Seat No.: ________ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code: 2130608 **Date: 07/06/2019**

Subject Name:Strength of Materials

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)**	Define : (1)Hardness (2)co-efficient of friction (3)Shear Modulus	**03**
	(b)	Derive relation between S.F. and B.M. in a beam subjected to general loading	**04**
	(c)	A cantilever of length 2.5 m carries a UDL of 1.5KN/m run over the whole length and a point load of 2 KN at a distance of 1.0m from the free end. Calculate shear force and bending moments and plot the S.F. and B.M. diagrams.	**07**
Q.2	**(a)**	Explain different types of beam.	**03**
	(b)	Explain assumptions made in theory of pure bending	**04**
	(c)	A Hollow steel shaft 3m long transmits a torque of 24 kNm. The total angle of twist is not to exceed 2.5^{o} and the allowed shear stress is 90MPa. Determine inside and outside of shaft G= 85GPa.	**07**
		OR	
	(c)	Draw the Shear Force and Bending Moment Diagram of beam shown in fig no.1	**07**
Q.3	**(a)**	Explain assumptions in theory of pure torsion	**03**
	(b)	Write short note on (i) working stress (ii) load factor (iii) strain hardening	**04**
	(c)	A Steel bar ABCD of cross sectional area 500 mm2 is acted upon by forces as shown fig no.2 Neglecting effect of self-weight of the bars. Find change in length of bars AD. Take E=200GPa.	**07**
		OR	
Q.3	**(a)**	A uniform steel rod, 6 mm diameter (φ) and 0.5 m long, is subjected to a tensile force of 3 KN. Find the stress in the bar and its elongation. E = 200 GPa	**03**
	(b)	A simply supported beam of span 5m has a cross-section 150mm ×250mm and load with uniformly load over entire span, if the permissible stress is10N/mm2, find (a) Maximum intensity of u.d.l it can carry.	**04**
	(c)	At a point in a strained material, stress pattern as shown in figure no.3 was observed. Determine (i) magnitude of principal stresses and their location.(ii) Maximum shear stress and its orientation and (iii) stresses on plane AC (Ø=56.31^{o})	**07**
Q.4	**(a)**	Explain Static & Kinetic Friction	**03**
	(b)	Explain MOHR'S circle of stress	**04**
	(c)	Prove with usual notation $\frac{F}{Y} = \frac{M}{I} = \frac{E}{R}$	**07**
		OR	
Q.4	**(a)**	Define i) angle of friction ii) angle of repose iii) coefficient of friction	**03**
	(b)	Explain the law of static friction and law of dynamic friction.	**04**

(c) Prove with usual notation $\frac{T_1}{T_2} = e^{\mu\theta}$ for belt friction **07**

Q.5 **(a)** Enumerate various types of supports with neat symbolic sketches, showing possible reactions. **03**

(b) Define **04**
i) elastic body ii) plastic body iii) rigid body

(c) The T-shaped Cross-section of a beam shown in fig no.4 is subject to vertical shear force of 100 kN. Calculate the shear stress at neutral axis and at the junction of web and flange. **07**

OR

Q.5 **(a)** Define section modulus and its importance in bending **03**

(b) Explain the polar Modulus **04**

(c) A uniform ladder of 4m length rests against a vertical wall with which it make an angle of 45°, the coefficient of friction between the ladder and the wall is 0.4 and that between ladder and the floor is 0.5. if a man, whose weight is one-half of that of the ladder ascends it, how will it be when the ladder slips? **07**

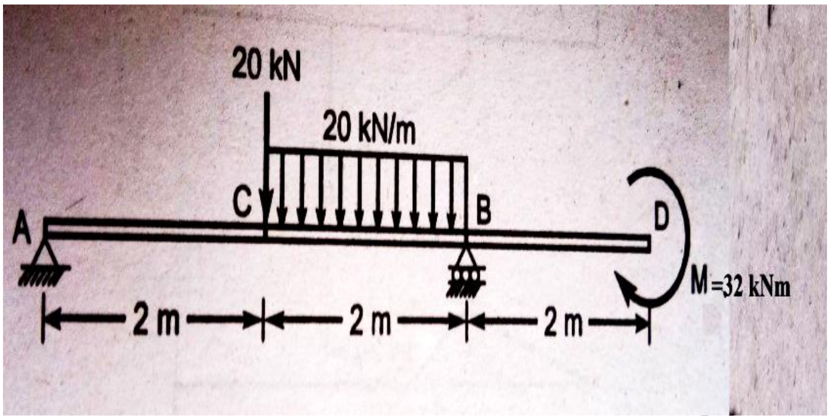


Figure No. 1 for Q2(C) OR

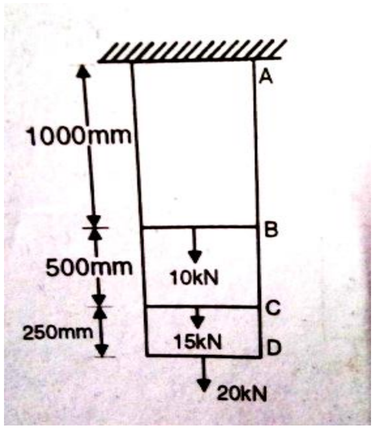
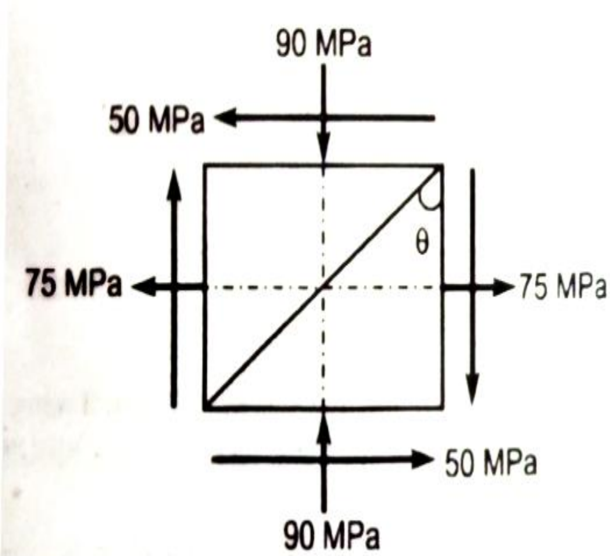
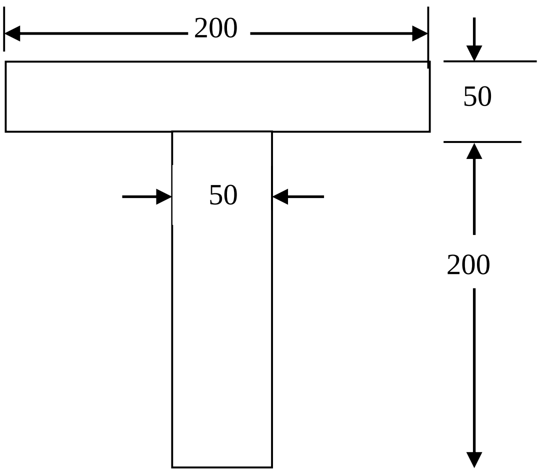


Figure No. 2 Q3 (C)

Figure No. 3 Q3 (C) OR

Figure no. 4 for Q5(C)





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