Form A: Paper-setting Blank Ref. No. Ex /EE/T/223/2018

B E.E 2nd year 2nd Sem. EXAMINATION, 20 18

SUBJECT Electrical Engineering Materials
(Name in full)

PAPER .....

Time : ~~Two hours~~/Three hours/~~Four hours/Six hours~~

Full Marks ~~30~~/ 100
(~~15~~/50 marks for each part)

Use a separate Answer-Script for each part

No. of questions	Part I Answer any three questions (Q 1 to Q 4 carries 16 marks and Q 5 carries18 marks)	Marks
Q1		8+8
i)	Deducing Curie-Weiss law, compare susceptibility characteristics of ferromagnetic materials above and below the Curie temperature?	
ii)	From the ferromagnetic domain theory explain the process of magnetization and demagnetization of ferromagnetic materials.	
Q2		
i)	Classify magnetic materials based on the presence of permanent magnet dipole moments. Draw and explain susceptibility versus temperature characteristics in each case.	8+8
ii)	What is anisotropy? Explain the dependency of anisotropic energy on crystallographic axis for ferromagnetic materials.	
Q3i)	Compare magnetic behavior of ferrimagnetic and antiferromagnetic materials?	8+8
ii)	Explain critical field and critical current density of superconductors. Also explain Meissner effect.	
Q4 i)	Explain the importance of the following terms in selection of contact materials (i) Contact resistance (ii) contact force (iii) voltage and current	8+8
ii)	From the free electron theory deduce Ohms law. Explain mobility.	
Q5	Write short notes on any three (03) of the following (a) Hard magnetic materials (b) Preece's law of fuses (c) Exchange force in magnetic materials (d) Silsbee's rule for Superconductivity	6X3

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Ex/EE/T/223/2018

B.E.ELECTRICAL ENGINEERING EXAMINATION, 2018

(2^{nd} Year, 2nd Semester)

ELECTRICAL ENGINEERING MATERIALS

Time: Three Hours Full Marks: 100

(50 marks for each part)

Use a separate Answer-script for each Part

PART-II

Answer ***any three*** questions

(Two marks are reserved for neatness and well organized answers)

1. a) State the postulates of Bohr's Atomic theory. 4

   b) Determine the wavelengths present in the radiation emitted by a hydrogen atom when it is returned to ground state from n=3 state. Derive necessary relations. 8

   c) Discuss about the limitations of Bohr's Atomic theory. 4

2. a) Derive an expression for the insulation resistance of a coaxial cable of length L with internal radius r_1 and external radius r_2. 4

   b) The insulation resistance of 200m length of a cable is 100MΩ at 25°C. An increase in 15°C reduces the insulation resistance to half the value at 25°C. Determine the insulation resistance of 100m of the cable at 15°C. 6

   a) Classify insulating materials in the light of thermal gradation with suitable examples. 6

3. a) A 110 kV, 3 core coaxial XLPE insulated power cable has a capacitance of 125nF/km. The dielectric dissipation factor of XLPE at 50 Hz is 0.02%. Determine the dielectric power loss of the cable at 50Hz in W/km. Derive necessary relations. 8

   b) Why dielectric dissipation factor of a power cable is generally measured at very low frequency (VLF)? 4

   c) What is the difference between breakdown strength and breakdown voltage of an insulating material? 4

4. a) Write a brief note on important properties of transformer oil as a liquid insulating material. 8

   b) Discuss briefly about the breakdown phenomenon of a gaseous insulation in the light of collision mechanism. 4

   c) Draw and explain the nature of variation of breakdown voltage of gaseous insulation with pressure. 4

5. Write short notes on *any two* of the following: 8×2=16

   (i) Nuclear Binding Energy vis-à-vis Mass Defect.

   (ii) Epoxy resin.

   (iii) Vulcanized rubber insulation.

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