BACHELOR OF ELECTRICAL ENGINEERING (EVE) (1ST YR 2ST SEMESTER)
EXAMINATION, 2017
(1st / 2nd-Semester/Repeat/Supplementary/Annual/Bi-Annual)

SUBJECT: - ELECTRICAL ENGINEERING MATERIAL
Full Marks 100

Time: Two hours/Three hours/ Four hours/ Six hours　　　　　　(50 marks for each part)
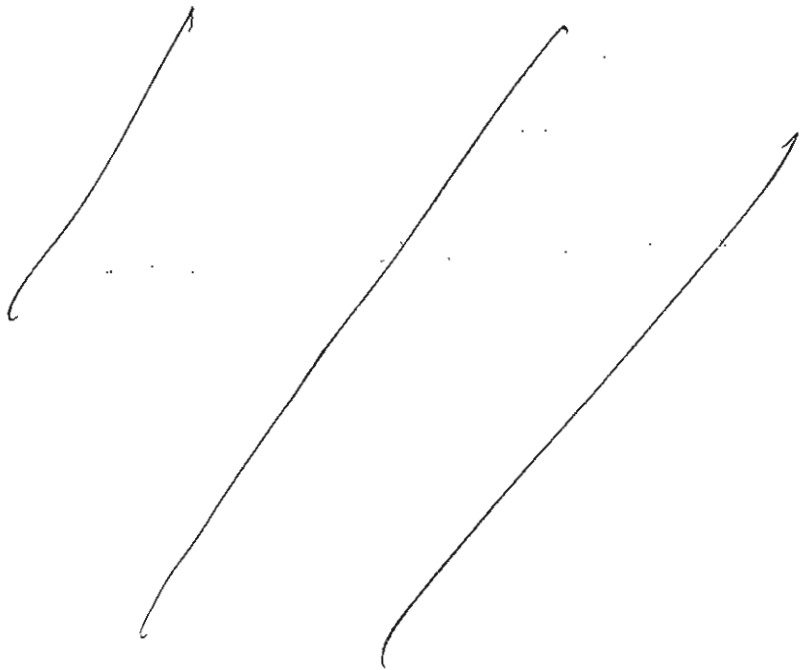
Use a separate Answer-Script for each part

No. of Questions	PART I	Marks
	Answer any three questions *(Two marks are reserved for appropriate answers).*	
1.	a) Derive the expression for the induced dipole moment for an electron rotating around nucleus on a circular orbit, having mass m , initial angular velocity, and subjected to uniform magnetic field with flux density B.	
	b) Discuss the following :	
	I. Orbital angular momentum	
	II. Electron spin momentum	8+8=16
2.	c) Compare the magnetic property of Fe, Ni and Co materials in respect of Bohr magneton.	
	d) Derive expressions for the Para and Ferro magnetic Curie constants.	
		4+6+6= 16
	e) Draw the susceptibity vs temperature plots for Para and Ferro magnetic materials. Hence discuss the difference observed in those plots.	
3.	a) What will happen when a ferromagnetic material is subjected to weak, medium and strong eternal magnetic fields?	
	b) Explain the phenomenon of magnetic anisotropy in connection to domain theory.	
	c) Derive the expression of susceptibility of antiferromagnetic material having two types of molecules ,A and B . Compare the susceptibility among Para, Ferro and Antiferro-magnetic	4+4+8= 16

Ref No: EX/EE/5/T/122/2017

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4.	materials. a) Explain, why free electrons in metal attain uniform velocity when subjected to uniform electric field? b) Explain how resistivity changes with temperature for the pure and the impure metals? c) "If the mean free path increases , the conductivity increases and vice versa"----Justify this statement.	6+5+5

B.E ELECTRICAL ENGINEERING (PART TIME) EXAMINATION, 2017

(1st 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 Question no 1 *and any two* from the rest

1. a) Calculate the frequency and the energy of photons emitted if an electron in a hydrogen atom makes a transition from a quantum state of principle quantum number n=3 to the ground state. Given h = 6.62e-34 J.

   8

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

   4

   c) Distinguish between conductors, semiconductors and insulators in the light of energy band theory of solids.

   8

2. a) Discuss about nuclear binding energy vis a vis mass defect with suitable examples.

   7

   b) The insulation resistance of 200m of a cable is 500MΩ 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.

   8

3. a) Define surface resistivity and volume resistivity of an insulating material.

   4

   b) Derive an expression for dielectric power loss in an insulating material.

   8

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

   3

4. a) Discuss about some important properties of transformer oil.

   4

   b) Discuss about the nature of variation of breakdown voltage of a gas with pressure.

   3

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

   8

5. Write short notes on *any two* of the following: 7.5×2=15
      (i) Thermal gradation of insulating materials
      (ii) Epoxy resin
      (iii) Porcelain Insulation

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