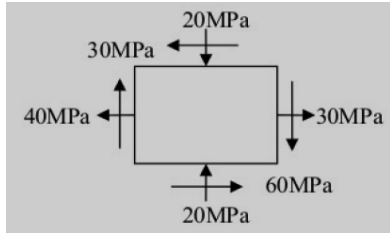


GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– IV(NEW) EXAMINATION – SUMMER 2023****Subject Code:3142108****Date:07-07-2023****Subject Name:Mechanical Properties of Materials****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Explain dislocation.	03
	(b) Explain slip system.	04
	(c) For the state of stress as shown in figure, determine location of principal planes, principal stresses and maximum shear stress.	07
		
Q.2	(a) Explain single crystal.	03
	(b) Determine the tensile stress that is applied along the [1-10] axis of silver crystal to cause slip on the (1-1-1) [0-11] system. The critical resolved shear stress is 6 Mpa.	04
	(c) Explain Critical resolved Shear Stress. (CRR).	07
	OR	
	(c) Differentiate Slip and twinning.	07
Q.3	(a) Draw typical Engineering stress strain curve for mild steel.	03
	(b) An aircraft component is fabricated from an aluminum alloy that has a plane-strain fracture toughness of 40MPa.m ^{1/2} . It has been determined that the fracture results in a stress of 300MPa when the maximum internal crack length is 4mm. For this same component the fracture occurs at a stress level of 260MPa when the maximum internal crack length is 6mm a) True b) False. Prove your answer.	04
	(c) Differentiate Edge dislocation and Screw dislocation.	07
	OR	
Q.3	(a) Show the planes and direction in cubic unit cell: (111), [10-1] and (110).	03
	(b) Explain ductile to brittle transition.	04
	(c) Differentiate Engineering stress and strain with true stress and strain.	07
Q.4	(a) With the Vickers hardness test a 10 kg load gave for a sample of brass an indentation with diagonals having mean lengths of 0.510 mm. What is the hardness?	03
	(b) Explain dispersion strengthening.	04
	(c) Differentiate elastic and plastic deformations.	07
	OR	
Q.4	(a) 10 kg of load produces an extension of 4 mm in a wire. The length and diameter of wire is 10 m and 2 mm respectively. Calculate the Young's modulus of wire in Pa?	03

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| | (b) | Explain Griffith theory of fracture. | 04 |
| | (c) | Explain solid solution strengthening. | 07 |
| Q.5 | (a) | Explain equicohesive temperature. | 03 |
| | (b) | Justify-Fatigue crack start from the surface or subsurface. | 04 |
| | (c) | Explain recrystallization, recovery and grain growth. | 07 |
| | | OR | |
| Q.5 | (a) | Explain hardness. | 03 |
| | (b) | Explain point defects. | 04 |
| | (c) | Distinguish cold working and hot working. | 07 |
