

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV (NEW) EXAMINATION – WINTER 2018****Subject Code: 2142106****Date: 22/11/2018****Subject Name: Plastic Deformation of Metals****Time: 02:30 PM TO 05:00 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	(a) Draw sample stress-strain diagrams for ductile and brittle material.	03
	(b) Explain yield point phenomena with a neat sketch.	04
	(c) With the help of neat sketches, differentiate between edge and screw dislocations.	07
Q.2	(a) Multiple Choice Questions:	03
	1) Which of the following is false?	
	a. Line defects are thermodynamically stable	
	b. Dislocation can end inside a crystal without forming loop	
	c. ABC ABC ABC... is stacking sequence for HCP crystal	
	d. All of the above	
	2) Figure-out the odd point in the following	
	a. Proportional limit	
	b. Fracture point	
	c. Elastic limit	
	d. Yield point	
	3) Requirement for cross-slip movement of dislocation	
	a. Preferred slip plane	
	b. Preferred slip direction	
	c. No preferred slip plane	
	d. No preferred slip direction	
	(b) Draw & give difference between engineering stress strain curve & true stress strain curve.	04
	(c) What is slip system? Explain why FCC metal is usually more ductile than BCC & HCP Metals.	07
	OR	
	(c) Differentiate between slip and twinning as mechanisms of plastic deformations.	07
Q.3	(a) Explain with neat schematic –critical resolved shear stress for slip.	03
	(b) Define effective stress. Write down equations for calculating effective stress under Tresca criterion & Von Mises Criteria.	04
	(c) What is strain hardening effect? What is the effect of it on the mechanical properties of metals?	07
	OR	
Q.3	(a) Define dislocation. What are sources of dislocations?	03
	(b) What is ductile brittle transition temperature (DBTT)?	04

- (c) Define solid solution. Explain Hume Rothery rules for formation of substitutional solid solution. **07**
- Q.4** (a) What is the role of grain boundaries in dislocation motion? **03**
(b) Explain fatigue test with the help of S-N Diagram. **04**
(c) Write down procedure of "Mohr's Circle" analysis for solving Principal Stresses. **07**
- OR**
- Q.4** (a) What are the prerequisites for an alloy to be age-hardenable? **03**
(b) Draw fatigue curves for ferrous & non ferrous metals systems. Define fatigue limit. **04**
(c) Why is annealing required after cold working of Steels? Explain the structural changes that the material goes through while annealing with the help of sketches. **07**
- Q.5** (a) Distinguish between sessile dislocation and glissile dislocations. **03**
(b) Explain about the multiplication of dislocations through Frank Reed source. **04**
(c) What is Equi-cohesive Temperature? Explain in respect of Creep Fractures. **07**
- OR**
- Q.5** (a) Explain Kinks and Jogs with the help of neat diagrams. **03**
(b) Write a detailed classification of crystal imperfections. **04**
(c) Derive the Griffith equation for brittle fracture. **07**

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