

ANURAG Engineering College

(An Autonomous Institution)

II B.Tech II Semester Supplementary Examinations, December – 2024

STRENGTH OF MATERIALS - II

(CIVIL ENGINEERING)

Time: 3 Hours**Max. Marks: 75****Section – A (Short Answer type questions)****(25 Marks)****Answer All Questions**

	Course Outcome	B.T Level	Marks
1. Summarize the assumptions made in torsional equation.	CO1	L1	2M
2. Differentiate between closed coil helical spring and open coil helical spring.	CO1	L2	3M
3. Write the limitations of Euler's Formula.	CO2	L1	2M
4. Differentiate between eccentrically loaded column and axially loaded column.	CO2	L2	3M
5. Explain middle third rule	CO3	L1	2M
6. Distinguish clearly between direct stress and bending stress	CO3	L2	3M
7. How can you reduce hoop stress in a thick cylinder?	CO4	L1	2M
8. When will the longitudinal stress in a thin cylinder be zero?	CO4	L2	3M
9. What are the reasons for unsymmetrical bending?	CO5	L1	2M
10. What is the significance of locating shear centre in a beam?	CO5	L2	3M

Section B (Essay Questions)**Answer all questions, each question carries equal marks.****(5 X 10M = 50M)**

11. A) A solid steel shaft is subjected to a torque of 45kNm. If the angle of twist is 0.50 per metre length of the shaft and the shear stress is not to be allowed to exceed 90MN/m ² . & C= 80GN/m ² . Evaluate i) Suitable diameter for the shaft ii) Final maximum shear stress iii) Angle of twist iv) Maximum shear strain in the shaft	CO1	L3	10M
OR			
B) A helical spring of circular cross-section wire 18 mm in diameter is loaded by a force of 500 N. The mean coil diameter of the spring is 125 mm. The modulus of rigidity is 80 KN/mm ² . Determine the maximum shear stress in the material of the spring. What number of coils must the spring have for its deflection to be 6 mm?	CO1	L3	10M
12. A) A mild steel tube 4m long, 3 cm internal diameter and 4mm thick is used as a strut with both ends hinged. Find the collapsing load, what will be the crippling load? i) Both ends are built in ii) One end is built-in and one end is free.	CO2	L3	10M
OR			
B) Compare the crippling loads given by Euler's and Rankine's formulae for a tubular strut 2.25 m long having outer and inner diameters as 37.5 mm and 32.5 mm loaded through pin-jointed at both the ends. Take E = 200GPa; yield stress = 315 MPa; $\alpha = 1/7500$. If the elastic limit stress is taken as 200 MPa, then for what length of the strut does the Euler's formula cease to apply.	CO2	L3	10M

13. A) A trapezoidal masonry dam is of 18 m height. The dam is having water up to a depth of 15 m on its vertical side. The top and bottom width of the dam are 4 m and 8 m respectively. The weight density of the masonry is given as 19.62 kN/m^3 . Determine:
- The resultant force on the dam per meter length.
 - The point where the resultant cuts the base, and
 - The maximum and minimum stress intensities at the base.
- OR**
- B) A short column of external diameter 40 cm and internal diameter 20 cm carries an eccentric load of 80 kN. Find the greatest eccentricity which the load can have without producing tension on the cross section.
14. A) i) Define Thin Cylinder.
ii) Derive an expression for circumferential stress and Longitudinal stress.
- OR**
- B) A thick cylinder of external and internal diameter of 300 mm and 180 mm is subjected to an internal pressure of 42 N/mm^2 and external pressure 6 N/mm^2 . Determine the stresses in the material. Now if the external pressure is doubled, what internal pressure can be maintained without exceeding the previously determined maximum stress?
15. A) Find the centroidal principal moments of inertia of a equal angle section $30 \times 30 \times 8 \text{ mm}$.
- OR**
- B) Determine the position of the shear centre of a channel having dimensions: flanges $120 \text{ mm} \times 20 \text{ mm}$ and web $160 \text{ mm} \times 10 \text{ mm}$.