

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-IV (NEW) EXAMINATION – WINTER 2023****Subject Code:3142109****Date:31-01-2024****Subject Name:Physical 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.
4. Simple and non-programmable scientific calculators are allowed.

	MARKS
<b>Q.1</b> (a) Explain system.	<b>03</b>
(b) Explain phase and phase rule.	<b>04</b>
(c) Explain Isomorphs diagram of Cu-Ni.	<b>07</b>
<b>Q.2</b> (a) Explain peritectic reaction.	<b>03</b>
(b) Explain dispersion strengthening.	<b>04</b>
(c) Find relative amount of alpha ferrite and cementite in 0.6% plain carbon steel at room temperature. Also find relative amount of pro eutectoid alpha ferrite and pearlite in 0.6% plain carbon steel at room temperature. Draw microstructure 0.6% plain carbon steel at room temperature.	<b>07</b>
<b>OR</b>	
(c) (1) Find relative amount of alpha ferrite and cementite in eutectoid steel at room temperature	<b>07</b>
(2) Find relative amount of austenite and cementite at just below eutectic temperature in Ledeburite.	
<b>Q.3</b> (a) Justify-Eutectic point in Fe-Fe <sub>3</sub> C is monovariant.	<b>03</b>
(b) Sketch the Fe-Fe <sub>3</sub> C Diagram.	<b>04</b>
(c) Draw TTT diagram for eutectoid steel and explain it.	<b>07</b>
<b>OR</b>	
<b>Q.3</b> (a) Justify-Eutectoid point in Fe-Fe <sub>3</sub> C is Invariant system.	<b>03</b>
(b) Explain effect of alloying elements in TTT diagram.	<b>04</b>
(c) Explain CCT diagram with different cooling rate.	<b>07</b>
<b>Q.4</b> (a) Explain white cast iron with applications.	<b>03</b>
(b) Explain Stress relief annealing.	<b>04</b>
(c) Explain effect of quenching media on hardening of steel.	<b>07</b>
<b>OR</b>	
<b>Q.4</b> (a) Explain heat treatment.	<b>03</b>
(b) Explain austempering.	<b>04</b>
(c) Differentiate annealing and normalizing.	<b>07</b>
<b>Q.5</b> (a) Explain nodular Cast Iron.	<b>03</b>
(b) Explain 18-8 Stainless steel with its applications.	<b>04</b>
(c) What is hardenability and explain Jominy End Quenched test for hardenability.	<b>07</b>
<b>OR</b>	
<b>Q.5</b> (a) Why Titanium alloys used in Aerospace Industry.	<b>03</b>
(b) Explain 18-4-1 tool steel with its applications.	<b>04</b>
(c) Explain super alloys with its heat treatment.	<b>07</b>

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