(Please write your Roll No. immediately) Roll No. .....

Mid- Term Examination

First Semester [B.Tech.]
Paper code: ETPH-103
Time: 1:30 Hrs.

September 2017
Sub: Applied Physics-I
Max. Marks: 30

NOTE: Attempt Q. No. 1, which is compulsory and two more questions from the remaining.

1. (a) Explain, why interferences fringes are circular in Newton's Ring. (2)

   (b) A light source emits light of two wavelengths $\lambda_1 = 4300$ Å and $\lambda_2 = 5100$ Å. The source is used in a double slit interference experiment. The distance between the source and the screen is 1.5 m and the distance between the slits is 0.025 mm. calculate the separation between the third order bright fringes due to these two wavelengths. (2)

   (c) Distinguish between Fresnel and Fraunhofer class of diffraction. (2)

   (d) State Brewster's law. Show that when a ray is incident at polarizing angle, the reflected ray is perpendicular to refracted ray. (2)

   (e) Calculate the thickness of (i) a quarter wave plate and (ii) a half wave plate given that $\mu_e = 1.553$ and $\mu_o = 1.544$ and $\lambda = 5000$ Å (2)

2. (a) Discuss the phenomenon of interference of light in thin films and obtain the conditions of maxima and minima. Show that the interference patterns in reflected and transmitted lights are complimentary. (4)

   (b) Describe and explain the formation of Newton's ring in reflected light. Hence, derive an expression for diameter of n^{th} dark ring. (4)

   (c) Light of wavelength 600 nm falls normally on a thin wedge shaped film of refractive index 1.4, forming fringes are 2 mm apart. Find the angle of wedge. (2)

3. (a) Discuss the Fraunhofer diffraction at a single slit and show that the relative intensities of the maxima are nearly in the ratio of $1 : 4/9\pi^2 : 4/25\pi^2 : 4/49\pi^2$ .....(6)

   (b) A plane transmission grating has 6000 line/cm. Calculate the highest order of spectrum, which can be observed with light of wavelength 400 nm. (2)

   (c) What particular spectrum of plane transmission grating would be absent if the width of the transparencies and opacities of the grating are equal? (2)

4. (a) Explain the construction and working of a *Nicol Prism* used to produce polarized light (5)

   (b) What is the specific rotation? Describe construction and working of Laurent's half shade polarimeter. (5)