Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:2142106 **Date:18/11/2016**

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		**Short Questions**	**14**
	1	Write name of Metals having BCC Crystal Structure.	**01**
	2	Write name of Metals having FCC & HCP Crystal Structure.	**01**
	3	Write Nos. of Slip System in BCC, FCC & HCP Crystal respectively.	**01**
	4	Draw Schematic of sessile & Glissile dislocation	**01**
	5	What is CRSS Max Value & Min or Zero Value ?	**01**
	6	Define Kink & Jog with schematic only.	**01**
	7	Draw Slip bands & write name of metals which exhibits.	**01**
	8	Draw Schematic of Twinning.	**01**
	9	Define Shear Modulus.	**01**
	10	Define fatigue fracture in 1-2 sentences.	**01**
	11	Draw labelled graph of Creep Curve.	**01**
	12	What is Endurance Limit ?	**01**
	13	Explain Grain size measurement by applying formula.	**01**
	14	Define Fracture Toughness.	**01**
Q.2	**(a)**	What are different modes of Plastic deformation?	**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)	What is Slip System? Explain why FCC metal is usually more ductile than BCC & HCP Metals?	**07**
Q.3	**(a)**	Explain briefly the techniques of observation of dislocation.	**03**
	(b)	Write a short note on Yield point phenomena.	**04**
	(c)	Differentiate Slip and Twinning as mechanisms of Plastic deformations	**07**
		OR	
Q.3	**(a)**	What is the role of Grain boundary in Dislocations Motions?	**03**
	(b)	What is ductile brittle transition temperature (DBTT)?	**04**
	(c)	What do you mean by Fatigue Fracture? Explain "Fatigue Test with the Help of S-N Diagram	**07**
Q.4	**(a)**	Why Annealing is required after Cold working of Steels. ?	**03**
	(b)	What is Strain Hardening effect? What is the effect of it on the mechanical properties of steels?	**04**
	(c)	What is Hall-petch relationship? Discuss the basis of strengthening of materials by grain –size reduction method.	**07**
		OR	
Q.4	**(a)**	What are the prerequisites for an alloy to be age-harden able?	**03**
	(b)	What is Schmid's Law ? Derive the expression of Critical resolved Shear Stress.	**04**
	(c)	Define solid solution. Explain Hume Rothery rule for solubility of solute atoms	**07**

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)	Discuss the mechanism of Frank-Read Source of dislocation multiplications.	**07**

OR

Q.5	**(a)**	What is fundamental difference between edge and screw dislocation?	**03**
	(b)	Explain the Griffith theory of brittle fracture with neat schematic	**04**
	(c)	Differentiate between hot working and cold working.	**07**

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