T0131 / T1871 APPLIED PHYSICS 1.

F.E. SEM I / CHOICE BASED CREDIT GREDING SYSTEMS / MAY 2017 / 08.06.2017

Q.P. Code: 18533

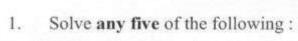
[Time : 2 Hours]

[Total Marks: 60

Please check whether you have got the right question paper.

N.B:

- 1. Questions No.1 is compulsory.
- Attempt any three from Q.No.2 to Q.No.6.
- Assume any data wherever required.
- 4. Figures to the right indicate marks.



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- (a) Draw the unit cell of HCP structure and work out the no. of atoms per unit cell.
- (b) The mobility of holes is $0.025 \text{m}^2/\text{V-sec}$. What would be the resistivity of n-type Si if the Hall coefficient of the sample is $2.25 \times 10^{-5} \text{m}^3/\text{C}$.
- (c) What is the principle of solar cell? Write its advantages and disadvantages.
- (d) An electron is confined in a box of dimension 1A°. Calculate minimum uncertainty in its velocity.
- (e) Explain the factors on which reverberation time depends.
- (f) Explain cavitation effect.
- (g) What is Maglev? How it can have very high speed?
- (a) Draw the following: (1 1 3), (200) [0 0 1].
 An electron is accelerated through 1200 volts and is reflected from a crystal. The second order reflection occurs when glancing angle is 60°. Calculate the inter planar spacing of the crystal.
 - (b) Explain the concept of Fermi level. Prove that the Fermi level exactly at the centre of the Forbidden energy gap in intrinsic semiconductor.
- 3. (a) Find the following parameters for DC (Diamond Cubic) structure :

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- i) No. of atoms per unit cell
- ii) Co-ordination No.
- iii) Nearest atomic distance
- iv) Atomic radius
- v) APF
- (b) Define drift current, diffusion current and P N junction. The electrical conductivity of a pure silicon at room temperature is 4 × 10⁻⁴mho/m. If the mobility of electron is 0.14 m²/V-S and that of hole is 0.04m²/V-S. Calculate the intrinsic carrier density.

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4.	(a)	Distinguish between Type I & Type II superconductors.	5
	(b)	A classroom has dimensions $10 \times 8 \times 6$ m ³ . The reverberation time is 3 sec.	5
		Calculate the total absorption of surface and average absorption.	
	(c)	Explain the principle, construction and working of a Magnetostriction Oscillator.	5
5.	(a)	Write Fermi Dirac distribution function. With the help of diagram, explain the	5
		variation of Fermi level with temperature in n-type semiconductor.	
	(b)	Derive Schrodinger's time dependent wave equation for matter waves.	5
	(c)	Find the depth of sea water from a ship on the sea surface it the time interval of	5
		two seconds is required to receive the signal back. Given that: temperature of sea	
		water is 20°C, salinity of sea water is 10gm/lit.	
6.	(a)	Define the term critical temperature. Show that in the superconducting state the	5
	(a)	material is perfectly diamagnetic.	3
	(b)	In a solid the energy level is lying 0.012eV below Fermi level. What is the	5
		probability of this level not being occupied by an electron?	
	(c)	What is the wavelength of a beam of neutron having:	5
		i) an energy of 0.025eV?	
		ii) an electron and photon each have wavelength of 2A°. What are their	
		momentum and energy? $m_p = 1.676 \times 10^{-27} \text{kg}$, $h = 6.625 \times 10^{-34} \text{ J-sec}$.	