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EXAMINATION - Summer Mid Semester - 2018

B.Tech

COURSE CODE: **10B11PH111**
COURSE NAME: **PHYSICS -I**
COURSE CREDITS: **04**

MAX. MARKS: **50**

MAX. TIME: **2 Hrs**

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

Q.1. (a) Explain how the wavelength of light and thickness of thin transparent sheet can be determined using Fresenel's Biprism experiment. **[6]**

(b) Monochromatic light from a narrow slit illuminates two narrow slits 0.15 mm apart producing an interference pattern with bright fringes 1 .5 mm apart on a screen 75 cm away. Find the wavelength of the light. How will the fringe width be altered if **(i)** the distance of the screen doubled and **(ii)** the separation between slits is doubled? **[4]**

Q.2. (a) Describe with theory, the Newton's ring experiment to determine the refractive index of liquid and wavelength of monochromatic light source of radiation. **[6]**

(b) Newton's ring arrangement is used with a source emitting two wavelengths λ_1= 5500 Å and λ_2= 7500 Å and it is found that the n^{th} dark ring due to λ_1 coincides with $(n+1)^{th}$ dark ring for λ_2. Find the diameter of the n^{th} dark ring of λ_1 if the radius of curvature of the lens R=100 cm. **[3]**

Q.3. (a) Differentiate between **(i)** Interference and diffraction. **(ii)** Fresnel and Fraunhoffer diffraction **(iii)** Single slit and double slit diffraction **[3]**

(b) Describe and explain the phenomenon of diffraction by double slit. Derive the equation for bright and dark fringes also discuss about the missing orders in diffraction. **[7]**

(c) In a double slit Fraunhoffer diffraction pattern, the screen is placed 150 cm away from the slits. The width of the slit is 0.05 mm and the slits are 0.4 mm apart. Calculate the wavelength of light if the fringe width is 0.25 cm. Also find the missing order. **[3]**

(d) How many orders will be observed by a grating having 4000 lines/cm, if it is illuminated by a visible light of wavelength in the range of 4000 Å to 7500 Å? **[3]**

Q.4. (a) Write short notes: **(i)** Methods to produce polarized light **(ii)** Polarizer and analyzer **(iii)** **[3]**

(b) Derive the equations for the result of superposition of waves linearly polarized at right angles? Discuss the special cases also. **[7]**

(c) Unpolarized light falls on two polarizing sheets placed one on top of the other. What must be the angle between the characteristic directions of the sheets if the intensity of the transmitted light is one-third intensity of the incident beam? **[3]**

(d)A half-wave plate is fabricated for a wavelength of 3800 Å. For what wavelength does it work as a quarter-wave plate? **[2]**