

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III (NEW) EXAMINATION – WINTER 2017

Subject Code: 2131904

Date: 17/11/2017

Subject Name: Material Science and Metallurgy

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.

		MARKS
Q.1	(a) State the importance of study of 'Materials Science' and briefly explain engineering requirements of materials.	03
	(b) Explain edge dislocation and screw dislocation.	04
	(c) Determine atomic packing factor for FCC crystal structure with sketch.	07
Q.2	(a) Explain the mechanism of twinning with suitable sketches.	03
	(b) What is the solid solution? Explain types of solid solution with sketch.	04
	(c) Draw & Explain Iron-Iron Carbide Diagram with all regions.	07
	OR	
	(c) Draw cooling curve of pure metal and An alloy of two metals which are completely soluble in liquid and solid phase.	07
Q.3	(a) State the Gibbs Phase Rule & justify that degree of freedom at eutectic point in binary phase diagram is zero.	03
	(b) What is major difference between homogeneous & heterogeneous nucleation processes?	04
	(c) What is NDT? Explain in Detail Radiography testing Method with advantages, disadvantages & applications of radiographic testing method.	07
	OR	
Q.3	(a) Explain in Brief "Types of Diffusion".	03
	(b) What is powder metallurgy? State applications of the powder metallurgy.	04
	(c) What is Micro Examination? What are the various steps required for specimen preparation for Micro examination.	07
Q.4	(a) Difference between annealing and tempering.	03
	(b) Types/Manners of Growth for Metals & Alloys.	04
	(c) Draw only steel portion of iron-iron carbide diagram & indicate on it the temperature ranges up to which steels are heated for (i) annealing (ii) normalizing (iii) hardening	07
	OR	
Q.4	(a) State critical reactions of Iron-carbon phase Diagram.	03
	(b) Classify types of cast iron. Discuss any one. Draw its microstructure also.	04
	(c) Classifications of Plain Carbon Steels with applications and Limitations.	07
Q.5	(a) State & Explain Lever Rule for phase diagram	03
	(b) Explain Optical Metallurgical Microscope with neat sketch	04
	(c) Write shorts on the following (1) Nichrome (2) Monel (3) Invar	07

OR

- Q.5**
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|------------|---|-----------|
| (a) | Write short note on Malleable Cast Iron. | 03 |
| (b) | What are the advantages of Austempering & Martempering? | 04 |
| (c) | Explain Eddy current testing method with neat sketch. Also explain limitations and applications | 07 |