand and supply, and comprehend how changes in these factors can lead to fluctuations in economic output and price levels.

**Study Business Cycles:** Investigate the nature of business cycles, including recessions and expansions, and understand their causes and consequences for individuals and businesses.

**Evaluate Long-Term Growth:** Examine the factors that contribute to long-term economic growth, including technological progress, human capital, and investment, and assess the role of economic policies in promoting sustainable growth.

**Explore International Trade and Finance:** Understand the principles of international trade, exchange rates, and balance of payments, and analyze how global economic factors impact national economies.

**Analyze Unemployment and Inflation:** Study the causes and consequences of unemployment and inflation, and explore the trade-offs between these two macroeconomic challenges.

**Understand Economic Policy Debates:** Engage with current economic policy debates, such as the role of government intervention, the impact of globalization, and the challenges posed by income inequality.

**Apply Macroeconomic Analysis:** Apply macroeconomic theories to real-world situations, both domestically and internationally, to assess economic trends, make predictions, and inform policy recommendations.

**Enhance Critical Thinking:** Develop critical thinking skills by analyzing complex macroeconomic phenomena, understanding the interactions between different macroeconomic variables, and identifying unintended consequences of economic policies.

**Communicate Macroeconomic Ideas:** Effectively communicate macroeconomic concepts, analyses, and policy recommendations using clear and concise language, both in written and oral formats.

**Foster Lifelong Learning:** Cultivate an ongoing interest in macroeconomic issues and provide a basis for continuous learning in economics and related fields.

By achieving these learning objectives, students will gain a deep understanding of macroeconomic principles, enabling them to interpret and evaluate the performance of national economies, contribute to economic discussions, and make informed decisions related to economic policy and financial planning.

By the end of this course, students will:

**Enhanced Conceptual Understanding:** Develop a more sophisticated comprehension of core microeconomic concepts, including utility maximization, cost minimization, market equilibrium, and consumer and producer surplus.

**Advanced Analysis:** Acquire advanced analytical techniques to evaluate the effects of changes in market conditions, prices, and policies on consumer and producer behavior. This includes the application of partial and general equilibrium analysis.

**Market Structures:** Explore different market structures, such as perfect competition, monopoly, oligopoly, and monopolistic competition. Understand the implications of market structure on pricing, output determination, and efficiency.

**Consumer Choice:** Deepen insights into consumer decision-making processes by studying topics like indifference curves, budget constraints, and the theory of demand. Analyze how changes in income and prices influence consumer choices.

**Producer Behavior:** Examine producer decisions regarding input usage, cost minimization, and output maximization. Understand the implications of various cost structures on firm behavior and market outcomes.

**Welfare Economics:** Investigate the concepts of Pareto efficiency and market failure. Study the conditions under which markets fail to allocate resources optimally, leading to the rationale for government intervention.

**Externalities and Public Goods:** Analyze cases of externalities, public goods, and common resources. Explore the challenges these situations pose to market efficiency and potential policy remedies.

**Asymmetric Information:** Understand how situations with asymmetric information, such as adverse selection and moral hazard, impact market outcomes and explore potential solutions.

**Applied Analysis:** Apply microeconomic concepts to real-world scenarios, including environmental issues, labor markets, and policy analysis, fostering critical thinking skills in economic analysis.

**Quantitative Skills:** Develop proficiency in using mathematical and graphical tools to model and solve intermediate-level microeconomic problems.

**Communication and Presentation:** Enhance the ability to communicate economic ideas, analyses, and conclusions effectively, both in writing and through oral presentations.

Overall, the Intermediate Microeconomics course aims to equip students with a comprehensive toolkit of theoretical and analytical skills, enabling them to make informed economic decisions, and contribute to discussions on various economic issues.

By the end of this course, students will:

**Advanced Macroeconomic Concepts:** Develop a deeper understanding of core macroeconomic concepts, including economic growth, inflation, unemployment, aggregate demand and supply, and the business cycle.

