COURSE CODE: 18B11PH112   MAX. MARKS: 25

COURSE NAME: BASIC ENGINEERING PHYSICS - I

COURSE CREDITS: 4   MAX. TIME: 1 Hr 30 Min

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Scientific calculator is allowed.

Q1 a) Obtain an expression for fringe width in case of Young's double slit experiment. Prove that in this case of interference dark and bright fringes are of equal width.   **[3] (CO-1)**

b) A beam of light having wavelengths 650 nm is used to obtain interference fringes in Young's double slit experiment. Find the distance of third bright fringe on the screen from the central maximum. Given the distance between slits is 2 mm and the distance from plane slits to screen is 120 cm.   **[2] (CO-2)**

Q2 a) Obtain an expression for maxima and minima in interference in thin films for reflected light case. Considering the individual case of maxima and minima in interference in thin films, what are the applications of this phenomenon?   **[3] (CO-3)**

b) In Newton's ring experiment, a source is emitting two wavelengths 589 nm and 589.6 nm. It is observed that n^{th} dark ring due to first wavelength coincides with $(n+1)^{th}$ dark ring due to second wavelength. Find the diameter of nth dark ring if radius of curvature of the plano-convex lens is 1 m.   **[2] (CO-2)**

Q3 a) Using diagram only, show the effect of barrier and opening size on the diffraction. Derive an expression for the width of central maximum in Fraunhoffer diffraction due to a single slit.   **[3] (CO-1)**

b) Calculate the angle at which first dark band and next bright band are formed in Fraunhoffer diffraction pattern of a slit of width 0.3 mm with a wavelength of light 600 nm.   **[2] (CO-2)**

Q4 (a) A light of wavelength 600 nm falls normally on a transmission grating of length 3 cm. The first order spectrum is obtained at 15° from normal. Calculate the total number of lines on grating surface.   **[3] (CO-2)**

(b) What do you understand by missing order spectrum in a diffraction grating? What particular spectra would be absent if the widths transparent and opaque parts are equal.   **[2] (CO-4)**

Q5 Write short notes on **a)** Polarised and un-polarised light, **b)** Quarter and half - wave plate, **c)** Nicol prism.

[5] (CO-4)