Graphic Era
HILL UNIVERSITY

End Term Odd Semester Back/Debarred Examination June-2025

Roll no: .....

Name of the Course and semester: B.Tech. / Semester - I
Name of the Paper: *Engineering Physics*
Paper Code: *ZPH-101*
Time: 3 hour

Maximum Marks: 100

Note:

(i) All the questions are compulsory.
(ii) Answer any two sub questions from a, b and c in each main question.
(iii) Total marks for each question is 20 (twenty).
(iv) Each sub-question carries 10 marks.

Q1. (2X10=20 Marks)

a. Discuss Huygens principle. Calculate the fringe width of interference fringes formed by Fresnel's biprism and consider the source monochromatic. **(CO1)**

b. Draw a schematic of the interaction of light from a diffraction grating. Explain the grating element and the resolving power of a grating. **(CO1)**

c. Newton's rings are observed in reflected light of wavelength 6000 Å. The diameter of the 10th dark ring is 0.5 cm. Find the radius of curvature of the lens and the thickness of the corresponding air film. **(CO1)**

Q2. (2X10=20 Marks)

a. Explain the phenomenon of double refraction using suitable diagrams. What are the advantages of optical fibers over metallic wires? **(CO2)**

b. Describe the construction and working of a Ruby laser. How will you obtain laser output from it? **(CO2)**

c. Plane polarized light passes through the quartz plate with its axis parallel to its face. Calculate the thickness of the plate so that the emergent light may be plane polarized. For quartz $\mu_e = 1.55$ and $\mu_o = 1.54$, and wavelength = 589 nm. **(CO2)**

Q3. (2X10=20 Marks)

a. Distinguish between inertial and non-inertial frames of reference. Specify the postulates of the special theory of relativity. **(CO3)**

b. Discuss the importance of the negative results of the Michelson–Morley experiment. Derive Lorentz transformation equations. **(CO3)**

c. A particle is moving with 30% of the velocity of light. Compare its relativistic mass with its rest mass. **(CO3)**

Q4. (2X10=20 Marks)

a. Calculate the energy eigenvalue for a particle confined in a one-dimensional infinitely deep potential well of length "*L*". **(CO4)**

b. What is the physical significance of wave function? Derive time-independent Schrödinger wave equation. What happens if the particle is free? **(CO4)**

c. Explain de Broglie's hypothesis. Calculate the energy difference between the ground state and the first excited state for the electron if the length of the box is 10^{-8} cm. **(CO4)**

Q5. (2X10=20 Marks)

a. Explain the significance of the Meissner effect in superconductors. Differentiate between Type–I and Type–II superconductors. **(CO5)**

b. Derive the third Maxwell's equation. Discuss its importance. **(CO5)**

c. Discuss the density of states (DOS) for a two-dimensional material. Elaborate a method to fabricate nanoparticles. Provide two applications of nanostructured materials in daily life. **(CO5)**