**Aggregate Demand and Supply Analysis:** Acquire advanced analytical techniques to analyze the determinants of aggregate demand and supply, and to understand their implications for economic fluctuations and stability.

**Macroeconomic Models:** Study and analyze macroeconomic models, including the Keynesian model, the neoclassical growth model, and the open economy model. Understand how these models provide insights into economic behavior and policy outcomes.

**Fiscal and Monetary Policy:** Explore the role of government and central banks in influencing economic performance through fiscal and monetary policies. Analyze the trade-offs, effectiveness, and limitations of various policy tools.

**Inflation and Unemployment:** Investigate the relationship between inflation and unemployment, exploring the Phillips curve and its implications for macroeconomic policy.

**Economic Growth:** Study the factors that contribute to long-term economic growth, including human capital, technological progress, and institutional factors. Analyze the role of policies in promoting sustainable economic growth.

**Open Economy Macroeconomics:** Examine the interactions between economies through international trade, exchange rates, and capital flows. Understand the implications of globalization for economic stability and policy choices.

**Financial Markets:** Explore the role of financial markets and institutions in shaping macroeconomic outcomes. Study the impact of monetary policy on interest rates, investment, and overall economic activity.

**Macro prudential Policy:** Introduce the concept of macroprudential policy, focusing on its role in maintaining financial stability and preventing systemic risks.

**Economic Fluctuations:** Analyze the causes and consequences of business cycles, including the role of aggregate demand shocks and supply-side factors. Understand the challenges of managing economic fluctuations.

**Policy Analysis:** Apply macroeconomic concepts to evaluate and analyze real-world policy issues, such as economic crises, fiscal stimulus, and central bank actions.

**Quantitative Tools:** Develop proficiency in using mathematical and graphical techniques to model and solve intermediate-level macroeconomic problems.

**Critical Thinking:** Enhance the ability to critically assess macroeconomic theories and policy recommendations, considering their assumptions, implications, and real-world applicability.

**Communication Skills:** Improve the communication of macroeconomic ideas and analyses through effective writing and oral presentation.

# Dumkal College

Dumkal, Murshidabad

(Affiliated to the University of Kalyani)

Department of Environmental Studies

## Course Outcomes of

## Environmental Studies

(Under CBCS System)

B.A. B.SC AND B.COM (HONOURS+PROGRAMME) (AECC-2 ) 1<sup>ST</sup> SEMESTER

### SEMESTER – I

The following topics will be discussed

CORE COURSE	COURSE OUTCOME
Unit – I Introduction to Environmental Studies	Students can obtain the basic concept of Environmental studies. They can acquire knowledge about different branches of science related with Environment. Students are also concerned about necessity and awareness about environment.
Unit – II Ecosystem	Students understand the relationship between plants and animals, Concept of photosynthesis process, food chain and food web, Energy flow, Food pyramid of biomass, pyramid of Energy different type of Ecosystems (Terrestrial and Aquatic Ecosystem)
Unit – III Natural Resources, Renewable and Non-renewable sources	Students gain knowledge of about the different disaster (Land degradation, Soil erosion, deforestation, flood, drought)
Unit – IV Biodiversity	Students attribute the basic knowledge of different types of biodiversity, importance, threats and necessity of biodiversity, realizing about “In-situ conservation” and “Ex-situ conservation” and get idea about trends of different plant and animal species. It also expresses primary concept of India as a mega- biodiversity nation. It also depicts the different sanctuaries and related states of India.

