

Enrollment No./Seat No.:

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**Bachelor of Engineering - SEMESTER - VI EXAMINATION - WINTER 2025**

**Subject Code: 3160923**

**Date: 19-11-2025**

**Subject Name: Electrical Materials**

**Time: 02:30 PM TO 05:00 PM**

**Total Marks: 70**

**Instructions**

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**
- 4. Simple and non-programmable scientific calculators are allowed.**

	<b>Marks</b>
<b>Q.1 (a)</b> Define the following for magnetic material : a) Permeability, b) Saturation, c) Remenance,	<b>03</b>
<b>(b)</b> Name the materials which are used for making: (a) Transmission lines (b) Winding wire of Electric Motor (c) Resistor of loading rheostat (d) Elements of electric heaters	<b>04</b>
<b>(c)</b> Explain various characteristics of a good insulating materials	<b>07</b>
<b>Q.2 (a)</b> Explain the hysteresis and eddy current losses.	<b>03</b>
<b>(b)</b> Explain factors affecting the resistivity of conducting materials	<b>04</b>
<b>(c)</b> Enlist gaseous insulating materials in Electrical Engineering and explain any two with its characteristics	<b>07</b>
<b>OR</b>	
<b>(c)</b> Explain properties, characteristics and applications of commonly used high resistive materials	<b>07</b>
<b>Q.3 (a)</b> State the properties and applications of Copper.	<b>03</b>
<b>(b)</b> Explain Seebeck effect and Peltier effect	<b>04</b>
<b>(c)</b> Explain the properties of superconductors	<b>07</b>
<b>OR</b>	
<b>(a)</b> Explain hall effect, drift, mobility, diffusion in Semiconductors,	<b>03</b>
<b>(b)</b> Classify the insulating materials according to temperature.	<b>04</b>
<b>(c)</b> Draw hysteresis loop and explain coercivity and retentivity of magnetic material.	<b>07</b>
<b>Q.4 (a)</b> Explain polarization in dielectric materials.	<b>03</b>
<b>(b)</b> Discuss the various conducting materials used in making of D.C.Machines & Transformer	<b>04</b>

(c) Compare type-I and type-II semiconductors 07

**OR**

(a) Discuss Magnetostriction in magnetic materials. 03

(b) Explain the terms : Dielectric strength, Dielectric losses, and loss angle. 04

(c) Write a short note on refractory materials 07

**Q.5** (a) Explain in brief : intrinsic Semi-conductors, extrinsic Semi-conductors, compound semiconductor 03

(b) Explain partial discharge breakdown in liquid dielectric material. 04

(c) Discuss the difference between the soft and hard magnetic materials. 07

**OR**

(a) List out Applications of Superconductors. 03

(b) Explain ferrimagnetic materials and ferromagnetic material 04

(c) Discuss the various properties and applications of the following insulating materials. 07  
(1) Glass (2) Cotton (3) Teflon.

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