3RD SEM./ELE&MECH /ELECTRICAL./ 2023(W) NEW

Th- 4 Electrical Engineering Material

Full Marks: 80 **Time- 3 Hrs**

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10
   a. Define reluctance and coercivity.
   b. What is dielectric strength and dielectric loss in insulators?
   c. Define eddy current.
   d. Write down two applications of copper.
   e. What is superconductor?
   f. What is the effect of porosity?
   g. What are the advantages of using bundled conductors?
   h. What do you mean by covalent bond?
   i. What is ageing?
   j. Why conducting materials like copper and aluminium are not used for making the element for electrical heaters?

2. Answer **Any Six** Questions 6 x 5
   a. What is the difference between N type semiconductor and P type semiconductor?
   b. Write down properties of gold and silver.
   c. What is fuse? Write down the properties of fuse material.
   d. Define Plastics and give its classifications with applications.
   e. Name the conducting materials used in making
      (i) Thermo-couple
      (ii) Starter element used in starting d.c. motor
      (iii) Electrodes for electric arc furnace
      (iv) Plug and socket
      (v) Element of a fan regulator
   f. Write in brief about photovoltaic cell.
   g Write short notes on Bimetals and their applications.

Answer Any **Three** Questions

3 Explain the hysteresis loop for ferromagnetic material with suitable diagram. 10

4 Explain the process of polarisation of a dielectric material. 10

5 (a) Distinguish between low resistivity and high resistivity materials. 10
(b) Explain the effect of temperature on resistivity.

6 Explain physical, thermal and electrical properties of insulating materials. 10

7 Write short notes on 10
(a) Hall effect generators
(b) Magnetostriction

3RD SEM/ ELECTRICAL/ELECT & MECH/2020(W) NEW
TH4-ELECTRICAL ENGINEERING MATERIAL

Full Marks: 80 Time : 3 Hours

Answer any Five Questions including Q No. 1& 2

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1. **Answer all the questions** 10x2

a) Define(i) Energy level of an electron (ii)Energy Band

b) What do you mean by resistivity and state its SI unit.

c) What is dielectric loss?

d) What do you mean by Curie point?

e) Which properties should a fuse material possess?

f) What are the factors affecting dielectric strength of insulating material?

g) Which material is used for making (i)frames of small electric machines(ii) tanks for transformer

h) What is eddy current?

i) Define diamagnetism. Give an example

j) What is photovoltaic cell?

2. **Answer any six questions** 6x5

a) Write a short note on hysteresis loop for a ferromagnetic material.

b) Differentiate between intrinsic and extrinsic semiconductors.

c) Describe about the soft magnetic materials briefly.

d) Explain the electric conductivity of gaseous dielectrics.

e) Write about soldering materials briefly.

f) Explain the application of superconductor material.

g) What are the factors affecting insulation resistance?

3. Explain about the polarisation of dielectric material in details. 10

4. Describe about natural and synthetic rubber and their applications. 10

5. Write a short note on(i)Hall Effect generators(ii) Solar power 10

6. Describe about high resistivity materials and their applications 10

7. Explain fuse and fuse materials. Draw also a cross section view of cartridge fuse. 10

3RD SEM. /ELECTRICAL/ ELECTRICAL & MECHANICAL / 2022(W)

Th-4 Electrical Engineering Material

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. Mention the factors which affect the value of resistivity of a material.
b. Of what material is high voltage overhead lines for power transmission made? Give reasons.
c. Name the conducting material which is generally used in plug points, socket outlets, switches and lamp holders. State 2 properties of this material should possess for such applications.
d. Mention what number of electrons in the valence ring makes the best conductor and the best insulator.
e. State the use of semiconductor in industrial applications.
f. State the factors which affect the dielectric loss of an insulating material.
g. State the difference between a dielectric material and an insulating material as regards their functions.
h. Name the special type of steel used for cores of power transformers. Give reasons.
i. Explain magnetostriction and eddy current loss.
j. What are bimetals? Where are these used?

2. Answer **Any Six** Questions 6 x 5

a. What is resistivity of conductor materials? A resistance wire of length 1 meter and diameter 0.08 mm has a resistance of 95.5 ohms. Calculate the resistivity of the wire material.
b. Explain with the help of energy diagram n-type and p-type semiconductors.
c. Name the different classes of varnishes available. Describe what are epoxy resin varnishes and silicone resin varnishes.
d. Explain the following:
   (i) Permittivity (ii) Dielectric strength (iii) Dielectric constant (iv) Breakdown voltage (v) Loss angle
e. What are ferrites? What are their advantages over other magnetic materials?
f. Describe briefly the Hall effect and Hall effect generator.
g. What is superconductivity? Explain the applications of superconducting materials.

