3/12/2011

FE Sem - II
Applied physics - II

V-2nd-HI-Ex-11-C-17

Con. 5731-11.

MP-2500

(2 Hours)

[Total Marks : 75

N.B. : (1) Question No. **1** is **compulsory.**
(2) Solve any **four** questions from Question Nos. **2** to **7.**
(3) Use **suitable** data whenever **necessary.**

1. Answer any **five** from the following :— **15**
   (a) Explain the conditions of sustained interference pattern of light.
   (b) What do you mean by difraction and state its types.
   (c) Explain two types of Light Sources used in optical communication systems.
   (d) Why Electron microscope is consider better than optical microscope ?
   (e) Explain De-Broglie's hypothesis.
   (f) Define relative permeability and susceptibility. Write the relation between them.
   (g) What do you mean by Vacuum ? What are various gauges used to measure vacuum ?

2. (a) Obtain the condition for maxima and minima due to interference in a wedge-shaped film observed in reflected light. Derive the expression for fringe width. **8**
   (b) What is diffraction grating ? What is the advantage of increasing the number of lines in a grating ? In an experiment with grating, third order spectral line of wavelength λ, coincides with the fourth order spectral line of wavelength 4992 Å Calculate the value of λ. **7**

3. (a) What is De-Broglie concept of matter-waves ? Derive one dimensional time dependent Schrodinger equation for matter waves. **8**
   (b) Derive the expression of numerical operture for a step index fibre. Calculate the acceptance angle for the fibre in water of refractive index 1·33 given that N.A. is 0·2 and cladding refractive index is 1·59. **7**

4. (a) Obtain an expression for the radius of the n^{th} dark ring in the case of Newton's rings. **8**
   White light falls normally on a soap film of thickness 5×10^{-5} cm and of refractive index 1·33 which wavelength in the visible region will be reflected most strongly. **7**
   (b) What is holography ? Explain the process of recording and reconstruction of hologram. **8**

5. (a) With neat energy level diagram describe the construction and working of He-Ne laser. What are its merits and demerits ? **7**
   (b) Differentiate between soft and hard magnetic materials. In a magnetic material the field strength is found to be 10^6 ampere/m. If the magnetic susceptibility of the material is $0{\cdot}5 \times 10^{-5}$. Calculate the intensity of magnetization and the flux density in the material.

6. (a) Explain the atomic origin of ferromagnetism ? Differentiate between diamagnetic and paramagnetic materials. **8**
   (b) Show that electron can not pre-exist in free state in a nucleus. An electron has a speed of 4×10^5 metre/sec. accurate to 0·01%. With what accuracy can we locate the position of the electron ? **7**

7. Write short notes on any **three** of the following :— **15**
   (a) AFM.
   (b) Rotary Pump.
   (c) Anti reflecting film.
   (d) Holography.