

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-IV(New) EXAMINATION – SUMMER 2016

Subject Code:2142106

Date:26/05/2016

Subject Name:Plastic Deformation of Metals

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.

MARKS

		MARKS
Q.1	Short Questions	14
	1 What is Strain rate?	01
	2 Define Slip & Slip Plane.	01
	3 Draw Schematic of Climb.	01
	4 Draw Schematic of sessile & Glissile dislocation	01
	5 When CRSS value is Zero & When it is Max. ?	01
	6 Define Kink & Jog with schematic only.	01
	7 Draw schematic of Slip bands & name the metals in which it	01
	8 Draw Staking fault schematic.	01
	9 Define ductile fracture in 1-2 sentences.	01
	10 Define brittle fracture in 1-2 sentences.	01
	11 Write only name of 03 stages of Creep failures.	01
	12 What is Endurance Limit ?	01
	13 What is Coherency with respect to precipitates?	01
	14 Define Fracture Toughness.	01
Q.2	(a) Explain yield point phenomenon in detail with neat sketch	03
	(b) Draw Engineering & True stress strain curves. Differentiate these two curves & state the reason which curve is most referred.	04
	(c) Explain In brief: a. Yielding criterion b. Von-Mises criteria	07
OR		
	(c) Explain the method of construction of Mohr's circle.	07
Q.3	(a) Explain briefly the techniques of observation of dislocation.	03
	(b) What are fundamental principles which govern the strengthening mechanism in metals and alloys?	04
	(c) What is Strain Hardening effect? What is the effect of it on the mechanical properties of steels?	07
OR		
Q.3	(a) What is the role of Grain boundary in Dislocations Motions?	03
	(b) What is ductile brittle transition temperature?	04
	(c) Explain correct statement for plastically deformed metal to modify the microstructure.	07
Q.4	(a)  Explain Twinning as a mode of plastic deformation	03
	(b) Explain "Fatigue Test with the Help of S-N Diagram.	04
	(c) Explain Precipitation Hardening phenomena of Al-Cu System.	07
OR		
Q.4	(a) Explain the mechanical properties of precipitates.	03
	(b) Explain with neat schematic –critical resolved shear stress for Slip	04

- (c) Explain the following with reference to dislocations: 07
- a. Slip system
 - b. Burger's vector
 - c. Properties of dislocations
- Q.5** (a) Only draw & label different Crystal Imperfection in Solids. 03
- (b) What is Equi-cohesive Temperature? Explain in respect of Creep Fractures 04
- (c) Explain about the Multiplication of dislocations-Frank Reed source 07
- OR**
- Q.5** (a) Define Strain Hardening phenomena in brief. 03
- (b) What is Hall-Petch Equation? Which relationship is explained between Strength & Microstructural feature? 04
- (c) Explain the Griffith theory of brittle fracture with neat schematic 07