3. What insulating material would you select for the following? Also Mention reasons for the selection: 10
   (a) Flexible wire (b) High Voltage cable (c) Low voltage cable
   (d) Fuse Holder (e) Commutator in D.C machines

4. Explain the process of polarisation of a dielectric material. 10

5. Explain the hysteresis loop for different magnetic material with suitable diagram. 10

6. Write short notes on (a) Soldering material (b) Silica gel 10

7. Discuss the physical, electrical and mechanical properties of copper and its use as an engineering material. Where it can be substituted by aluminium and with what limitations? 10

3RD SEM./Electrical/Electrical(Inst. & Control)/ 2020(w) OLD
EET - 302 Electrical Engineering Materials

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
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1. Answer **All** questions 2 x 10

   a. What is Hall Effect?

   b. Define Curie Point?

   c. What is ACSR and where it is used?

   d. Differentiate between volume resistance and surface resistance.

   e. What is Varister?

   f. What is Intrinsic Semiconductor?

   g. What is PVC and for what purpose it is used?

   h. What are theclassification of magnetic materials?

   i. What do you mean by Skin Effect?

   j. What is the effect of Porosity?

2. Answer **Any Six** Questions 6 x 5

   a. Explin, why Glass is an insulating material and what are its uses?

   b. Classify the Insulating materials on the basis of its physical and chemical structure?

   c. State the advantages and disadvantages of Aluminium as compared to Copper for use as conductor in Electricity.

   d. Write in brief about Varnishes.

   e. Write notes on Soft and Hard Magnetic Materials.

   f. Explain properties of Dehydrating Materials with Examples.

   g What are Thermocouple Materials? State their applications.

3 Distinguish between Diamagnetic, Paramagnetic and Ferromagnetic Materials. 10

4 How Polyvinyl Chloride is made? Explain how its properties are affected by different materials? 10

5 What is super conducting materials? Write its applications. 10

6 What are Solder Materials and also Explain about electrical contact materials. 10

7 What are the differences between Conductor, Semiconductor and Insulator? Explain. 10

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TH4 Electrical Engineering Material

Full Marks: 80 **Time- 3 Hrs**

Answer any five Questions including Q No.1& 2
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1. Answer **All** questions 2 x 10
   a. What is breakdown voltage?
   b. Explain why Aluminium is a very good conductor but Gallium is not.
   c. What is thermocouple material?
   d. What do you mean by covalent bond?
   e. Differentiate between dielectric material and insulating material as regards their functions.
   f. What is diamagnetic and paramagnetic?
   g. What are the advantages of using stranded conductors?
   h. What is soft solder and hard solder?
   i. What are bimetals?
   j. Mention what number of electrons in the valence ring makes the best conductor and the best insulator.

2. Answer **Any Six** Questions 5X6
   a. State the advantages and disadvantages of aluminum as compared to copper as a conductor of electricity.
   b. What do you mean by eddy current, permeability and curie point? How the eddy current loss is minimised in case of transformer?
   c. Write in brief about photovoltaic cell.
   d. State four factors which decide the selection of insulating material for given purpose.
   e. State the function of a fuse. Mention the desirable properties of a fuse material.
   f. Write short notes on Varnishes.
   g Calculate the diameter of copper wire of length 100m used as winding material in a transformer such that the resistance of whole winding is 2Ω. Calculate the diameter of the wire if the aluminum is to be used for above winding, resistance remaining the same. $\rho_{cu} = 1.7\ x\ 10^{-8}\ ohm\ m$ and $\rho_{Al} = 2.8\ x\ 10^{-8}\ ohm\ m$

Answer **Any Three** Questions

3. Explain the hysteresis loop for ferromagnetic material with suitable diagram. 10
4. Write short notes on 5+5
   (a) Hall effect generators
   (b) Magnetostriction
5. What is superconductivity? Explain the applications of superconducting materials. 2+8
6. Explain different types of material with the help of energy band diagram. 10
7. Write short notes on (a) Soldering material (b) Silica gel 5+5

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