FE/Sem-II (Netaji)
A.P. II 27/11/12

VI-S.H.Exam. Nov.-12- 39

Con. 8837–12. **KR–3546**

(2 Hours) **[Total Marks : 75**

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from Q. Nos. **2** to **7**.
(3) **Figures** to **right** indicate **full** marks.
(4) Assume **suitable** data if **necessary**.

1. Attempt any **five** from the following :– **15**
   (a) Explain why we see beautitul colours in thin film when it is exposed to sunlight.
   (b) Why would you recommend use of optical fiber in communication system ?
   (c) Draw the energy level diagram of He-Ne laser. What is its wavelength in visible range ?
   (d) Calculate the De-Broglie wavelength of proton travelling with a velocity equal to $1/20^{th}$ velocity of light. (mass of proton = $1{\cdot}674 \times 10^{-27}$ kg).
   (e) The susceptibility of a paramagnetic material at 300 K is $3{\cdot}7 \times 10^{-3}$. Find its relative permeability at 300 K.
   (f) State and explain ohm's law for magnetic circuit
   (g) Define and name different ranges of vaccum in terms of pressure.

2. (a) Explain with neat figure construction and working of Rotary pump. For which vaccum range is it used ? **8**
   (b) Write full form of LASER ? Explain main three processes involved in the production of LASER with appropriate figures. **7**

3. (a) Derive the formula for numerical aperture for a step index fiber. Calculate the Acceptance angle for an optical fiber given that refractive index of core is 1·45 and refractive index of cladding is 1·4. **8**
   (b) Explain the construction and working of semiconductor diode laser with proper sketches. What are merits and demerits of this laser ? **7**

4. (a) In a Newton's ring experiment the diameter of the 10th dark ring changes from 1·4 cm to 1·27 cm when a liquid is introduced between the lens and the plate. Calculate the refractive index of the liquid. **5**
   (b) Using the uncertanity principle show that electron cannot pre-exist in free state in a nucleus. **5**
   (c) A solenoid consisting of 500 turns and carrying 4 Amp. current is 0·5 m long. Calculate :– **5**
      (i) Magnetomotive force
      (ii) Flux density B.

[TURN OVER

5. (a) A diffraction grating used at normal incidance gives a line 5400 A° in certain order superimposed on another iine 4050 A° of the next higher order. If the angle of diffraction is 30°, how many lines/cm are there on the grating ? **5**
   (b) Derive one dimensional time dependent Schrodinger equation for matter waves. **5**
   (c) Explain construction and working of Atomic force microscope. **5**

6. (a) Explain the experimental method of determination of wavelength of spectral line using diffraction grating. **5**
   (b) An electron is bound in one dimensional potential box with width 2·5 A°. Assuming the hight of the box to be infinite, Calculate the first two permitted energy values of the electron. **5**
   (c) Discuss the importance of molecular modeling in bio-physics study. **5**

7. (a) 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 ? **5**
   (b) How the phenomenon of holography be explained with interference and diffraction of light ? **5**
   (c) What are hard and soft magnetic materials ? Explain these materials using their characteristic properties and applications. **5**

****