COURSE CODE (CREDITS): 18B11PH111 (4) MAX. MARKS: 25
COURSE NAME: ENGINEERING PHYSICS-1
COURSE INSTRUCTORS: PBB, SKK, VSA, RRS, SKT, HAZ, SBD   MAX. TIME: 1.5 Hr

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

Q1. (a) Find the minimum attainable pressure for an ideal gas in the process in which temperature is $T=T_0 + \alpha V^2$; where T_0 and α are positive constants and V is volume of 1-mole of gas. Also draw the P *vs* V plot for this process. [3-marks] [CO-5]

(b) Using laws of thermodynamics prove in which processes the thermodynamic potentials internal energy (U) and Enthalpy (H) are constants. [2-marks] [CO-4]

(c) Using first law of thermodynamics prove that PV^γ = constant for an adiabatic process, where $\gamma = C_p/C_v$. [3-marks] [CO-4]

Q2. (a) A certain length L_1 of 5% solution causes an optical rotation of 20 degrees. How much length L_2 of 10% solution of the same substance will cause 35 degree rotation. [2-marks] [CO-2]

(b) Plane polarized light is incident on a plate of quartz cut with faces parallel to optic axis. Calculate the thickness for which the phase difference between two rays is 60 degree, where $\mu o=1.5442$ and $\mu e=1.5583$ and $\lambda=5000Å$. [3-marks] [CO-2]

Q3. (a) Describe using diagram how the elliptically polarized is produced and detected. Also show how the elliptically polarized light can be differentiated from partially polarized light. [3-marks] [CO-1]

(b) A diffraction grating which has 4000 lines to a centimeter is used at normal incidence. Calculate the dispersive power of the grating in the third order spectrum in the wavelength region 5000Å. [2-marks] [CO-2]

Q4. (a) Two plane glass surfaces in contact along one edge are separated at the opposite edge by a thin wire. If 20 interference fringes are observed between these edges in sodium light (5890Å) of normal incidence, what is the thickness of the wire? [3-marks] [CO-2]

(b) In a Fresnel biprism experiment, the fringe width is observed to be 0.087 mm. What will it become if the slit to biprism is reduced to ¾ of the original distance? [2-marks] [CO-2]

(c) A lens of focal length 100 cm forms fraunhofer diffraction pattern of a single slit of width 0.04 cm in its focal plane. The incident light contains two wavelengths λ_1 and λ_2. It is found that the fourth minimum corresponding to λ_1 and fifth minimum corresponding to λ_2 occur at the same point 0.5 cm from the central maximum. Calculate λ_1 and λ_2. [2-marks] [CO-1]