Question Paper Code: R22A22CE03

R22

ANURAG Engineering College

(An Autonomous Institution)

II B.Tech II Semester Regular Examinations, June/July – 2024

STRENGTH OF MATERIALS – II

(CIVIL ENGINEERING)

Time: 3 Hours **Max. Marks: 60**

Section – A (Short Answer type questions) (10 Marks)

Answer All Questions

		Course Outcome	B.T Level	Marks
1.	What is meant by stiffness of spring?	CO1	L1	1M
2.	Define polar modulus.	CO1	L1	1M
3.	State the assumptions in Euler's column theory	CO2	L1	1M
4.	Write Rankine Gordon formula for long columns subjected to eccentric loading.	CO2	L1	1M
5.	What do you mean by Middle third rule for rectangular sections.	CO3	L1	1M
6.	List out the various conditions for the stability of a dam.	CO3	L1	1M
7.	Differentiate between thin and thick cylinders	CO4	L1	1M
8.	Write the equation for longitudinal stress for a thin cylindrical shell subjected to an internal pressure of intensity 'p' with a thickness 't' and diameter 'd'.	CO4	L1	1M
9.	What are the causes for Unsymmetrical bending of beams?	CO5	L1	1M
10.	What is the importance of shear centre?	CO5	L1	1M

Section B (Essay Questions)

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

11. A)	A steel shaft circular in cross section has to withstand a torque of 12×10^3 N-m. If the Shearing stress is not to exceed 45 MPa and angle of twist has to remain with one degree per 5 m length of the shaft, find i) the minimum diameter of the solid shaft, ii) Minimum diameter of hollow shaft. Given $G=8 \times 10^4$ MPa.	CO1	L3	10M
	OR			
B)	A steel wire of diameter 10 mm is used to form a close-coiled helical spring with 10 complete turns. The helical spring with mean radius 6 cm is subjected to an axial pull of 200 N. Find: i) spring deflection ii) maximum shear stress developed and iii) Spring constant.	CO1	L3	10M
12. A)	Derive an expression for the Euler's crippling load for a long column with Both ends are hinged.	CO2	L2	10M
	OR			
B)	Determine the maximum stress induced in a cylindrical steel strut of length 1.2 m and diameter 30 mm. The strut is hinged at both its ends and subjected to an axial thrust of 20 kN at its ends and a transverse point load of 1.8 kN at the centre. Take $E = 208GN/m^2$.	CO2	L3	10M

13. A)	A chimney of uniform thickness is 45 m high with external diameter tapers from 4 m at the base to 2.5 m at the top. The internal diameter at the base is 2.5 m. The chimney is subjected to horizontal wind pressure of 2 kN/m^2. The self-weight of the chimney is 2500 kN. Determine the maximum and minimum stresses.	CO3	L3	10M
	OR			
B)	A masonry dam of rectangular section 12m height and 5m wide has water upto the top on its side. If the density of masonry is 2300kg/m^3.calculate the i) pressure force due to water per metre length of dam. ii) Resultant force and the point at which the cuts the base of the dam.	CO3	L3	10M
14. A)	A thin cylindrical shell of 120 cm diameter, 1.5 cm thick and 6m long is subjected to internal fluid pressure of 2.5 N/mm^2. If the value of E= $2x10^5$ N/mm^2 and poisson's ratio $\mu = 0.3$, Calculate i) Change in diameter, and ii) change in volume.	CO4	L3	10M
	OR			
B)	A compound cylinder is made by shrinking a cylinder of external diameter 200 mm and an internal diameter 160 mm over another cylinder of external diameter 160 mm and internal diameter 120 mm. The radial pressure at the junction after shrinking is 8 N/mm^2. Find the final stress set up across the section, when the compound cylinder is subjected to an internal fluid pressure of 60 N/mm^2.	CO4	L3	10M
15. A)	Develop the equation of Shear centre for T- section.	CO5	L2	10M
	OR			
B)	Determine the position of shear centre for a channel section having dimensions: Flange 120mm x 20mm and web 160mm x10mm.	CO5	L2	10M