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24003

B. Tech.1st Semester F- Scheme
Examination, December – 2016
PHYSICS–I
Paper–PHY-101-F

Time allowed : 3 hours] *[Maximum marks : 100*

Note : ***Question No. 1 is compulsory.*** *Students have to attempt* ***five*** *question in total, selecting at least* ***one*** *question from each unit. Each question carries equal marks.*

1. (a) What is the value of refracting angle in Fresnel's bibrism ? (2)

(b) The brilliant colours in thin films of soap are due to ------. (2)

(c) What is Rayleigh's limit of resolution ? (2)

(d) On what factors does resolving power of a grating depend ? (2)

(e) What do you understand by optical activity ? (2)

(f) What is optical pumping. (2)

(g) What are dielectric losses ? (2)

(h) What are polar molecules ? Give example. (2)

(i) How much mass a photon would gain when accelerated to a kinetic energy of 500 Mev ? (2)

(j) What are the assumptions in Lorentz transformations ? (2)

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Section–A

2. (a) Explain setup and working of Michelson interferometer. Discuss how it can be used to measure wavelength of light. (15)

(b) Describe the theory of colour of thin films. (5)

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

$$1 : \frac{4}{9\pi^2} : \frac{4}{25\pi^2} : \frac{4}{49\pi^2} : \text{-------} \quad (16)$$

(b) Find the radius of first half period element on a zone plate behaving like a convex lens of focal length 50 cm. The wavelength of light $\lambda = 5000\,\text{Å}$. (4)

Section–B

4. Discuss in detail phenomenon of double refraction. Also discuss production of Polarized light by double refraction. (20)

5. (a) Discuss Einstein coefficients. Derive relation between them. (8)

(b) Describe the principle, construction and working of a ruby laser. (12)

Section–C

6. (a) What is numerical aperature and acceptance angle. Find an expression for them. Discuss in detail modes in fiber optics. (12)

(b) Discuss various applications of optical fibres. (8)

7. (a) Explain dielectric losses. (10)

(b) Discuss in detail Gauss's law in dielectrics. (10)

Section–D

8. (a) What was the main object of the Michelson-Morley experiment. Write the conclusions. (14)

(b) Find the velocity that an electron must be given so that its momentum is 10 times its rest mass times the speed of light. What is the energy at this speed. (6)

9. (a) Give an experimental survey of super conductivity. (6)

(b) Discuss London's equations and its applications. (14)

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