Ref No: **EX/EE/5/T/122/2019**

BACHELOR OF ENGINEERING (ELECTRICAL ENGINEERING) 1ST YR 2ST SEMESTER EXAMINATION, 2019

(1st/ 2nd Semester/~~Repeat/Supplementary/Annual/Bi-Annual~~)

SUBJECT: - ELECTRICAL ENGINEERING MATERIAL

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

Full Marks 100
(50 marks for each part)

Use a separate Answer-Script for each part

No. of Questions	PART I	Marks
	Answer Question:1 and any TWO from the rest:	
1.	**(any four):-** a) Why Fe, Ni and Co have different magnetic dipole moment? b) Why anitiferromagnetism is observed in compound material? c) Why magnetostriction phenomenon is related to domain movement? d) Why anisotrophy property is important for magnetizing ferromagnetic material? e) Why free electrons in conductor suffer by collision with neighboring molecules? f) Why the relaxation time of pure metal is metal lesser that that of impure?	4X5=20
2.	a) Using classical theory derive the expression of magnetic susceptibility in terms of curie constant (C) and temperature (T). b) Prove that the magnetic dipole moment by rotating electron around the nucleus of an atom is given by : $\mu_m = -\frac{1}{5}eR^2\omega$, according to spherical charge cloud model. c) Prove that for a current loop , the dipole moment and the torque produced due to mutual interaction between external magnetic field and dipole are given by : $\mu_m = n.I.A$ and	

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3.	$T = \mu_m XB$	5+5+5
	a) Explain what happens when ferromagnetic is subjected to weak, medium and strong external magnetic fields?	
	b) State the significance of Neel temperature in antiferromagnetic material and derive the expression of it.	
	c) Discuss the hard and soft magnetic material with comparison magnetic anisotropy, hysteresis properties.	5+5+5
4.	a) Explain why the free electrons in conductor attain uniform velocity when it is subjected to uniform electric field?	
	b) Explain the significance of electron mobility in conductor. How the resistivity and conductivity are related to mobility. Give mathematical expression.	
	c) Explain how the resistivity changes with temperature for a pure metal and impure metal.	6+4+5
5.	**Write short notes on any three of the following:**	
	a) Bohr magneton	
	b) Matthiessens's rule	
	c) Mean free path	
	d) Curie-Weiss law	
	e) Orbital magnetic dipole moment and angular momentum.	3X5=15

Ex/EE/5/T/122/2019

BACHELOR OF ENGINEERING (ELECTRICAL ENGINEERING)

(1st Year, 2nd Semester Exam, 2019)

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 answer script

1. a) State the postulates of Bohr's Atomic theory & limitations of Rutherford's Atomic Model . 8

   b) Discuss about the limitations of Bohr's theory of hydrogen atom. 4

   c) Briefly explains "Nuclear Binding Energy" vs. "Mass Defect". 4

2. a) Explain about ionic and covalent bonding with examples 6

   b) Discuss about five significant electrical properties of insulating materials. 10

3. a) Discuss briefly about the thermal classification of insulating materials. 6

   b) Explain how dielectric polarization is related to the relative permittivity of the dielectric medium. 6

   c) Discuss about some important properties of transformer oil 4

4. a) Explain the nature of the relationship between dielectric strength and pressure for gaseous dielectric. Justify the use of compressed gas in high voltage systems. 8

   b) Explain the process of impregnation of paper with insulating oil. What is the use of this combination? 8

5. Write short notes on any two of the followings: 8×2

   (i) Cross-linked Polyethylene
   (ii) Porcelain
   (iii) Epoxy resin

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