DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

End Semester Examination – Winter 2018

Course: B. Tech in Electrical Engineering **Sem: III**

Subject Name: Electrical Engineering Materials **Subject Code:** BTEEE305A

Max Marks: 60 **Date: 10/12/2018** **Duration: 3 Hr.**

Instructions to the Students:

1. *Solve **ANY FIVE** questions out of the following.*
2. *The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Marks
Q. 1	**Solve following questions.**		**12**
A)	Define atomic packing factor of the cubic system. Show that the APF for BCC crystal structure is 0.68	**CO 1**	**4**
B)	With neat diagram explain and derive Bragg's law of X-ray diffraction in crystal.	**CO 1**	**5**
C)	If the interplanar distance for a plane having Miller indices (1 1 0) is 2.86 A°. Calculate the lattice constant 'a'	**CO 1**	**3**
	OR		
C)	A certain orthorhombic crystal has a ratio of a:b:c of 0.430:1:0.377. Find the Miller indices of faces whose intercepts are i) 0.215:1:0.188 ii) 0.860:1:0.754	**CO 1**	**3**
Q.2	**Solve following questions.**		**12**
A)	Give the classification with examples for magnetic materials based on relative permeability(μ_r)	**CO 2**	**5**
B)	Draw and explain the hysteresis loop for ferromagnetic materials. What is retentivity and coercivity	**CO2**	**7**
	OR		
B)	Define magnetic dipole moment &relativepermeability(μ_r). Show that$\mu_r = (1+\chi_m$),Where χ_m is magnetic susceptibility.	**CO 2**	**7**
Q. 3	**Solve following questions.**		
A)	Describe the formation of energy bands in solids and explain with proper diagrams, classification of materials into conductors and insulators.	**CO 3**	**5**
B)	With ref to superconductivity explain with neat diagrams i) Meissner effect ii) Cooper pair formation iii) High temp super conductivity	**CO 3**	**7**

Q.4	**Solve following questions.**		**12**
A)	Explain Hall effect and its significance. Give its applications	CO 2	6
B)	Explain the concept of Fermi-level in case of semiconductors and derive an expression for Fermi-energy in intrinsic semiconductor	CO 3	6
	OR		
C)	Obtain the expression for the i)Total conductivity of semiconductor ii) conductivity of N & P semiconductors	CO 3	6
Q. 5	**Solve following questions.**		**12**
A)	Define Electric dipole moment and explain dielectric polarization and indicate different types of polarizations	CO 4	6
B)	Derive Clausius-Mosotti relation from first principles as applied to dielectric materials, state the assumptions made	CO 4	6
Q. 6	**Solve following questions.**		**12**
A)	Explain the concept of Nano-technology as it applies to electrical / electronic engineering materials. Also state important properties and applications of Nano particles	CO 4	6
B)	With neat diagram explain the principle , construction and working of STM-Scanning Tunneling Microscope	CO 4	6
	OR		
C)	Write a short note on carbon nano-tubes and its applications	CO 4	6

***** End *****