<p>Unit – V Environmental Pollution</p>	<p>Develop the key idea of reflection and contemporary assessment of Air, Water, Soil, Noise and radiation Pollution (Sources, detrimental effects and mitigation measures). Have insightful study about control measure of urban and industrial waste. Students are also informed about secondary pollutants, Eutrophication, oil spill pollution, DO, BOD, COD.</p>
<p>Unit – VI Environmental Policies and practices</p>	<p>Students realize about recent update about three Environmental Consequences</p> <ol style="list-style-type: none"> <li>i) Global Warming</li> <li>ii) Ozone layer depletion</li> <li>iii) Acid Rain and impacts upon human and Environment.</li> </ol> <p>Awareness about different types of Environmental Act and their implementation (Water Pollution Control Act (1974), Air Pollution control Act (1981), Environmental protection Act (1986), Wildlife Conservation Act (1972)</p> <p>Different International agreements (Kyoto Protocol, Montreal Protocol, CBD) which provides such information to abatement of Pollution.</p>
<p>Unit – VII Human Communities and Environment</p>	<ol style="list-style-type: none"> <li>1) Students know about human population growth and impacts on environment.</li> <li>2) Importance of different Environment movements like Chipko Movement, Silent valley Movement. Bishnoi of Rajasthan.</li> <li>3) Students can learn Environmental communication and public awareness (CNG Vehicle in India)</li> </ol>
<p>Unit- VIII Project /Field Work / Internal Assignment/ Internal Assessment</p>	<p>Students gain different activities by learning different types of projects providing by Teacher.</p> <ol style="list-style-type: none"> <li>i) Rain Water Harvesting</li> <li>ii) Global Warming</li> <li>iii) Green House Effect</li> <li>iv) Ozone layer depletion</li> </ol>

**COURSE OUTCOME DEPARTMENT  
OF ENVIRONMENTAL STUDIES  
B.A,B.SC AND B.COM (HONOURS+PROGRAMME) (AECC-2) B.A,B.SC  
AND B.COM (GENERAL/PROGRAMME) 2<sup>ND</sup> SEMESTER**

**SEMESTER – II**

**The following topics will be discussed**

CORE COURSE	COURSE OUTCOME
Unit – I Introduction to Environmental Studies	Students can obtain the basic concept of Environmental studies. They can acquire knowledge about different branches of science related with Environment. Students are also concerned about necessity and awareness about environment.
Unit – II Ecosystem	Students understand the relationship between plants and animals, Concept of photosynthesis process, food chain and food web, Energy flow, Food pyramid of biomass, pyramid of Energy different type of Ecosystems (Terrestrial and Aquatic Ecosystem)
Unit – III Natural Resources, Renewable and Non-renewable sources	Students gain knowledge of about the different disaster (Land degradation, Soil erosion, deforestation, flood, drought)
Unit – IV Biodiversity	Students attribute the basic knowledge of different types of biodiversity, importance, threats and necessity of biodiversity, realizing about “In-situ conservation” and “Ex-situ conservation” and get idea about trends of different plant and animal species. It also expresses primary concept of India as a mega- biodiversity nation. It also depicts the different sanctuaries and related states of India.

<p>Unit – V Environmental Pollution</p>	<p>Develop the key idea of reflection and contemporary assessment of Air, Water, Soil, Noise and radiation Pollution (Sources, detrimental effects and mitigation measures). Have insightful study about control measure of urban and industrial waste. Students are also informed about secondary pollutants, Eutrophication, oil spill pollution, DO, BOD, COD.</p>
<p>Unit – VI Environmental Policies and practices</p>	<p>Students realize about recent update about three Environmental Consequences</p> <ul style="list-style-type: none"> <li>i) Global Warming</li> <li>ii) Ozone layer depletion</li> <li>iii) Acid Rain and impacts upon human and Environment.</li> </ul>
	<p>Awareness about different types of Environmental Act and their implementation (Water Pollution Control Act (1974), Air Pollution control Act (1981), Environmental protection Act (1986), Wildlife Conservation Act (1972)</p>
	<p>Different International agreements (Kyoto Protocol, Montreal Protocol, CBD) which provides such information to abatement of Pollution.</p>
<p>Unit – VII Human Communities and Environment</p>	<ul style="list-style-type: none"> <li>1) Students know about human population growth and impacts on environment.</li> <li>2) Importance of different Environment movements like Chipko Movement, Silent valley Movement. Bishnoi of Rajasthan.</li> <li>3) Students can learn Environmental communication and public awareness (CNG Vehicle in India)</li> </ul>
<p>Unit- VIII Project /Field Work / Internal Assignment/ Internal Assessment</p>	<p>Students gain different activities by learning different types of projects providing by Teacher.</p> <ul style="list-style-type: none"> <li>i) Rain Water Harvesting</li> <li>ii) Global Warming</li> <li>iii) Green House Effect</li> <li>iv) Ozone layer depletion</li> </ul>

