



PRESIDENCY UNIVERSITY

BENGALURU

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Make Up Examinations – December 2025

Date: 26 – 12- 2025

Time: 9:30am – 12:30pm

School: SOE	Program: B.Tech Civil Engineering		
Course Code : CIV2007	Course Name: Strength of Materials		
Semester: MK	Max Marks: 100	Weightage: 50%	

CO - Levels	C01	C02	C03	C04	C05
Marks	28	24	24	24	

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks.

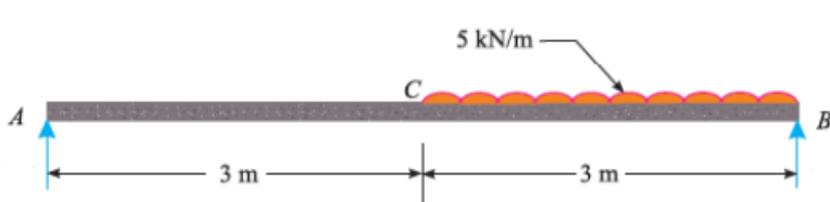
10Q x 2M=20M

1.	What is unit of stress?	2 Marks	L1	C01
2.	What is the difference between normal stress and shear stress?	2 Marks	L1	C01
3.	State Hooke's Law.	2 Marks	L1	C01
4.	Define Poisson's Ratio.	2 Marks	L1	C01
5.	Define shear force at a section of beam.	2 Marks	L1	C02
6.	State any 2 assumptions made in pure torsion theory.	2 Marks	L1	C02
7.	State the torsion equation.	2 Marks	L1	C03
8.	Define torque.	2 Marks	L1	C03
9.	State any 2 assumptions made in the calculation of Euler's Buckling Load.	2 Marks	L1	C04
10.	State the Rankine's Formula to calculate crippling load.	2 Marks	L1	C04

Part B

Answer the Questions.

Total Marks 80M

11.	a.	A load of 4kN has to be raised at the end of a steel wire. If the unit stress in the wire must not exceed 80 N/mm ² what is the minimum diameter required? What will be the extension of 3.5m length of wire? Take $E = 2 \times 10^5$ N/mm ² .	10 Marks	L3	CO1
Or					
12.	a.	The following data refer to a mild steel specimen tested in a laboratory. Diameter of specimen = 25mm, gauge length of the specimen = 300mm, the length of specimen after failure = 360mm, extension observed under a load of 20kN = 0.06mm. Load at yield point = 150kN and load at failure = 252kN. Neck diameter at failure = 18.25mm. Determine a) Young's Modulus, b) Yield Stress, c) Ultimate Stress, d) percentage elongation, e) percentage reduction of cross sectional area.	10 Marks	L3	CO1
13.	a.	A compound tube consists of a steel tube 15cm internal diameter and 1cm thickness and an outer brass tube of 17cm internal diameter and 1cm. thickness. The two tubes are of the same length. The compound tube carries an axial load of 1000kN. Find the stresses and the load carried by each tube and the amount it shortens. Length of each tube is 15cms. Take $E_s = 2 \times 10^5$ N/mm ² and $E_b = 1 \times 10^5$ N/mm ² .	10 Marks	L3	CO1
Or					
14.	a.	<p>A uniaxial test was carried out to on a steel sample of diameter 50mm and gauge length 350mm to determine its material properties. The results of the test are follows:</p> <p style="margin-left: 40px;">a. Load at Elastic Limit – 150 kN b. Deformation at 100 kN load – 2mm c. Change in diameter at 100 kN load – 0.1mm</p> <p>Estimate the elastic constants</p>	10 Marks	L3	CO1
15.	a.	<p>Draw the Shear Force Diagram and Bending Moment Diagram for the simply supported beam shown in Figure.</p> 	10 Marks	L3	CO2
Or					

16.	a.	Draw the Shear Force Diagram and Bending Moment Diagram for the cantilever beam shown in Figure.	10 Marks	L3	CO2

17.	a.	A cantilever beam of symmetrical section of 300mm depth has moment of inertia $8 \times 10^7 \text{ mm}^4$. The span of the beam is 4m. Find the point load the beam can carry at its free end, if the allowed bending stress is 120 N/mm^2 .	10 Marks	L3	CO2
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Or

18.	a.	A beam of symmetrical cross section has a depth of 40 mm and a moment of inertia 362540 mm^4 about its axis of bending. Find the maximum permissible span for this beam if, simply supported at the ends, it has to carry to UDL of 18 kN/m run without exceeding a bending stress of $8 \times 10^{-3} \text{ kN/mm}^2$.	10 Marks	L3	CO2
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19.	a.	Determine the diameter of the shaft of a rotor in case of 7.5 kW motor rotating at 3600 rpm , if the maximum permissible shear stress is 55 N/mm^2 in the shaft.	10 Marks	L3	CO3
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Or

20.	a.	Calculate the maximum intensity of shear stress induced and the angle of twist produced in a solid shaft of 100 mm diameter, 10 m long, transmitting 112.5 kW at 150 rpm . Take $G = 82 \text{ kN/mm}^2$.	10 Marks	L3	CO3
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21.	a.	A torque of 5 kNm is applied to a shaft having 1.2 m length and 75 mm diameter. Determine the angle of twist and the maximum shear stress. Take $G = 25 \times 10^3 \text{ N/mm}^2$.	10 Marks	L3	CO3
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Or

22.	a.	A hollow circular shaft of 6 m length and inner and outer diameters of 75 mm and 100 mm is subjected to a torque of 10 kNm . If $G = 80 \text{ kN/mm}^2$, determine the maximum shear stress produced and the total angle of the twist.	10 Marks	L3	CO3
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23.	a.	A strut 3 m long is 100 mm in diameter with one end of the strut fixed while the other end hinged. Find the safe compressive load for the member using Euler's Formula, allowing a factor of safety 2. Take $E = 2.1 \times 10^5 \text{ N/mm}^2$.	10 Marks	L3	CO4
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Or					
24.	a.	Find the Euler's crippling load for a hollow cylindrical cast-iron column 160mm outer diameter and 20mm thick, if it is 6m long and hinged at both ends. Take $E = 80\text{kN/mm}^2$.	10 Marks	L3	CO4

25.	a.	Find the Rankine's load for a column 50mm x 40mm in cross-section and 2m long, if one end is fixed and the other hinged. $E = 2 \times 10^5 \text{ N/mm}^2$ and crushing stress = 325N/mm^2 .	10 Marks	L3	CO4
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Or					
26.	a.	A solid cast-iron column 5m long and 150mm diameter is fixed at one end and free at the other. Assuming a factor of safety 5, calculate the safe load the column can carry. The value of Rankine's Constant may be taken as $1/1800$ and crushing stress = 150N/mm^2 .	10 Marks	L3	CO4