## **GUJARAT TECHNOLOGICAL UNIVERSITY**

		SEMESTED III (NEW) EXAMINATION SUMM	
Subject Code: 2132004			
Subject Code. 2132004 Date: 05/00/2017 Subject Name: Principles Of Materials Science And Physical Metallurgy			
Time 10.		M = 01.30  PM	Total Marks, 70
Instructions	<b>ЗU А</b> . •		Total Marks: 70
1. <i>A</i>	Attemr	ot all questions.	
2. N	Make s	suitable assumptions wherever necessary.	
3. I	Figure	s to the right indicate full marks.	
Q.1	(A)	Answer following :	07
	1	What is unit cell? What is lattice parameter?	
	2	What is a solid solution?	
	3	Define a phase? What is Gibbs phase rule?	
	4	What is an alloy?	
	5	Define micro examination	
	7	Define and interpretate APF.	
	( <b>B</b> )	Choose appropriate correct answer :	07
	8	Which test is used to measure hardness?	
		(a) Rockwell (c) Brinell	
		(b) Vickers (d) All of above	
	9	Brass is an alloy of	
		(a) copper and zinc (c) copper, tin and zinc	
		(b) copper and tin (d) none of these	
	10	Which one of the following is not a strong bond?	
		(a) van der Waals bond (c) Covalent bond	
		(b) Metallic bond (d) Ionic bond	
	11	Coordination number for closest packed crystal structure	
		(a) 16 (c) 12	
		(b) 8 (d) 4	
	12	Eutectic product in Fe-C system is called	
		(a) Pearlite (c) Ledeburite	
		(b) Bainite (d) Spheroidite	
	13	Time dependent yield is known as	
		(a) Fracture (c) Fatigue	
		(b) Buckling (d) Creep	
	14	Brittle fracture is more dangerous than ductile fracture beca	use
		(a) no warning sign (c) Crack propagates at ve high speeds	ery
		(b) No need for extra (d) All	
		stress during crack	
		propagation	
Q.2	(a)	Explain the need of material science in Engineer applications.	1ng <b>03</b>

(b) What is the importance of Structure-property-performance 04

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relationship?

(c) Explain the procedure to get Miller indices for 07 Crystallographic planes and directions with suitable example.

OR

 (c) Briefly explain single crystal, polycrystalline and noncrystalline materials. Also explain the isotropy and anisotropy of material.

Q.3 (a) Derive Bragg's Law.

Limitations.

03

03

04

- (b) Explain the material selection process for Air craft skin.
  (c) Explain LPT with principle, methodology, application and
  07
  - OR

## **Q.3** (a) Enlist various point defects and explain the same.

- (b) Explain the material selection process for Fizzy drink 04 bottle.
- (c) Explain MPT with principle, methodology, application and 07 Limitations.
- Q.4 (a) Explain the ductile and brittle failures with relevant 03 diagram.
  - (b) What is creep? Explain the factors affecting it.
  - (c) Explain Eutectic, Eutectoid, Peritectic and Peritectoid 07 Systems.

OR

- Q.4 (a) Enlist the various techniques for powder production. 03 Explain any one with neat sketch.
  - (b) Give the overview Hardening, tempering and normalizing 04 processes.
  - (c) Draw iron-iron carbide equilibrium diagram with all 07 necessary details. Briefly explain cooling of 0.8 % carbon steel from liquid state to room temperature.
- Q.5 (a) Density of Lead is 11.36 gm/cm<sup>3</sup>. Its atomic weight is 207.19 gm/mole. Calculate the lattice parameter and the atomic radius if the structure is FCC.
  - (b) Draw cooling curve of (i) pure metal and (ii) An alloy of two metals which are completely soluble in liquid and solid phase.
  - (c) Explain Induction and flame hardening processes, also 07 give its applications.

## OR

Q.5 (a) Differentiate between carburizing and nitriding.
(b) Draw Time Temperature Transformation diagram for Eutectoid steel. Explain it briefly by considering few cooling rates.
(c) What is the use of Jominy hardenability test? Explain in Detail.

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