# Dumkal College

Dumkal, Murshidabad

(Affiliated to the University of Kalyani)

Department of Commerce

## Course Outcomes of

### Commerce Honours and Program/General Course (B Com)

(Under CBCS System)

Course Code	Course Name	<b>Courses Outcome:</b> After successfully completion of these subject wise courses students will be enable:
<i>SEMESTER-I</i>		
UG BCOM-H- CC-T-01	FINANCIAL ACCOUNTING - 1	<ul style="list-style-type: none"><li>➤ To enable the students to learn principles and concepts of Accountancy.</li><li>➤ Students are enabled with the Knowledge in the practical applications of accounting.</li><li>➤ To understand the methods of calculating profits under single entry System.</li><li>➤ To analyse what bank reconciliation statement is and understand about rectification of errors and suspense account</li><li>➤ To enable the students to learn the basic concepts of Partnership Accounting, and allied aspects of accounting.</li><li>➤ The student will get thorough knowledge on the accounting practice prevailing in partnership firms and other allied aspects.</li><li>➤ To find out the technical expertise in maintaining the books of accounts.</li><li>➤ To encourage the students about maintaining the books of accounts for further reference.</li><li>➤ To understand the various methods of calculating depreciation.</li></ul>
UG BCOM-H- CC-T-02	PRINCIPLES OF MANAGEMENT	<ul style="list-style-type: none"><li>➤ To develop knowledge about management.</li><li>➤ To understand the concept &amp; functions and importance of management and its application.</li><li>➤ To have a better understanding of planning and decision making.</li><li>➤ To give an idea about organisation, departmentation and delegation.</li></ul>

		<ul style="list-style-type: none"> <li>➤ To familiarise with directing, motivation theories, communication process and leadership. To provide idea about requirements of coordination, control process and MIS</li> <li>➤ To make the student understand principles, functions and different management theories.</li> </ul>
UG BCOM-H- GE-T-01	MICRO ECONOMICS	<ul style="list-style-type: none"> <li>➤ To provide students knowledge of Micro Economic concepts and inculcate an analytical approach to the subject matter.</li> <li>➤ To familiarizes the students with the basic concepts of micro economics and its applications to business situations.</li> <li>➤ To understanding the real world market situations &amp; business applications.</li> <li>➤ To arouse the students interest by showing the relevance and use of various economic theories.</li> <li>➤ To apply economic reasoning to solve business problems.</li> <li>➤ To identify Equilibrium, price and output decisions in various market forms</li> </ul>
UG BCOM-H- AECC-T- 01	ENVIRONMENT AL STUDIES	<ul style="list-style-type: none"> <li>➤ To makes students aware about the Business and Business Environment.</li> <li>➤ To makes students aware about waste management.</li> <li>➤ To exposes learners to the impact of Industrial development on Agriculture.</li> </ul>
<i>SEMESTER-II</i>		
UG BCOM-H- CC-T-03	MARKETING MANAGEMENT	<ul style="list-style-type: none"> <li>➤ To understand the Modern marketing concepts.</li> <li>➤ To gather practical knowledge and the tactics in the marketing.</li> <li>➤ To study and critically analyze the basic concepts and trends in Marketing.</li> <li>➤ To providing knowledge about marketing mix, segmentation, targeting and positioning.</li> <li>➤ To get clear idea of product planning, Diversification, Elimination and pricing strategies.</li> <li>➤ To summarize marketing of consumer goods, channels of distribution.</li> <li>➤ To aware of the recent changes in the field of marketing.</li> <li>➤ To practice and act of International marketing</li> </ul>
UG BCOM-H- CC-T-04	BUSINESS LAWS	<ul style="list-style-type: none"> <li>➤ The student will well verse in basic provisions regarding legal frame work governing the business world.</li> <li>➤ To know the students with the basic concepts, terms &amp;</li> </ul>

