

FE / Sem-II (Network)

A.P. II 27/11/12

VT-S.II 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 beautiful 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 $1/20^{\text{th}}$ velocity of light. (mass of proton = 1.674×10^{-27} kg).
 - (e) The susceptibility of a paramagnetic material at 300 K is 3.7×10^{-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 vacuum in terms of pressure.
2. (a) Explain with neat figure construction and working of Rotary pump. For which vacuum 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 uncertainty 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. 5
Calculate :-
(i) Magnetomotive force
(ii) Flux density B.

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5. (a) A diffraction grating used at normal incidence gives a line 5400 \AA in certain order superimposed on another line 4050 \AA 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 \AA . Assuming the height 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 $5 \times 10^{-5} \text{ cm}$ 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