FE, sem. I, CBGS, FH2018 05/04/18

App. Physics-I

Q. P. Code: 39777

OLD

Time: 2 hours Marks: 60

Note : Q.1 is compulsory
Attempt any three from Q.2 to Q.6
Assume suitable data if necessary, (Avogadro's No= $6.02X10^{26}$ per kg mole)

		Marks
Q.1	Attempt **any five**	
a	Identify crystal structure if its density is 9.6 X 10^2 kg/m^3 and lattice constant is 4.3 Angstrom. (atomic weight 23)	3
b	Explain the concept of hole? In Intrinsic semiconductor if number of electrons in conduction band is "x" find the number of holes in valence band	3
c	Write the advantages of solar cell	3
d	What is meant by active and passive dielectrics?	3
e	Define the terms permeability, relative permeability and susceptibility with reference to magnetic materials.	3
f	Explain Frankle defect in crystal imperfections.	3
g	In Piezo electric Oscillator what is the role of resonance?	3
Q.2		
a	Draw the unit cell of HCP. Derive (i) atoms/ unit cell (ii) atomic radius (iii) APF	8
b	Explain the term "Ligancy" why certain ligancies are not possible? Calculate critical radius ratio for Ligancy 3.	7
Q.3		
a	What is the term "Hysteresis"? Draw Hysteresis loop explain various important point on it. What is the technical significance of area enclosed under it? For a transformer which kind of material will you prefer the one with small Hysteresis loop area or the big one?	8
b	Silicon has the same crystal structure as of diamond. Its density is 2.33X 10^3 kg/m^3 and atomic weight 28.9. Calculate atomic radius and lattice constant	7
Q.4		
a	Draw the following [120], (100) , (001), [121], [210]	5
b	What is Fermi level? Draw suitable diagrams to show its position in intrinsic semiconductor, p and n type semiconductor. Also draw its variation with temperature in p type.	5
c	Describe various polarization mechanisms in dielectrics.	5
Q.5		
a	State and derive Bragg's Law	5
b	Describe the Hall effect experiment to find the type of extrinsic semiconductor with proper labelled diagram	5
c	A hall of dimension 20 x 15x 10 m^3 has average absorption coefficient 0.1. Find the reverberation time. If a curtain cloth of 100m^2 is suspended at the centre of the hall with absorption coefficient 0.66, find the change in reverberation time	5
Q.6		
a	Explain Ohm's law for magnetic circuit. Write at least 2 points as comparison with electric circuit	5
b	What is Cavitation? Write its applications(any three)	5
c	The Hall coefficient for a specimen is given as 3.66 X 10^{-4} m^3 /C. Its resistively is 8.93 x 10^{-3} Ω m. Find its μ and n.	5

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