Total No. of Questions : 8]

## **P9092**

SEAT No. :

[Total No. of Pages : 3

[Max. Marks : 70

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S.E. (Electrical)

MATERIALSCIENCE

## (2019 Pattern) (Semester - III) (203142)

Time : 2<sup>1</sup>/<sub>2</sub> Hours]

Instructions to the candidates:

- 1) Attempt Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6, Q. No. 7 or Q. No. 8
- 2) Figures to the right indicate full marks.
- 3) Assume suitable data, if necessary.
- 4) Neat diagrams must be drawn wherever necessary.
- *Q1*) a) Explain thermal classification of solid insulating materials. Hence write properties and applications of any two materials from Class E type. [6]

b) State the properties and applications of -

- i) Pressboard
- ii) Varnish
- c) Explain properties of good liquid insulating material along with their examples. [5]

## OR

Q2) a) Classify insulating materials as per their physical state, structure of material and mode of manufacturing along with their examples. [6]

b) State the properties and applications of -

[5]

[6]

Air

i)

- ii) Askarel
- Explain properties of insulating materials which are used in rotating machines and transformers. [6]

*P.T.O.* 

- Q3) a) Define with units
  - i) Magnetic field strength
  - ii) Magnetic permeability of free space
  - iii) Magnetic susceptibility
  - b) With necessary diagram, classify magnetic materials on the basis of magnetic dipole moment and magnetic permeability. [6]
  - c) Draw and explain magnetization curve for a ferromagnetic material and hence define with units [6]
    - i) Coercive force

i) & Residual Flux Density

Q4) a) In a magnetic material, hysteresis loss is 140 W when maximum flux density of 1.1 tesla and frequency is 40 Hz. What would be hysteresis loss if flux density is decreased to 0.9 tesla and frequency is increased to 60 Hz? Assume that hysteresis loss is proportional to  $(B_m)^{1.7}$ . PI check the solution. [6]

OR

- b) Compare Soft Magnetic Materials and Hard Magnetic Materials.
- c) Write short note on ferrites and their applications.

Q5) a) Define resistivity of the material along with its unit. Hence explain factors affecting resistivity of the material.

b) With the neat diagram, explain principle of working of thermal bimetal. Give its examples and applications. [6]

Describe properties and applications of Copper and Nichrome. [5]

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c)

**[6]** 

<b>Q6</b> )	a)	What do you mean by alloy? Hence explain properties and applicat of copper alloys.	tions [6]
	b)	State properties and applications of materials used for solders.	[5]
	c)	With the neat diagram, explain principle of working of thermocou Give its examples with temperature ranges and its applications.	iple. [6]
<b>Q</b> 7)	a)	Describe with neat diagrams - Carbon clusters.	[6]
	b)	Explain with neat diagram - Single Electron Transistor (SET).	[6]
	c)	Write a short note on - $C_{60}$ .	[6]
	20	QR S.	
<b>Q</b> 8)	a)	Describe with neat diagram - Nano wires.	[6]
	b)	Describe with neat diagrams - Boron Nano Tubes.	[6]
ć	c)	Explain Nano materials used in Batteries and Photovoltaic Cells.	
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