F.E.C Sem I) (Rev.) Dec'08.
Sub: Applied Physic-
16/12/08   (REVISED COURSE)
3729-08.   (2 Hours)

RC- 5592
[Total Marks : 75
48

(1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from question Nos. **2 to 7**.
(3) Assume **suitable** data & symbols if **required**.
(5) Figures to the **right** indicate **full marks**.

Attempt any **five** :—

   (a) Differentiate between continuous and characteristics x-rays spectra.   3

   (b) What is Hall effect ? Give any two of its applications.   3

   (c) Why is a super conductor termed as a perfect diamagnetic ?   3

   (d) What are Ultrasonic waves ? Explain the direct and inverse Piezo-electric effect.   3

   (e) Electron bombarding the anode of coolidge tube produces x-rays of wavelength 1·5 A°. Find the energy of the electron at the moment of impact. (Given $h = 6·63 \times 10^{-34}$ J-sec; $e = 1·6 \times 10^{-19}$ C)   3

   (f) Draw the plane in cubic unit cell $(1\bar{2}0)$, (100), (101).   3

   (g) Silver has FCC structure & its atomic radius is 1·441 A°. Find the spacing of (111) plane.   3

   (h) How Lissajous figures can be obtained on CRO Screen ?   3

  (a) Draw a schematic diagram of a Cathode ray tube and show its principal parts. Briefly describe their function.   10

  (b) An ultrasonic beam of 1cm wavelength sent by a ship returns from sea bed after 2 seconds. If velocity of ultrasonic beam in sea water is 1510 m/sec at 0°C & its salinity at 30°C is 29 gm/lit, calculate depth of sea bed at 30°C and frequency of ultrasonic beam.   5

  (a) State the acoustic requirements of a good auditorium. Explain how these requirements can be achieved.   10

  (b) The resistivity of copper is $1·72 \times 10^{-8}$ ohm-m. Calculate mobility of electrons in copper. Given that the number of electrons per unit volume is $10·41 \times 10^{28}/m^3$.   5

  (a) Write any four applications of ultrasonic waves. Describe the non destructive testing and cavitation effect applications in detail.   10

  (b) Calculate the number of atoms per unit cell of a metal having the lattice parameter 2·9 A° and density is 7·87 gm/cm³. Atomic weight of a metal is 55·85. Avagadro's number is $6·023 \times 10^{23}/gm$.   5

  (a) What is the lattice constant ? Find the relation between lattice constant with atomic weight and density in a cubic crystal. Draw unit cell of NaCl crystal structure and discuss its structure.   10

  (b) An electron enters a uniform magnetic field $B = 0·23$ wb/m² at 45° angle to B. Determine radius and pitch of helical path. Assuming electron speed to be 3×10^7 m/s.   5

  (a) What is super conductivity ? Describe type - I and type - II super conductor. Give three applications of super conductor.   10

  (b) In comparing the wavelengths of two monochromatic x-ray lines, it is found that line A gives 1st order Bragg's reflection maximum at a glancing angle of 30° to the smooth face of a crystal. Line B of known wavelength of 0·97 A° gives 3rd order reflection maximum at a glancing angle of 60° with the same face of the same crystal. Find the wavelength of line A.   5

  (a) Describe in short the formation of energy band in solids and how it helps to classify the materials into conductor, insulator and semi conductor.   10

  (b) Write short note on 'point defect' in crystal.   5

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