

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III(New) • EXAMINATION – WINTER 2016

Subject Code:2132004

Date:06/01/2017

Subject Name:Principles Of Materials Science And Physical Metallurgy

Time:10:30 AM to 01:30 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 Short Questions

14

- 1 Co-ordination number of HCP is
(A) 10 (B) 8 (C) 12 (D) 16
- 2 Connecting rod is usually made of
(A) Medium Carbon steel (B) Low carbon steel
(C) Aluminium (D) Cast iron
- 3 Pure iron is the structure of
(A) Pearlite (B) Austenite
(C) Ferrite (D) Ferrite & Cementite
- 4 Write down full name of TTT.
(A) Time Temperature Transformation
(B) Temperature Time Transformation
(C) Transformation Time Temperature
(D) None of Above
- 5 _____ is used for economical manufacturing of high precision components.
(A) Forging (B) Casting
(C) Powder Metallurgy (D) None of Above
- 6 Annealing is defined as heating of metals to certain temperature followed by _____.
(A) Air cooling (B) Furnace cooling
(C) Water cooling (D) Brine cooling
- 7 In Jominy end quench test the hardness value is taken at _____.
(A) Every 1/16th inch distance
(B) Every 1/6th inch distance
(C) Every 1/10th inch distance
(D) None of Above
- 8 In LPI, Penetrant comes out due to _____.
(A) Surface Tension
(B) Gravity action
(C) Capillary action
(D) None of Above
- 9 In Ultrasonic Test _____ is used as Couplant.
(A) Grease (B) Oil (C) Water (D) All of Above
- 10 Define Material Science.
- 11 State the factors affecting the choice of the materials.
- 12 Define unit cell.
- 13 State the Gibb's phase rule.

14	The Melting point of Cu is (A) 1020°C (B) 980°C (C) 1085°C (D) 1230°C	
Q.2	(a) Define the following properties:- (i) Malleability (ii) Creep (iii) Ductility	03
	(b) What is micro examination of metal? What are the various steps required for such an examination?	04
	(c) What is fracture? Discuss in detail about types of fracture.	07
	OR	
	(c) What is crystal system? Discuss in detail types of crystal system.	07
Q.3	(a) Write down crystal structures for metallic elements with example.	03
	(b) Explain eutectic, eutectoid and peritectic reactions.	04
	(c) Draw iron-iron carbide diagram with all necessary details.	07
	OR	
Q.3	(a) Explain importance of TTT diagram.	03
	(b) What is heat treatment? Discuss objects of heat treatment.	04
	(c) Describe with neat sketch how would you carry out a Jominy hardenability test on a steel sample.	07
Q.4	(a) Write down on Comparison of destructive and non destructive test.	03
	(b) Explain flame-hardening process in brief.	04
	(c) Explain ultrasonic method of inspection with reference to its working principle, advantages, limitations and applications.	07
	OR	
Q.4	(a) Define powder metallurgy. Enlist methods of metal powder manufacturing.	03
	(b) Suggest and explain a simple and economical NDT method to determine minute surface defects in large size components.	04
	(c) Enlist the products made from powder metallurgy. Explain all four steps of powder metallurgy.	07
Q.5	(a) Define the following terms:- (i) phase (ii) Alloy (iii) System	03
	(b) State the types of solid solution and explain Hume Rothery's rule for the formation of solid solution.	04
	(c) Explain and differentiate edge dislocations and screw dislocations with neat sketch.	07
	OR	
Q.5	(a) State the names of NDT methods.	03
	(b) Explain the difference between annealing and normalizing.	04
	(c) Explain principle and procedure of eddy current test.	07
