Sanjay Ghodawat University, Kolhapur 2018-19

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Year and Program:2018-19 **School of Technology** **Department of Civil Engineering**

Course Code: CET 205 **Course Title: Structural Mechanics** **Semester – III**

Day and Date: Friday 14-06-2019 **End Semester Examination (ESE)** **Time:** 3Hrs. 2.30 to 5.30 pm. **Max Marks: 100**

Instructions:
1) All questions are compulsory.
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks.

			Marks	Bloom's Level	CO
Q.1	a)	A bar of 20mm diameter is subjected to pull of 50KN. The measured extension over a gauge length of 20cm is 0.1mm and change in diameter is 0.0035 mm. Calculate poisons ratio and modulus of elasticity.	07	L_3	CO 1
		OR			
	a)	Rails of 10m length each are laid on the track in the morning when the atmospheric temperatures was 12°c. a gap of 3mm was kept between two consecutive rails. At what maximum temperature the rail will remain stress free. If temperature is raised further by 10°c, What will be the magnitude and stress induced in the rails. Take E=200GPa, $\alpha=12X10^{-6}$/°c,			
	b)	Construct the shear force diagram for the beam shown in Fig.1b	08	L_4	CO 2

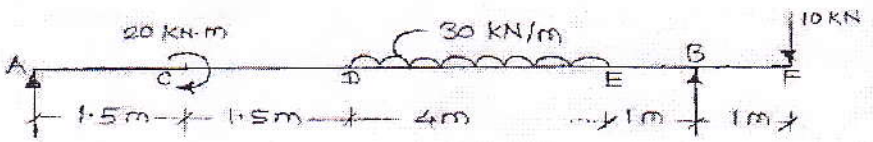

Fig.1b

OR

	b)	Construct the Bending Moment diagram for the beam shown in Fig.1b	08	L_4	CO 2
Q.2	a)	Calculate the maxmimum intensity of shear stress induced and the angle of twist produced in degrees in solid shaft of 100mm diameter, 10m long, transmitting 112.5kw @150rpm. Take G=82Gpa.	07	L_3	CO 3

OR

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a)	A thin cylindrical shell 2m long has 200mm diameter and thickness of 10mm. It is filled completely with a fluid at atmospheric pressure. If an additional 2500 mm3 fluid is pumped in, find pressure developed and Hoop stress developed. Take E= $2X10^5$ N/mm^2 and μ=0.3.	07	L_3	CO 3
b)	A cast iron channel section having top flange 150mmX15mm, bottom flange 200mmX20mm and web 15mm X 200mm is supported over a span of 6m. If the permissible stresses are 120 Mpa compressions what udl can be safely applied on beam?	08	L_3	CO 4
	OR			
b)	A simply supported beam of 5m span has a cross section 200mmX400mm, Carries a uniformly distributed load of 2 KN/m over an entire span. Find out maximum bending stress induced in the beam.	08	L_3	CO 4
Q.3	**Solve any Two**			
a)	Explain the following: 1) Explain the stress vs strain graph of mild steel. With neat curve 2) Explain the following terms a) Poisson's Ratio b) Temperature stress.	08	L_2	CO 1
b)	Explain the following terms: 1) Point of contra flexure and its importance in a bending moment diagram. 2) Explain the inter relationship between shear force, Bending Moment and load in a beam.	08	L_2	CO 2
c)	Explain the following: 1) Define longitudinal stress and circumferential stress. 2) Define Torsion and Write the assumptions in torsion of circular shaft.	08	L_2	CO 3
d)	Explain the following: 1) Define bending stress and explain about pure bending in beams with example. 2) Write the assumptions of simple theory of bending.	08	L_2	CO 4

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Q.4 **Solve any Two**

a) A rectangular beam 100mm wide and 250mm deep is subjected to a maximum shear force of 50KN Determine
i) Maximum shear stress ii) Average shear stress iii) Shear stress at a distance 25mm above the neutral axis. 09 L_3 CO 5

b) A T section having top flange 150mmX10mm and Web 10mmX90mm. The member is used as a simply supported beam of span 1.5m. Calculate uniformly distributed load which can be applied over the entire span such that maximum shearing stress induced in the cross section is not to exceed 3 MPa. 09 L_3 CO 5

c) A beam of extruded magnesium has the uniform cross section shown in fig.4c. Calculate the shear stress at the junction AB, if the total shear force on the cross section is 225 KN. 09 L_3 CO 5

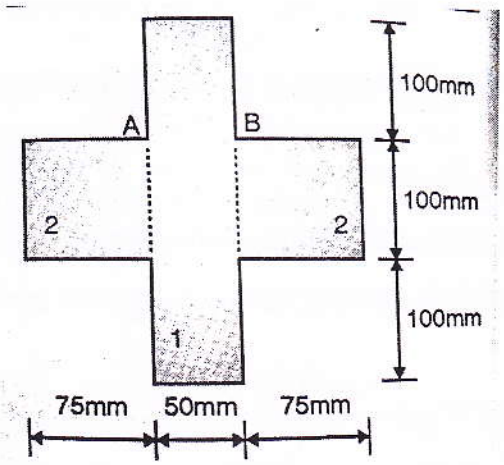

Fig.4c

Q.5 **Solve any Two**

a) A steel rod 40mm in diameter is 2.5m long. Find the maximum instantaneous stress induced when a pull of 80KN is applied, (i) Gradually (ii) Suddenly. Also find the instantaneous elongation. Take E=105GPa. 09 L_3 CO 6

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b) A cantilever beam of span L carries a concentrated load W at the free end as shown in fig. 5b. Find the deflection under the load by strain energy method — 09 — L_3 — CO 6

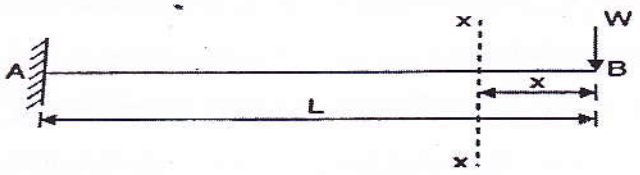

Fig.5b

c) An unknown weight falls by 30mm on to collar rigidly attached to the lower ends of a vertical bar 4m long and 1000mm2 in cross section. If the maximum instantaneous extension is found to be 3.66mm, find the corresponding stress and the value of the unknown weight. E=200 GPa.; — 09 — L_3 — CO 6

Q.6 **Solve any Three**

a) Draw the shear stress distribution diagram for rectangular, triangle & T cross section beams. — 06 — L_2 — CO 5

b) Define shear stress and derive the expression for shear stress for rectangle with width b and depth d. — 06 — L_2 — CO 5

c) Explain the following terms — 06 — L_2 — CO 6

i) Resilience ii)Proof of resilience iii) Modulus of Resilience

d) Define strain energy and explain different types of forces will generate strain energy. — 06 — L_2 — CO 6

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