FIRST TERM EXAMINATION

First semester(B.Tech.) February (2021)

Paper code: ETPH103 Subject Applied Physics-1

Time: 1Hour 30 minutes Max. Marks: 30

Note: Question No 1 is compulsory and attempt any two more questions.

1. (a) Why there is need of an extended source in case of interference by division of amplitude? (2)

(b) What should be the minimum number of lines per inch in a half inch width grating to resolve the D_1 (5890Å)and D_2(5896Å) lines of sodium in the first order. (2)

(c) Differentiate between single mode and multimode optical fibre. (2)

(d) Differentiate between spontaneous and stimulated emission. (2)

(e) A beam of light consisting of two wave lengths 650mm and 520 mm is used to obtain interference fringes in Young's double slit experiment. The distance between the slits is 2 mm and between the plane of the slits and screen is 120 cm. Find the least distance from the central maximum where the bright fringes due to both wavelengths coincides. (2)

2. (a) Explain the formation of Newton's rings in reflected monochromatic light. Show that the spacing between rings goes on decreasing with increased order. (6)

(b) Two glass plates encloses a wedge shaped air film, touching at one edge and separated by a wire of 0.05mm diameter at a distance of 0.15 m from the edge. Calculate the fringe width when light of wavelength λ= 6000Å from a broad source falls normally on the film. (2)

(c) Draw a labelled ray diagram depicting interference in a Fresnel's biprism . (2)

3. (a) Describe the Fraunhofer's diffraction at a single slit and show that the intensities of successive maxima are nearly in the ratio of $1 : \frac{1}{22} : \frac{1}{61} : \frac{1}{121} : .....$ (6)

(b) In a two slit diffraction pattern, the screen is 160 cm away from the slit. The slit widths are 0.08mm and they are 0.4mm apart. Calculate the wavelength of light if the fringe spacing is 0.25 cm. Also find the missing orders. (2)

(c) Explain population inversion in lasing action. (2)

4. (a) Describe the construction and working of a Nicol prism. (4)

(b) Calculate the thickness of the quarter wave plate, given μ_o = 1.658 and μ_e =1.486. The wavelength of light used is 5890 Å. (2)

(c) Define acceptance angle and numerical aperture of an optical fibre. (2)

(d) The velocity of light in water is 2.2 *10^8 m/s. Find polarising angle of incidence for water surface.

(2)