Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III(New) EXAMINATION – SUMMER 2016

Subject Code:2130608 **Date:09/06/2016**

Subject Name:Strength 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.**

Q.1 (a) Short Questions **07**

1 The ratio of limiting friction and normal reaction is known as
(a)coefficient of friction (b)angle of friction (c)angle of repose
(d)slidingfriction

2 The necessary condition for forces to be in equilibrium is that these should be
(a)coplanar (b) meet at onepoint; (c) both (a) and (b) above
(d) all be equal

3 A body moves, from rest with a constant acceleration of 5 m per sec. The distance covered in 5 sec is most nearly
(a)38m (b)62.5m (C)96m (d)124m

4 A heavy ladder resting on floor and against a vertical wall may not be in equilibrium, if
(a)the floor is smooth,the wall rough
(b) the floor is rough, the wall is smooth
(c)the floor and wall both are smooth surfaces
(d) the floor and wall both are rough sur-faces

5 According to principle of transmissibility of forces,the effect of a force upon a body is
(a)maximum when it act at the center of gravity of a body
(b)different at different points in its line of action
(c)the same at every point in its line of action
(d)minimum when it acts at the C.G. of the body

6 The units of moment of inertia of an area are
(a)kgm2 (b) m4 (c) kg/m2 (d) m3

7 In actual machines
(a)mechanical advantage is greater than velocity ratio
(b)mechanical advantage is equal to velocity ratio
(c)mechanical advantage is less than velocity ratio
(d) mechanical advantage is unity

(b) Define: (i) elastic body(ii) plastic body(iii)rigid body **07**
(iv) deformation (v)Hardness (vi)Toughness (vii) Ductility

Q.2 (a) Explain the sign convention taken to compute Shear force and Bending moment **03**

(b) Draw shear stress distribution diagram for the following section, **04**
(1) Rectangular section (2)Circular section (3) I section (4) T section.

(c) What power can be transmitted by a hollow circular shaft of 10cm outer diameter and 8cm inside diameter while rotating at 150 rpm if the maximum permissible shear stress is 60MN/m^2 and the maximum torque is 1.3 times the mean torque? **07**

OR

(c) A circular log of timber has diameter D. find the dimensions of the strongest rectangular section to resist moment, one can cut from this log. **07**

Q.3	**(a)**	Explain the principal planes, principal stresses and natural axis.	**03**
	(b)	A simply supported beam is shown in fig Q-3(b) of span 5m has a cross-section 150mm ×250mm .if the permissible stress is10N/mm^2,find(a) Maximum intensity of u.d.l it can carry.	**04**
	(c)	Explain neutral axis and pure bending moment of resistance.	**07**

OR

Q.3	**(a)**	Explain in simple theory of bending.	**03**
	(b)	Write short note on (i) working stress (ii) load factor (iii) strain hardening.	**04**
	(c)	At a point in a strained material there is tensile stress of 80N/mm2 upon a horizontal plane and a compressive stress of 40N/mm2 upon a vertical plane There is also a shear stress of 48N/mm2 upon each of these planes in fig Q-3 ©Determine the planes of maximum shear stress at the point. Determine also the resultant stress on the planes of maximum shear stress.	**07**
Q.4	**(a)**	Explain assumptions in theory of pure torsion.	**03**
	(b)	Explain MOHR'S circle of stress?	**04**
	(c)	Draw the bending moment and shear force diagrams for the cantilever beam shown in fig.Q-4©.	**07**

OR

Q.4	**(a)**	Explain classification of materials	**03**
	(b)	Explain static and kinetic friction.	**04**
	(c)	A hollow propeller shaft of a steam ship is to transmit 3750kW at 240rpm.if thee internal diameter is 0.8times the external diameter and if the maximum shear stress developed is to be limited to 160 N/mm2,determine the size of the shaft.	**07**
Q.5	**(a)**	Explain : (i) cone of friction (ii) coefficient of friction (iii) Laws of friction	**03**
	(b)	Define : (i) Brittleness (ii)Factor of safety (iii)Ultimate strength (iv)working stress	**04**
	(c)	The cross-section of a beam is shown in fig **Q-5©** if permissible stress is 150 N/mm^2, find its moment of resistance. Compare it with equivalent section of same but (a) square section (b) rectangular section with depth twice the width and (c) a circular section.	**07**

OR

Q.5	**(a)**	Explain maximum bending moment.	**03**
	(b)	Explain behavior of brittle materials under tension(stress strain curve for brittle materials)	**04**
	(c)	.Derive the equation of bending stress distribution across the cross section in a beam subjected to general loading.	**07**

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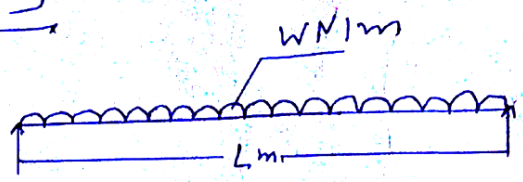
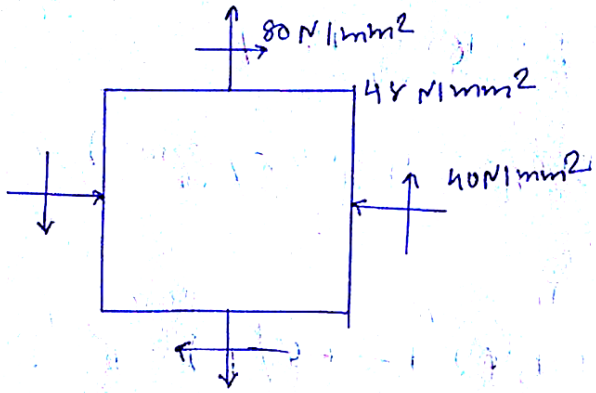
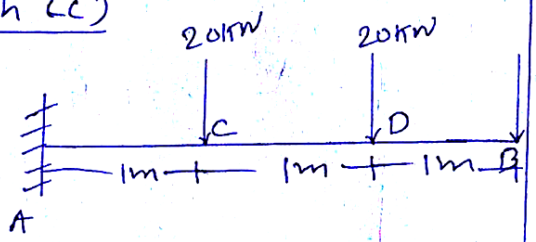
Q. 3[b]



Q. 3 [c]



Q.4 (c)



Q.5 (c)