

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

End Semester Examination – Winter 2018

Course: B. Tech in Electrical Engineering

Subject Name: Electrical Engineering Materials

Max Marks: 60

Date: 10/12/2018

Sem: III

Subject Code: BTEEE305A

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
<b>Q. 1 Solve following questions.</b>		<b>12</b>
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 Å. Calculate the lattice constant 'a'	CO 1	3
<b>OR</b>		
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
<b>Q.2 Solve following questions.</b>		<b>12</b>
A) Give the classification with examples for magnetic materials based on relative permeability( $\mu_r$ )	CO 2	5
B) Draw and explain the hysteresis loop for ferromagnetic materials. What is retentivity and coercivity	CO2	7
<b>OR</b>		
B) Define magnetic dipole moment & relative permeability( $\mu_r$ ). Show that $\mu_r = (1 + \chi_m)$ , Where $\chi_m$ is magnetic susceptibility.	CO 2	7
<b>Q. 3 Solve following questions.</b>		
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 **CO 3** **6**
- i) Total conductivity of semiconductor
- ii) conductivity of N & P semiconductors

**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 \*\*\***