Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2130608 **Date: 02/06/2017**

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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	Define Hardness of material.	01
	2	Define Ultimate Strength of material.	01
	3	Differentiate between ductility and malleability of material.	01
	4	Rupture Strength is a ratio of ……..to ……area.	01
	5	According to Hook's Law, Stress is directly proportional to …….	01
	6	Load factor = (……./……..)	01
	7	Write the flexural formula of stress.	01
	8	Coefficient of Static Friction μ_s =(… / Normal Reaction)	01
	9	A simply supported beam subjected to udl 'w' in span 'L' , the maximum bending moment will be ……..	01
	10	The stress in beam is lesser if its section modulus is…..	01
	11	Shear Stresses on Principal Planes are……	01
	12	Distinguish between Static Friction and Kinetic Friction.	01
	13	Method of Joint is used when forces in ……members are required.	01
	14	At neutral axis, the bending stress in beam is ……..	01
Q.2	**(a)**	Explain different types of beam.	**03**
	(b)	Find reactions at supports A & B in **fig(i).**	**04**
	(c)	A block of mass 100 kg is placed on an incline plane as shown in **fig (ii).** If μ_s = 0.35 and μ_k = 0.25 . determine the force P required to (i) start the block to move up the plane, (ii) to keep it moving up the plane , and (iii) to prevent it from sliding down.	**07**
		OR	
	(c)	Determine the required diameter of the solid circular shaft Subjected to torque of 10 kN m . The yield stress in shear of the shaft material is 170MPa. Use a factor of safety of 2.5.	**07**
Q.3	**(a)**	What is Point of Contraflexure ? What is its significance?	**03**
	(b)	Draw a shear stress distribution over a Triangular section.	**04**

	(c)	Draw the Shear Force and Bending Moment Diagram of beam shown in **fig (iii).**	**07**
		OR	
Q.3	**(a)**	A uniform steel rod, 6 mm diameter (φ) and 0.5 mm 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 hollow circular section, of the external diameter 200 mm and thickness 20mm, is to be used as beam. If the maximum stress permissible in the material is 120MPa, Find the maximum Bending Moment that this section can carry.	**04**
	(c)	A bar of uniform cross section 20mm diameter is subjected to loads as shown in **fig (iv).** Find the total elongation of the bar and the maximum stress in the bar. E=200GPa,(All lengths are in mm)	**07**
Q.4	**(a)**	Write the assumption for Theory of torsion.	**03**
	(b)	If the maximum shear stress in material is limited to $60N/mm^2$, Find the dimensions of as square section subjected to an axial force of 200 KN.	**04**
	(c)	If compressive stress of 30MPa and tensile stress of 20 MPa are acting on an element. Determine the normal, tangential and resultant stresses on a plane inclined at 25^o with the axis. **Fig (v)**	**07**
		OR	
Q.4	**(a)**	Explain different types of Supports used in Structures.	**03**
	(b)	Draw a shear stress distribution over a Rectangular section.	**04**
	(c)	Explain the Stress- Strain curve of Mild Steel.	**07**
Q.5	**(a)**	State the Laws of Friction.	**03**
	(b)	Derive the equation for shear stress for beam in bending.	**04**
	(c)	A solid steel shaft of 60mm diameter is subjected to torque of 5 KN-m at the free end as shown in **fig (vi).** Determine the (i) Maximum shear stress developed in the shaft (ii) the angular twist for 1 m length of shaft. Take G= 80GPa.	**07**
		OR	
Q.5	**(a)**	Define section modulus and its importance in bending.	**03**
	(b)	What are the assumptions made while derive the equation of bending.	**04**
	(c)	A mild steel bar having cross section of 20mm X 40mm and length of 400mm is subjected to an axial tensile load of 100KN. Calculate the change in its dimensions and the volumetric strain. Take E= 200 GPa and poisson ratio of the material , μ = 0.3	**07**

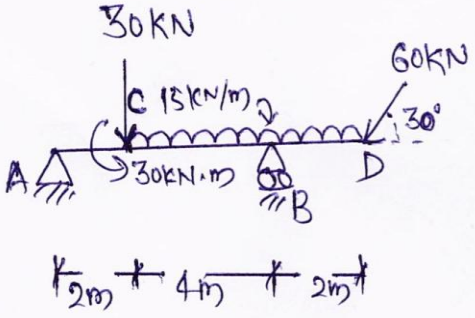

Fig (i) Q. 2(b)

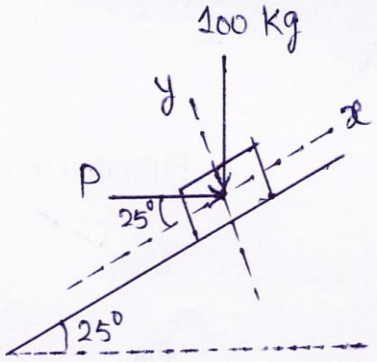

Fig. (ii) Q 2(c)

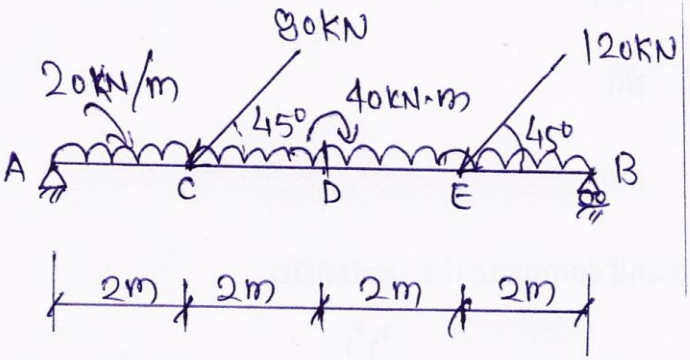

Fig (iii) Q 3(c)

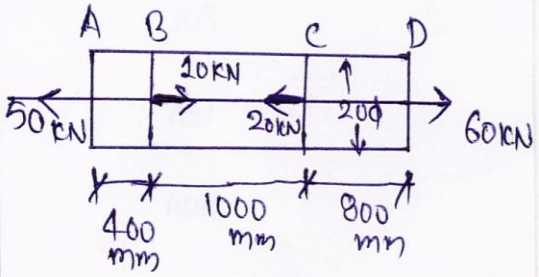

Fig (iv) (OR Q 3(c))

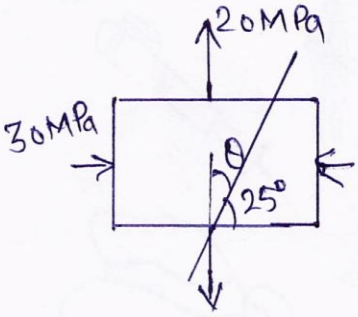

Fig (v) Q. 4(c)

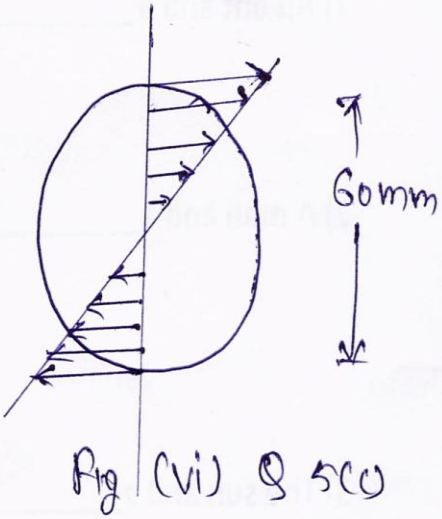

Fig (vi) Q 5(c)