Question Paper Code: R18A22CE01

R18

ANURAG Engineering College

(An Autonomous Institution)

II B.Tech II Semester Supplementary Examinations, Jan/Feb-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.	What is spring? Name the two important types of spring	CO1	L1	2M
2.	Define polar section modulus.	CO1	L1	3M
3.	Write the assumptions in Euler's theory of columns	CO2	L2	2M
4.	Differentiate column and strut	CO2	L2	3M
5.	What is overturning moment?	CO3	L1	2M
6.	Define core of a section	CO3	L1	3M
7.	What are the advantages of compound cylinders?	CO4	L1	2M
8.	What are the types of stresses developed in thin cylinders subjected to internal pressure?	CO4	L1	3M
9.	State two reasons for unsymmetrical bending.	CO5	L1	2M
10.	What is the practical implication of shear centre for steel channel section and angle section	CO5	L1	3M

Section B (Essay Questions)

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

11. A)	Derive an expression for deflection and shear stress in a close coiled helical spring with circular wire, when it is subjected to an axial load 'W'.	CO1	L3	10M
	OR			
B)	A hallow shaft having an internal diameter 50% of its external diameter transmits 600kW at 150 r.p.m. Determine the external diameter of the shaft if the shear stress is not to exceed 65N/mm^2 and the twist in a length of 3m should not exceed 1.4 degrees. Assume maximum Torque is 20% of mean Torque and modulus of rigidity is 1x10^5 N/mm^2.	CO1	L3	10M
12. A)	Design a hallow circular mild steel column, 6m long , one end fixed and another end is hinged, to carry an axial load of 500KN. Take the factor of safety as 3. The internal diameter is 0.65 times of external diameter. The Rankine's constants are 320MPa and 1/7500.	CO2	L3	10M
	OR			
B)	Derive the expression for crippling load when the both ends of the column are fixed	CO2	L3	10M
13. A)	A short column of rectangular cross section 80mm by 60mm carries a load of 40kN at a point 20mm from the longer side and 35mm from the shorter side. Determine the maximum compressive and tensile stress in the section	CO3	L3	10M
	OR			

	B)	A masonry retaining wall of trapezoidal section is 12 m high and retains earth which is level up to the top. The width at the top is 3m and at the bottom 6m and exposed face is vertical. Find the maximum and minimum intensities of normal stress at the base. Take density of earth=1600 kg/m^3 and density of masonry=2300 kg/m^3 and angle of repose of the earth=30°	CO3	L3	10M
14.	A)	Calculate the increase in volume of thin cylindrical shell 2.2m long, internal diameter 1m and 12mm thick, if it is subjected to an internal pressure of 9N/mm^2 . Take E = 2x10^{5}N/mm^2 and 1/m =0.3	CO4	L3	10M
		OR			
	B)	A thick cylinder of internal diameter 200mm is required to withstand a pressure of 30N/mm^2, if the permissible hoop stress is 120N/mm^2, calculate the external diameter and minimum value of hoop stress in the cylinder. Sketch the radial pressure and hoop stress distribution across the section.	CO4	L3	10M
15.	A)	A 45 mm x 45 mm x 5 mm angle is used as a SSB over a span of 2.4 m. It carries a load of 300 N along the vertical axis passing through the centroid of the section. Determine the resulting bending stress on the outer corners of the section, along the middle section of the beam.	CO5	L3	10M
		OR			
	B)	A channel section has flanges 12cm x 2cm and web 16cm x 1cm as shown. Determine the shear centre of the channel	CO5	L3	10M