		<p>provisions of Mercantile and Business Laws.</p> <ul style="list-style-type: none"> <li>➤ To develop the awareness among the students regarding these laws affecting trade business, and commerce.</li> </ul>
UG BCOM-H-GE-T-02	BUSINESS MATHEMATICS AND STATISTICS	<ul style="list-style-type: none"> <li>➤ To use and understand useful functions in business as well as the concept of EMI.</li> <li>➤ To understand the different concept of population and sample and to make students familiar with Calculation of various types of averages and variation.</li> <li>➤ To learn the applications of matrices in business. To understand the students to solve LPP to maximize the profit and to minimize the cost.</li> <li>➤ To use regression analysis to estimate the relationship between two variables and to use frequency distribution to make decision.</li> <li>➤ To understand the techniques and concept of different types of index numbers.</li> <li>➤ To explain the primary concepts of statistics, data collection, sampling and tabulation.</li> <li>➤ To understand the concepts of measures of central tendency and solve problems.</li> <li>➤ To understand the various measures of dispersion and solve related problems.</li> <li>➤ To develop the ability to solve problems in correlation and regression analysis.</li> <li>➤ To calculate the index numbers and understand the concept of</li> </ul> <p>time series and their application</p>
UG BCOM-H-AECC-T-02	MIL	<ul style="list-style-type: none"> <li>➤ To expose students to a variety of topics that dominates the contemporary socio-economic and cultural life.</li> <li>➤ To develop oral and written communication skills of the students so that their employability enhances.</li> <li>➤ To develop overall linguistic competence and communicative skills of students.</li> <li>➤ To expose students to a good blend of old and new literary extracts having various themes that are entertaining and informative so that they realize the beauty and communicative power of English.</li> <li>➤ To make students aware of the cultural values and the major problems in the world today.</li> <li>➤ To develop literary sensibilities and communicative abilities</li> </ul>

among students.

*SEMESTER-III*

BCOM-H-  
CC-T-05

FINANCIAL  
ACCOUNTING-2

- To understand the conceptual knowledge of accounting and acquire skills of maintaining accounts.
- To understands the techniques of consignment, Branch and Accounting methods.
- Analyse the essentials of bill of exchange and its accounting treatment.
- To acquaint learners with knowledge regarding accounting procedures related fire Ins. claims and the process of claims.
- To learn the accounting treatments in consignments, commission, Bad debts, valuation of unsold stock and calculation of normal and abnormal loss.
- To prepare joint venture accounts and methods of maintaining accounts.
- To prepare self balancing and sectional balancing accounts and insurance claims.
- To understand the accounts of hire purchase and installment system.
- To analyse and estimate the impact of insolvency accounts.
- To prepare Royalty accounts

UG  
BCOM-H-  
CC-T-06

INCOME TAX  
LAW

- To understand different aspects of tax.
- To understand the meaning of person, assessee, previous year, assessment year, total income.
- To identify the residential status and incidence of tax and solve problems.
- To compute taxable income from salary.
- To compute taxable income from house property.
- To understand the meaning of business and profession and compute taxable income.
- To identify long term and short term capital gain and calculate taxable capital gain.
- To understand income under the head other sources and solve problems.
- To compute total taxable income from the five heads of accounts.
- To compute set-off and carry forward of losses and aggregation of income.

