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.**

			Marks
Q.1	**(a)**	Define the following for magnetic material : a) Permeability, b) Saturation, c) Remenance,	**03**
	(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	**04**
	(c)	Explain various characteristics of a good insulating materials	**07**
Q.2	**(a)**	Explain the hysteresis and eddy current losses.	**03**
	(b)	Explain factors affecting the resistivity of conducting materials	**04**
	(c)	Enlist gaseous insulating materials in Electrical Engineering and explain any two with its characteristics	**07**
		OR	
	(c)	Explain properties, characteristics and applications of commonly used high resistive materials	**07**
Q.3	**(a)**	State the properties and applications of Copper.	**03**
	(b)	Explain Seebeck effect and Peltier effect	**04**
	(c)	Explain the properties of superconductors	**07**
		OR	
	(a)	Explain hall effect, drift, mobility, diffusion in Semiconductors,	**03**
	(b)	Classify the insulating materials according to temperature.	**04**
	(c)	Draw hysteresis loop and explain corcivity and retentivity of magnetic material.	**07**
Q.4	**(a)**	Explain polarization in dielectric materials.	**03**
	(b)	Discuss the various conducting materials used in making of D.C.Machines & Transformer	**04**

	(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. (1) Glass (2) Cotton (3) Teflon.	**07**

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Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VI (NEW) EXAMINATION – WINTER 2024

Subject Code:3160923 Date:28-11-2024

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.**

			Marks
Q.1	**(a)**	Give classification of Electrical material.	**03**
	(b)	Explain intrinsic and extrinsic semiconductors.	**04**
	(c)	Explain difference between hard and soft magnetic material.	**07**
Q.2	**(a)**	Explain the meaning of semiconductors. Give two examples of semiconductors.	**03**
	(b)	Give the characteristics of a good conductor material.	**04**
	(c)	List out the commonly used conductor materials and give any two conductor materials properties in brief.	**07**
		OR	
	(c)	Discuss properties of high resistivity material.	**07**
Q.3	**(a)**	Classification of Insulating material based on temperature.	**03**
	(b)	Name four natural insulating materials. Mention their most important properties and their application.	**04**
	(c)	Give and Justify choice of magnetic material for (1)transformer core (2)Stator of DC (3) Submarine cable(3) core of CT and PT	**07**
		OR	
Q.3	**(a)**	Give classification of magnetic material and explain in brief.	**03**
	(b)	Enumerate the factors that affect the dielectric strength.	**04**
	(c)	Write short notes on: mechanical and electrical properties of dielectric materials.	**07**
Q.4	**(a)**	Define curie point.	**03**
	(b)	Define magnetostriction.	**04**
	(c)	Discuss transformer oil as insulating material.	**07**
		OR	
Q.4	**(a)**	State the advantage of grain orientation.	**03**
	(b)	Make a list of the factors affecting the insulating resistance of a material.	**04**
	(c)	Write short notes on polarisation.	**07**
Q.5	**(a)**	Explain the functions of structural materials.	**03**
	(b)	Explain radioactive material. List out at least two radioactive materials.	**04**
	(c)	Write short notes on refractory materials.	**07**
		OR	
Q.5	**(a)**	Explain the important characteristics of a thermocouple materials.	**03**

(b) Discuss Nickel Iron alloys. **04**

(c) Explain Galvanizing and different methods of Galvanizing. **07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – WINTER 2023

Subject Code:3160923 Date:07-12-2023

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.**

			Marks
Q.1	**(a)**	Give classification of conducting material.	**03**
	(b)	List the different material used in making of AC and DC Machine?	**04**
	(c)	State the properties and applications of Copper.	**07**
Q.2	**(a)**	What are the desirable qualities of high conducting material?	**03**
	(b)	Enlist the factors affecting conductivity and resistivity of material.	**04**
	(c)	Discuss properties of high resistivity material.	**07**
		OR	
	(c)	Write a short note on: Radioactive material.	**07**
Q.3	**(a)**	Define “dielectric strength” of material. List the factors affecting it.	**03**
	(b)	Define : (i) Polarization (ii) dielectric loss & loss angle.	**04**
	(c)	Discuss classification of Insulating material based on temperature.	**07**
		OR	
Q.3	**(a)**	Discuss effect of “moisture” on the insulating material.	**03**
	(b)	Explain transformer oil as an insulating material.	**04**
	(c)	Explain the different Electrical properties of Insulating Materials.	**07**
Q.4	**(a)**	Discuss briefly: Classification of magnetic material.	**03**
	(b)	Explain the difference between hard and soft magnetic materials.	**04**
	(c)	Discuss the High Frequency Materials.	**07**
		OR	
Q.4	**(a)**	Explain “losses” in magnetic materials.	**03**
	(b)	Explain B-H curve of magnetic material.	**04**
	(c)	State and explain the properties of Magnetic Materials.	**07**
Q.5	**(a)**	Explain effect of temperature on semiconductor.	**03**
	(b)	Compare: P- type and N-type semiconductor material.	**04**
	(c)	Compare Type-I and Type-II superconductor.	**07**
		OR	
Q.5	**(a)**	Prepare a list of: Types and applications of Semiconductor.	**03**
	(b)	What is superconductor? Explain the applications of super Conducting materials.	**04**
	(c)	Write Properties of superconductors.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI(NEW) EXAMINATION – WINTER 2022

Subject Code:3160923 Date:15-12-2022

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.**

Q.1	**(a)**	What is the fundamental requirement of High Conducting materials?	**03**
	(b)	What is Seeback effect?	**04**
	(c)	State the properties and applications of Copper.	**07**
Q.2	**(a)**	Give classification of Insulating material based on Substances and Materials with example.	**03**
	(b)	Which is the different material used in making DC Machine?	**04**
	(c)	Explain the different Electrical properties of Insulating Materials?	**07**
		OR	
	(c)	Enlist solid insulating materials in Electrical Machines and explain any two with its electrical and thermal characteristics.	**07**
Q.3	**(a)**	What is Dielectric Strength of martial? Which factors affect the Dielectric Strength of material?	**03**
	(b)	What is Hygroscopicity?	**04**
	(c)	State and explain the properties of Magnetic Materials.	**07**
		OR	
Q.3	**(a)**	What is Paramagnetic Material?	**03**
	(b)	Draw and Explain BH curve of magnetic material.	**04**
	(c)	Give and justify the choice of Magnetic Material for (1) Armature of DC machine, (2) Stator of AC machine, (3) Submarine Cable.	**07**
Q.4	**(a)**	What is Intrinsic and Extrinsic semiconductors?	**03**
	(b)	Explain conduction of current in N-type Semiconductor.	**04**
	(c)	Explain the factors affecting the resistivity of Semiconductor.	**07**
		OR	
Q.4	**(a)**	Give classification of Semiconductor.	**03**
	(b)	Give comparison of Type I Superconductor and Type II Superconductor.	**04**
	(c)	Discuss the High Frequency Materials.	**07**
Q.5	**(a)**	What is Refractory Material? List out the various refractory materials.	**03**
	(b)	What is the effect of impurities of Material?	**04**
	(c)	Write short note on Galvanizing Material.	**07**
		OR	
Q.5	**(a)**	What is Peltier Effect?	**03**
	(b)	Explain Silicon superconductor material.	**04**
	(c)	Write short note on Radioactive Material.	**07**

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