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
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 criterionb. 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.	
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

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