

Con. 3703-09.

(REVISED COURSE)

SP-8468

(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 the **right** indicate **full** marks.
 (4) Use **suitable** data wherever **necessary**.

1. Solve any **five** from the following :— 15
- (a) Why is the wave nature of matter not more apparent in our daily life.
 - (b) Explain why the system of Newton's rings observed by transmitted light is complimentary to that observed by reflected light.
 - (c) Distinguish between single mode and multimode optical fibres.
 - (d) Why x-ray and Laser are so powerful than ordinary visible light.
 - (e) Explain the terms Diamagnetism, Paramagnetism and ferromagnetism on the basis of magnetic dipoles of atoms.
 - (f) What are the types of diffraction and differentiate between them.
 - (g) Explain the relationship between \vec{B} , \vec{H} , and \vec{I} .
2. (a) What is grating and grating element ? Explain the experimental method of determination of wavelength of spectral line using diffraction grating. 10
- (b) Compute the maximum radius allowed for a fibre having core refractive index 1.47 and cladding refractive index 1.46. The fibre is to support only one mode at a wavelength of 1300 nm. 5
3. (a) What is de Broglie concept of matter waves ? Derive one dimensional time dependent schrodinger equation for matter waves. 10
- (b) A soap film of refractive index $4/3$ and thickness 1.5×10^{-4} cm is illuminated by white light incident at an angle of 45° . The light reflected by it is examined by a spectro-scope in which is found a dark band corresponding to a wavelength of 5000 \AA . Calculate the order of interference band. 5
4. (a) What are the factors responsible for Hysterisis loss ? Prove that the area of B-H curve is equal to the Hysterisis loss per unit volume of the specimen in one cycle. 7
- (b) Explain Heisenberg's uncertainty principle with an example and give its physical significance. 3
- (c) Calculate the kinetic energy of an electron whose de-Broglie wavelength is 5000 \AA . (Given Mass of electron = 9.108×10^{-31} kg. Planck's constant = 6.625×10^{-34} J.sec.) 5
5. (a) Obtain the expression for n^{th} dark ring in case of Newton's rings experiment. Hence explain the suitable way to calculate refractive index of a liquid using same set up. 6
- (b) Explain the terms : 4
- (1) Spontaneous emission
 - (2) Stimulated emission
 - (3) Metastable state
 - (4) Population Inversion
- (c) An electron has a speed of 400 m/sec with uncertainty of 0.01%. Find the accuracy in its position. 5

6. (a) Explain with neat sketch the principle, working and application of the Nd : YAG laser. 10
(b) A magnetic material has magnetizing force 198 A/m and magnetization of 2300 A/m. 5
Find.
(1) Corresponding flux density (2) Relative Permeability.
7. (a) Write short notes on :— 10
(1) Molecular modeling in biophysics
(2) Scanning Electron Microscope.
(b) What are various gauges used to measure vacuum ? Explain any one of them in detail. 5
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