

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  $5^\circ$  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  $2\text{Å}$  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 15<sup>th</sup> dark ring was found to be 0.590 cm and that of 5<sup>th</sup> 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  $5900 \text{Å}$ , 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  $5 \times 10^{-5}$  cm is  $30^\circ$ . 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  $\alpha$ -particle of energy 1 KeV. Given Mass of  $\alpha$ -particle  $= 6.68 \times 10^{-27}$  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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