Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(NEW) – EXAMINATION – SUMMER 2019

Subject Code:2142106 Date:09/05/2019

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)**	State fundamental differences between theories of : a. Yielding criterion b. Von-Mises criteria	**03**
	(b)	What is Slip System? Explain why FCC metal is usually more ductile than BCC & HCP Metals?	**04**
	(c)	Define the Terms: (i) Young's Modulus (ii) Shear Modulus (iii) True Stress & True strain (iv) Engineering Stress and Engineering Strain v) Ultimate tensile stress vi) Proof stress vii) braking strength.	**07**
Q.2	**(a)**	What is "Dislocation loop"? Explain Multiplication of dislocation "Frank – Reed Source".	**03**
	(b)	Discuss the various techniques of observation of dislocation.	**04**
	(c)	Differentiate between plastic deformation by slip and twinning.	**07**
		OR	
	(c)	Explain with neat schematic and derive equation for –Critical resolved shear stress (Ƭ CRSS) for Slip phenomena in metallic solids.	**07**
Q.3	**(a)**	Write a formula stating relationship between Shear Modulus (G), Elestic Modulus(E), and Possion's ratio of materials	**03**
	(b)	What is Hall-Petch Equation? Explain giving suitable example	**04**
	(c)	Define Dislocation? Differentiate Edge and Screw dislocation with neat sketch.	**07**
		OR	
Q.3	**(a)**	What is Slip system? What is the use of Burger Circuit?	**03**
	(b)	What is the role of Grain boundary in Dislocations Motions?	**04**
	(c)	Define the following term: 1.Sessile dislocation 2. Glissile dislocation 3. Kinks 4. Jogs 5. Staking faults.	**07**
Q.4	**(a)**	Enlist various strengthening mechanisms in metallic alloys.	**03**
	(b)	Discuss the properties of precipitates in precipitation strengthened alloys	**04**
	(c)	Discuss about the different Crystal Imperfection in Solids	**07**
		OR	
Q.4	**(a)**	Explain "Ductile-Brittle Transition Temperature" (DBTT) curve	**03**
	(b)	Discuss how can we restore the structural properties of cold work hardened material?	**04**
	(c)	Derive the Griffith equation for brittle fracture.	**07**
Q.5	**(a)**	Draw schematic of grain boundary strengthening effect.	**03**
	(b)	State the fundamental principles governing the strengthening mechanism in metals and alloys with example	**04**
	(c)	Discuss the conditions necessary for the formation of solid solutions in metallic alloys.	**07**
		OR	

Q.5	**(a)**	Define Strain Hardening effect. State the effect of it on the mechanical properties of steels?	**03**
	(b)	Explain Creep curve and various stages of creep in brief.	**04**
	(c)	Draw and label typical schematic of Fatigue Fracture? Explain "Fatigue Test with the Help of S-N Diagram.	**07**

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