F.E. (Sem-I) CBGS - P.I Dec-2016 /30-12-2016

Physics-I

**QP Code : 529704**

( 2 Hours) **[ Total Marks : 60**

**N.B. :** (1) Question **No. 1** is **compulsory.**
(2) Attempt **any three** from Q.2 to Q.6
(3) Assume any data wherever required.
(4) Figures to the right indicates marks.

1. Solve any five from the following :- **15**
   (a) Why the X-rays are preferred to study crystalline solids?
   (b) Draw the following. (1 2 3), [1 2 3], (012)
   (c) Write APF values for SC, BCC and FCC.
   (d) Write Fermi-Dirac Distribution function and also mention the meaning of all the terms used over there.
   (e) Explain the concept of Holes in semiconductor.
   (f) Describe Inverse Piezo Electric effect.
   (g) Write three important characteristics of soft magnetic material.

2. (a) Show that for intrinsic semiconductor Fermi level is located at the centre of forbidden energy gap. **8**
   What is the probability of an electron being thermally excited at 27°C for a solid with band gap of 5.6 eV. Take $K = 1.38 \times 10^{-23}$ J/K
   (b) Find the following for Diamond cubic crystal stucture (i) Atomic radius (ii) Number of atoms per unit cell (iii) Volume of unit cell. Hence determine its APF. **7**

3. (a) State and derive Bragg's law of X -ray diffraction. Calculate the galncing angle of rock salt having d=1.407 Å. Consider first order diffraction and wavelength of x-ray as 1.541Å. **8**
   (b) A metal ring having cross sectional area $5cm^2$ and diameter 20 cm has a coil of 200 turns wound over it. Determine the curent required to produce flux of 2 milliweber when (i) No airgap (ii) Air gap of 1mm. **7**
   In both the cases consider relative permeability of metal as 380.

4. (a) Draw the diagram representing molecular arrangement of different phases for liquid crystal. State any two aplications of liquid crystal. **5**
   (b) Mention different types of polarizability in dielectric. Explain electronic polarizability. **5**
   (c) The resistivity of intrinsic semiconductor is $2 \times 10^{-4} \Omega$.cm. If the mobility of electron is $6m^2$/V-sec, and that of hole is $0.2m^2$/V-sec, Calculate its intrinsic carrier density. **5**

**[TURN OVER]**

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| 5. | (a) | Explain with neat diagram construction and function of solar cell. | 5 |
| | (b) | The volume of a room is $600m^3$. The wall area of the room is $220m^2$. The floor and ceiling area is same and is gien as $120m^2$. The average sound absorption coefficient for wal is 0.03, for Ceiling is 0.8 and for floor is 0.06. Calculate the average sound absorption coefficent and the reverberation time. | 5 |
| | (c) | Derive critical radious ration for ligancy 6. | 5 |
| 6. | (a) | Explain Magnetostriction Oscillator to produce Ultrasonic waves. | 5 |
| | (b) | Explain the formation of barrier potential in pn junction. | 5 |
| | (c) | Explain Ohm's law for magnetic circuit. Also write two points as its comparision with Ohm's law for electrical circuit. | 5 |

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