Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3132107 Date:10-12-2024

Subject Name: Introduction to Materials Engineering

Time:10:30 AM TO 01:00 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)**	State the role of a metallurgical and materials engineer in industries.	**03**
	(b)	Match the following:	**04**

Column 1	*Column 2*
Alloy	Glass
Ferrous Metal	Brass
Amorphous Material	Human Bone
Composite	Iron

	(c)	Defend the statement with at least two examples: "India has been historically exceptional in the field of materials and metallurgy."	**07**
Q.2	**(a)**	List different branches of metallurgical engineering.	**03**
	(b)	Match the following:	**04**

Column 1	*Column 2*
Ceramic	PVC
Non Ferrous Metal	Fullerene
Polymer	Titanium
Nanomaterial	Silica

	(c)	List six leading companies that are involved primarily in metallurgical and materials industry in India. Explain the status of metallurgical and materials industry in India.	**07**
		OR	
	(c)	Classify engineering materials in detail.	**07**
Q.3	**(a)**	Draw stress-strain diagram for rubber (ductile material).	**03**
	(b)	Suggest a combination of properties required and a suitable candidate material for the following components/parts: i) Electrical wires, and ii) Gutter pipe.	**04**
	(c)	Explain the engineering requirements of materials.	**07**
		OR	
Q.3	**(a)**	Draw stress-strain diagram for glass (brittle material).	**03**
	(b)	Suggest a combination of properties required and a suitable candidate material for the following components/parts: i) Electrical fuse, and ii) Cooking utensils.	**04**
	(c)	Describe the criteria for selection of materials for engineering applications.	**07**
Q.4	**(a)**	List important characteristics of ceramics.	**03**
	(b)	Classify imperfections in solids.	**04**
	(c)	Calculate atomic packing factor for SC and FCC crystal structure.	**07**
		OR	

Q.4	**(a)**	List important characteristics of metals.	**03**
	(b)	Explain the relationship between structure and property in materials.	**04**
	(c)	Calculate atomic packing factor for BCC and HCP crystal structures.	**07**
Q.5	**(a)**	List at least four technological properties of materials. Define any one.	**03**
	(b)	Write a short note on chemical failure analysis of engineering materials.	**04**
	(c)	Write a short note on powder metallurgy along with its advantages, disadvantages and applications.	**07**

OR

Q.5	**(a)**	Explain the need for metal joining processes despite the availability of metal forming processes in industry.	**03**
	(b)	Explain different steps of investigation for material failure. Give one example of famous material failures in the history of world.	**04**
	(c)	Write a short note on casting processes along with its advantages, disadvantages and applications.	**07**

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