		<ul style="list-style-type: none"> <li>➤ To identify the deductions from Gross Total Income and understand returns, filing of return of income, due date, kinds of assessment and assessment procedure.</li> <li>➤ To compute income tax liability of individuals.</li> </ul>
UG BCOM-H- CC-T-07	HUMAN RESOURCE MANAGEMENT	<ul style="list-style-type: none"> <li>➤ To understand the objectives, scope, functions and environment of Human Resource Management.</li> <li>➤ To understand manpower planning, components of a job study and selection process.</li> <li>➤ To evaluate the need as well as areas of training.</li> <li>➤ To understand the significance of Industrial relations , disputes and settlement.</li> <li>➤ To explain Workers participation in management and describe Collective Bargaining process.</li> </ul>
UG BCOM-H- GE-T-03	MACRO ECONOMICS	<ul style="list-style-type: none"> <li>➤ To familiarize the students with the basic concept of Macro Economics and its application. <ul style="list-style-type: none"> <li>➤ To aware students about Gross National Product (GNP), Net National Product (NNP), Income at Factor cost or National Income at Factor Prices, Per Capita Income, Personal Income ( PI), Disposable Income etc.</li> </ul> </li> <li>➤ To Study the relationship among broad aggregates.</li> <li>➤ To apply economic reasoning to solve the problems of the economy.</li> <li>➤ To understand the role of business economics in decision making</li> </ul>
UG BCOM-H- SEC-T+P- 01A	E-COMMERCE AND COMPUTER APPLICATIONS IN BUSINESS	<ul style="list-style-type: none"> <li>➤ To understand the components of computer.</li> <li>➤ To provide the knowledge about an overview of E-Commerce and E-business.</li> <li>➤ To describe the consumer oriented E-commerce applications.</li> <li>➤ To appraise the Electronic Data Interchange and its prerequisites.</li> <li>➤ To analyze the different types of E-marketing techniques.</li> </ul>
UG BCOM-H- SEC-T-01B	PERSONAL SELLING AND SALESMANSHIP	<ul style="list-style-type: none"> <li>➤ To gain practical knowledge and the tactics in the marketing.</li> <li>➤ To study and critically analyze the basic concepts and trends in Marketing.</li> <li>➤ To aware of the recent changes in the field of marketing.</li> </ul>
<i>SEMESTER-IV</i>		
UG BCOM-H- CC-T-08	COST ACCOUNTING	<ul style="list-style-type: none"> <li>➤ To understand the importance of costing in companies. Gain knowledge about losses in process costing.</li> </ul>

		<ul style="list-style-type: none"> <li>➤ To learn about the applications in Marginal Costing.</li> <li>➤ To understand the concepts of budgeting and budgetary control.</li> <li>➤ To estimate the future by applying standard costing technique.</li> <li>➤ To keep the students conversant with the ever – enlarging frontiers of Cost Accounting knowledge.</li> <li>➤ To get knowledge of different methods and techniques of cost accounting.</li> <li>➤ To impart Knowledge about the concepts and principles application of Overheads.</li> </ul>
UG BCOM-H- CC-T-09	INDIRECT TAX LAWS	<ul style="list-style-type: none"> <li>➤ To know Various Tax Procedure.</li> <li>➤ To updates them with Current Taxation Policies.</li> <li>➤ To acquire the knowledge of Goods and Services.</li> <li>➤ To explores the process of Registration, place and value of supply and computation of tax liability.</li> <li>➤ To have knowledge about payment of Tax &amp; Custom Act.</li> </ul>
UG BCOM-H- CC-T-10	COMPANY LAW	<ul style="list-style-type: none"> <li>➤ To impart students with the knowledge of fundamentals of Company Law and provisions of the Companies Act of 2013.</li> <li>➤ To apprise the students of new concepts involving in company law regime.</li> <li>➤ To acquaint the students with the duties and responsibilities of Key Managerial Personnel.</li> <li>➤ To understand the provisions and employment under Factories Act 1948.</li> <li>➤ To calculation of compensation and the disabilities of workmen.</li> <li>➤ To analyse disputes and the machineries under Industrial disputes Act 1947.</li> <li>➤ To gain knowledge about procedure, registration and cancellation of Trade Union and the various Forums under Consumer Act 1986.</li> <li>➤ To recognize the need of Employees State Insurance Act 1948 and about the payment of gratuity of the workers.</li> <li>➤ To gain knowledge other related acts under companies Acts of 2013.</li> </ul>
UG BCOM-H- GE-T-04	INDIAN ECONOMICS	<ul style="list-style-type: none"> <li>➤ To understand students to a new approach to the study of the Indian Economy.</li> <li>➤ To analyzing the present status of the Indian Economy.</li> <li>➤ To rendering the process of integration of the Indian Economy with other economics of the world.</li> <li>➤ To notify themselves with the emerging issues in policies of India's foreign trade.</li> </ul>

