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DUMKAL COLLEGE

P.O- Basantapur, P.S- Dumkal, Dist.- Murshidabad, West Bengal, Pin- 742406
(Govt. Aided, Affiliated to the: University of Kalyani Included under section 2(f) & 12 (B) of UGC Act.)
ESTD 1999

Date: 17.07.2025

NOTICE

(Department of Physics)

For submission of assignments:

All the student of Semester-II (Major & Minor Course) are hereby instructed to submit their assignments according to the following topics. The hard copy of assignments must be submitted to the Department of Physics on 28.07.2025 & 29.07.2025 at 12:00 pm. No assignments will be accepted after that day,

Assignment for Semester-II Major Course [PHY-M-T-2]: [Mechanics]:

1. Derive the Galilean Transformation Equations. Prove that Newton's Laws are invariant under Galilean transformations.
2. Derive the Law of Conservation of Mechanical Energy in the presence of conservative forces.
3. Derive the Work-Energy Theorem for a particle under a variable force. Derive the expression for the potential energy stored in a spring using Hooke's law.

Assignment for Semester-II SEC Course [PHY-SEC-T-2]: [Basic Instrumentation on Skills]:

1. Draw the block diagram of a general purpose CRO and indicate its basic components.
2. Draw a neat diagram of a cathode ray tube and explain its working principle. Explain how time-base is obtained in a cathode ray oscillograph.
3. Write a short-note on the use of a cathode ray oscilloscope.

Assignment for Semester-II Minor Course [PHY-MI-T-2]: [Mathematical Physics I]:

1. Define a vector. Explain the transformation of vector components under rotation of coordinate axes. Show that the magnitude of a vector is invariant under rotation.
2. Define a scalar field and a vector field with examples.
3. Derive the expression for the divergence of a vector field. State and prove the condition for a vector field to be solenoidal.

Principal
Dumkal College, Basantapur
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Head of the Department
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For submission of assignments:

All the student of Semester-IV (Major & Minor Course) are hereby instructed to submit their assignments according to the following topics. The hard copy of assignments must be submitted to the Department of Physics on 28.07.2025 & 29.07.2025 at 12:00 pm. No assignments will be accepted after that day.

Assignment for Semester-IV Major Course [PHY-M-T-4]: [Wave Optics and Electromagnetic Theory]:

1. Explain how Michelson's interferometer is used to determine (a) the wavelength of monochromatic light, (b) the wavelength difference of two very close spectral lines and (c) the refractive index and the thickness of a thin transparent film.
2. Derive an expression for the intensity of the fringe system formed by the transmitted light in a Fabry-Perot interferometer. What are the effects of reflectance and multiple beams on the pattern?
3. What are Fresnel's half-period zones? Why is it so-called? Prove that the area of a half-period zone on a plane wavefront is essentially independent of the order of the zone.
4. Show that the amplitude due to a large wavefront at a point in front of it is jus half that due to the first half-period zone. Hence give Fresnel's explanation of the rectilinear propagation of monochromatic light.
5. What is a zone plate? How is it constructed? Give its theory. Show that a zone plate has multiple foci. Compare the zone plate with a convex lens. What is meant by 'phase reversal zone plate'?

Assignment for Semester-IV Major Course [PHY-M-T-5]: [Thermal Physics]:

1. Show that an adiabatic curve for an ideal gas is steeper than the isothermal curve on a p-V diagram, and that a quasistatic adiabat and a quasistatic isotherm cannot intersect at more than one point.
2. What is the absolute scale of temperature? Derive Kelvin's expression for absolute thermodynamic scale of temperature. Show that the ideal gas scale and the thermodynamic scale are identical. Is negative temperature possible on this scale?
3. Write down Maxwell's four famous thermodynamic relations. Starting from a relation of Maxwell, derive Clapeyron's equation in a skeletal fashion.

Assignment for Semester-IV Minor Course [PHY-MI-T-4]: [Electricity and Magnetism]:

1. State and prove Gauss's theorem in electrostatics.
2. Derive the expression for electric potential due to:
(a) A point charge (b) An electric dipole on the axial and equatorial line (c) A uniformly charged spherical shell (inside and outside) (d) A uniformly charged solid sphere
3. Derive the capacitance of a parallel plate capacitor fully filled with a dielectric of constant

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