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End Semester Examination, December 2024
B. Tech (CSE) – 1st Semester
ENGINEERING PHYSICS (ENPH101)

Time: 2.5 hrs.

Max Marks: **50**

Note: **All Questions are compulsory. Marks are indicated against each question.**

PART-A

Note: **Attempt 5 out of 7 questions.**

- Q.1 (a) Give the location of the centre of mass of body of (a) Sphere (b) Cylinder (c) Ring (d) Cube, each of uniform mass density. Does the centre of mass of a body necessarily lie inside the body? [CO-1] [L-4] **2**
- (b) At what height from the surface of earth will the value of g be reduced by 36% from the surface? The radius of earth is 6400 km. [CO-1] [L-3] **2**
- (c) Describe Young's Double-Slit Experiment and state the fundamental conditions to produce interference fringes. [CO-1] [L-2] **2**
- (d) Consider a polarizer with a refractive index of 1.45. Calculate the polarization angle and the angle of refraction? [CO-1] [L-3] **2**
- (e) Describe Brewster's Law and how it is used to determine the Brewster angle. [CO-1] [L-2] **2**
- (f) What is the significance of critical temperature (T_c), and how does it vary among different superconducting materials? [CO-1] [L-1] **2**
- (g) A 1.75-kg particle moves as function of time as follows: $x = 4\cos(1.33t + \pi/5)$, where distance is measured in meters and time in seconds. What is the amplitude, frequency, angular frequency, and period of this motion? [CO-1] [L-1] **2**

2x5

PART-B

- Q.2 Describe dielectric polarization? Discuss the various types of dielectric polarization? [CO-2] [L-2] **10**

OR

Find the moment of inertia of a disc of mass 3 kg and radius 50 cm about the following axes.

- (a) axis passing through the center and perpendicular to the plane of the disc,
(b) axis touching the edge and perpendicular to the plane of the disc and
(c) axis passing through the center and lying on the plane of the disc.
(d) About which of the above axis is easier to rotate the disc? [CO-2] [L-1] **10**
- Q.3 (a) Describe the retarding plates. Illustrate how they can be used to produce different types of polarized lights. [CO-3] [L-2] **5**
- 5[CO3] [L1]
- (b) Explain the phenomenon of double refraction in a calcite crystal. [CO-3] [L-2] **5**

OR

What is top-down and bottom-up approach for the synthesis of nanomaterials? Provide a schematic diagram and examples to demonstrate. [CO-3] [L-1] **10**

- Q.4 (a) What are Newton's rings? Explain why the central spot is dark in Newton's ring experiment. [CO-4] [L-2] **5**
- (b) Calculate the radius of curvature of the lens in Newton's rings experiment if the diameter of 10th dark ring is 0.5 cm and wavelength is 6000 Å. [CO-4] [L-2] **5**

OR

- (a) Derive an expression for the angle of deviation for a ray of light passing through an equilateral prism of refracting angle A . [CO- 4] [L-1] **5**
- (b) Derive an expression for refractive index of material of prism in terms of the angle of prism and the angle of the minimum deviation. [CO- 4] [L-1] **5**

Q.5 Explain the lasing action of Ruby laser with a detailed discussion of its construction, working and energy level diagram. [CO-5] [L-2] **10**

OR

Explain the lasing action of He-Ne laser with a detailed discussion of its construction, working and energy level diagram. [CO- 5] [L-2] **10**