		<ul style="list-style-type: none"> <li>➤ To provides thorough understanding of Economic concepts and theories.</li> <li>➤ To analyse development in pre-reforms &amp; post-reforms periods to give a proper perspective of the Indian Economy.</li> </ul>
UG BCOM-H- SEC-T- 02A	TAX RETURNS AND FILING OF TAX RETURNS	<ul style="list-style-type: none"> <li>➤ To understand Income Tax system properly, and can get the knowledge of different tax provisions.</li> <li>➤ To give knowledge about Submission of Income Tax Return, Advance Tax, and Tax deducted at Source, Tax Collection Authorities under the Income Tax Act, 1961.</li> <li>➤ To compute and submit online income tax liability of individuals.</li> </ul>
UG BCOM-H- SEC-T-02B	OFFICE MANAGEMENT AND SECRETARIAL PRACTICE	<ul style="list-style-type: none"> <li>➤ To make familiar they with the emerging changes in the modern office environment and to develop organizational skills.</li> <li>➤ To build up the conceptual, analytical, technical and managerial skills of students efficient office organization and records management.</li> <li>➤ To develop technical skills among the students for designing and developing effective means to manage records, consistency and efficiency of work flow in the administrative section of an organization will be developed.</li> <li>➤ To develop employability skills among the students.</li> </ul>
<i>SEMESTER-V</i>		
UG BCOM-H- CC-T-11	CORPORATE ACCOUNTING	<ul style="list-style-type: none"> <li>➤ To enlighten on the accounting procedures followed by the Companies.</li> <li>➤ Student's skills about accounting standards will be developed.</li> <li>➤ To make aware the students about the valuation of shares.</li> <li>➤ To impart knowledge about holding company accounts, amalgamation, absorption and reconstruction of company.</li> <li>➤ To understand the procedures for the issue of shares. Prepare Financial Statements of Companies.</li> <li>➤ To ascertain profit or loss prior to incorporation by applying various methods. To identify the methods of valuation of Goodwill and shares. To prepare Accounts of Electricity companies and calculate Reasonable Return.</li> </ul>
UG BCOM-H- CC-T-12	AUDITING	<ul style="list-style-type: none"> <li>➤ To gain knowledge about auditing, audit programmes, working papers and preliminaries before audit.</li> <li>➤ To analyse about implementing internal check and internal</li> </ul>

