

E-E sem II (Rev) CGS May-2014,

Sub:- Applied Physics

(REVISED COURSE) QP Code : NP-17768

(2 Hours)

[Total Marks : 60

- N. B. : (1) Question no. 1 is compulsory.
(2) Figures to right indicates marks.
(3) Attempt any **three** questions from Q. no. 2 to Q. no. 6.
(4) Use necessary data wherever required.

1. Attempts any **five** :- 15
- (a) Why the Newton's rings are circular and centre of interference pattern (reflected) is dark?
 - (b) What is Rayleigh's criteria of resolution? What is resolving power of diffraction grating?
 - (c) An optical glass fibre of refractive index 1.50 is to be clad with another glass to ensure internal reflection that will contain light travelling within 5° of the fibre axis. What maximum index of refraction is allowed for the cladding?
 - (d) What is acronym of 'LASER'? How are they different than X-rays?
 - (e) An electron is bound in one dimensional potential well of width $2A^\circ$ that of infinite height. Find its energy value in the ground state.
 - (f) Explain measurement of frequency of AC signal using CRO
 - (g) What is the vortex state of a superconductor?
2. (a) With Newton's ring experiment explain how to determine the refractive index of Liquid. 8
In Newton's ring experiment, the diameter of 15th dark ring was found to be 0.590 cm and that of 5th dark ring was 0.336 cm. If the radius of curvature of planoconvex lens is 100 cm, calculate the wavelength of light.
- (b) Differentiate between S.I. fibre and GRIN fibre. Derive the expression for N.A. for step Index fibre. 7
3. (a) What is holography? Explain its construction and reconstruction with neat diagram. 8
(b) Obtain the conditions for maxima and minima due to interference in a wedge shaped film observed in reflected light. Two optically plane glass strips of length 10 cm are placed one over the other. A thin foil of thickness 0.01 mm is introduced between them at one end to form an air film. If the light used has wavelength $5900 A^\circ$. find the separation between consecutive bright fringes. 7
4. (a) What is grating element? Derive condition for maximum diffraction at diffraction grating. 5
(b) What is Heisenberg's uncertainty principle? Show that electron can not exist in nucleus. 5
(c) What is superconductivity? Differentiate between Type-I and Type II superconductors. 5

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5. (a) In plane transmission grating, the angle of diffraction for the second order principal maxima for the wavelength 5×10^{-5} cm is 30° . Calculate the no. of lines/cm. on diffraction grating. 5
- (b) Derive one dimensional time dependent schrodinger wave equation for matter wave. 5
- (c) With neat diagram explain construction and working of Scanning Electron Microscope. 5
6. (a) Calculate the velocity and De Broglie wavelength of an α -particle of energy 1 KeV. Given Mass of α -particle = 6.68×10^{-27} kg. 5
- (b) With neat diagram explain construction and working of CRT. 5
- (c) Explain the Physical Methods for synthesis of Nanoparticles. 5
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