		<p>control in concerns.</p> <ul style="list-style-type: none"> <li>➤ To understand the various aspects of vouching.</li> <li>➤ To learn how to verify and value various assets and liabilities.</li> <li>➤ To evaluate the traits of Company Auditor and how to draft Auditors Report.</li> </ul>
<p>UG BCOM-H- DSE-T- 01A</p>	<p>BUSINESS COMMUNICATI ON AND ENTREPRENEUR SHIP DEVELOPMENT</p>	<ul style="list-style-type: none"> <li>➤ To make the students aware about the business communication.</li> <li>➤ To understand the process and importance of communication.</li> <li>➤ To develop awareness regarding new trends in business communication, various media of communication and communication devices.</li> <li>➤ To extend business communication skills through the application and exercises.</li> <li>➤ To understand the functions of entrepreneur and its qualities. Understand various dimensions of entrepreneurship.</li> <li>➤ To express the contemporary role models in Indian Business.</li> <li>➤ To learn the procedure for preparing project appraisal and report.</li> <li>➤ To identify the sources of mobilizing resources to start the business.</li> </ul>
<p>UG BCOM-H- DSE-T- 01B</p>	<p>CORPORATE GOVERNANCE AND SOCIAL RESPONSIBILIT Y OF BUSINESS</p>	<ul style="list-style-type: none"> <li>➤ To gain knowledge about business ethics as a reflection of standard of business that either an individual or business uses when conducting transactions.</li> <li>➤ To increase the accountability of the company and avoid massive disasters before they occur.</li> <li>➤ To provide legal knowledge about banking regulation acts, the function of SEBI, amendment of new companies act and securitization of law in India. To enhance legal knowledge and various aspects of the corporate and securities law for learners.</li> <li>➤ To understand concepts of social justice and contributions of social reformers.</li> <li>➤ To understand the concept and principles of human rights and rights of marginalised people.</li> <li>➤ To understand social issues and concept of communal harmony.</li> <li>➤ To understand concept and need for media education and globalized world scenario.</li> <li>➤ To understand the values and overall ethics.</li> </ul>
<p>UG BCOM-H- DSE-T- 02A</p>	<p>ACCOUNTING FOR LOCAL BODIES</p>	
<p>UG</p>	<p>INTERNATIONA</p>	<ul style="list-style-type: none"> <li>➤ To create understanding on how globalisation has brought</li> </ul>

BCOM-H-DSE-T-02B	L BUSINESS	<p>about an increasing 'connectedness' of businesses, markets, people and information across countries.</p> <ul style="list-style-type: none"> <li>➤ To creates understanding of the different reason for currency fluctuations &amp; concept of comparative cost advantage</li> </ul>
<i>SEMESTER-VI</i>		
UG BCOM-H-CC-T-13	FINANCIAL MANAGEMENT	<ul style="list-style-type: none"> <li>➤ Enables learning of the basic concept of financial management, investment and capital investment options.</li> <li>➤ To provides knowledge of long term investment decisions, planning and risk of investment projected with it.</li> <li>➤ To imparts knowledge to the students about receivable management and cash management of companies.</li> <li>➤ To know about various sources of working capital finance and calculation of leverages.</li> </ul>
UG BCOM-H-CC-T-14	PROJECT WORK	<ul style="list-style-type: none"> <li>➤ Enable the application of conceptual knowledge in real life situations.</li> <li>➤ To apply the knowledge in conducting research and present the findings in the form of a research report.</li> <li>➤ To develop understanding of research methodology and its applications.</li> <li>➤ To understand the different methods of data collection and its interpretation.</li> <li>➤ To develop analytical skills in generalization of things and concepts.</li> </ul>
UG BCOM-H-DSE-T-03A	MANAGEMENT ACCOUNTING	<ul style="list-style-type: none"> <li>➤ To understand the objectives and functions of management accounting.</li> <li>➤ To evaluate the financial position by using ratios.</li> <li>➤ To gain knowledge about the preparation of fund flow statement.</li> <li>➤ To evaluate the financial position of a concern through cash flow statement.</li> <li>➤ To identify the capital budgeting decisions.</li> </ul>
UG BCOM-H-DSE-T-03B	ADVERTISING	<ul style="list-style-type: none"> <li>➤ To updates themselves about current trends in advertising.</li> <li>➤ To acquaints students about various tools of IMC and careers in advertising.</li> <li>➤ To creates understanding of the construction of effective advertisement.</li> <li>➤ To highlights the role of advertising for the success of brands and its importance within the marketing function of the company.</li> </ul>
UG BCOM-H-DSE-T-	INDIAN FINANCIAL SYSTEM	<ul style="list-style-type: none"> <li>➤ Enable the students with Financial Markets and its various segments.</li> <li>➤ To understanding of the operations and developments in</li> </ul>

