Question Paper Code: R18A21CE02

R18

ANURAG Engineering College

(An Autonomous Institution)

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

STRENGTH OF MATERIALS-I

(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.	Define Poisson' Ratio.	CO1	L1	2M
2.	Write the relationship between Young's Modulus, Modulus of Rigidity and Bulk Modulus.	CO1	L2	3M
3.	What is mean by positive or sagging BM?	CO2	L1	2M
4.	Define point of contra flexure.	CO2	L1	3M
5.	Define pure bending.	CO3	L1	2M
6.	Write the shear stress equation and explain the terms.	CO3	L2	3M
7.	What are the different methods of finding slope and deflection of a cantilever?	CO4	L1	2M
8.	What is Conjugate beam?	CO4	L1	3M
9.	Define principal planes and principal stresses.	CO5	L1	2M
10.	Define the maximum shear strain energy theory.	CO5	L1	3M

Section B (Essay Questions)

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

11. A)	A bar of 30 mm diameter is subjected to a pull of 60 kN. The measured extension on gauge length of 200mm is 0.09mm and the change in diameter is 0.0039. Calculate the Poisson's ratio and the value of the three moduli.	CO1	L2	10M
	OR			
B)	A steel rod of 30mm diameter and 5 m long is connected to two grips and the rod is maintained at a temperature of 95^0 C. Determine the stress and pull, when the temperature falls to 30°C, if (i) the ends do not yield and (ii) the ends yield by 1.2 mm. $E=2x10^5 N/mm^2$ and $\alpha = 12x10^{-6}/°C$.	CO1	L2	10M
12. A)	A cantilever of length 6 m carries two point loads of 2kN and 3kN at a distance of 1 m and 6 m from the fixed end respectively. In addition to this the beam is also carries a uniformly distributed load of 1 kN/m over a length of 2 m at a distance of 3 m from fixed end. Draw the shear force and bending moment diagram.	CO2	L3	10M
	OR			
B)	A simply supported beam of span 10 m carries point loads 6 kN each at distance of 3 m and 5 m from left support and also a uniformly distributed load of 2 kN/m between the two point loads. Draw the S.F and B.M diagrams for the beam.	CO2	L3	10M
13. A)	Derive the bending equation from fundamentals M/I= f/y = E/R along with assumptions.	CO3	L3	10M
	OR			

B)	A beam of T – section has a flange of dimension 200 mm x 20 mm and web 250mm x 30 mm. If it is used as simply supported beam of span 3 m and subjected to u.d. 1 of 5 kN/m over entire span and a point load of 10 kN at centre, then find the shear stress at neutral axis.	CO3	L2	10M
14. A)	A beam is 10 m long and is simply supported at the ends. It carries concentrated loads of 125 kN and 75 kN at distances of 2 m and 5 m respectively from left end. Calculate the deflection under each load. Take I = 16 x 10^8mm^4 and E = 2.1 x 10^5N/ mm^2	CO4	L2	10M
	OR			
B)	A simply supported beam of span L, carrying a point load P at 0.3L from left support. Determine the mid-span displacement and slopes at the supports, using the method of integration.	CO4	L2	10M
15. A)	At a point in a beam the normal stress along its length is 75 N/mm^2. The shear stress at that point is 25 N/mm^2. Find the stresses on a plane whose normal is inclined at 30° to the longitudinal axis. Also find the principal stresses and planes on which they act.	CO5	L2	10M
	OR			
B)	Determine the diameter of the bolt which is subjected to an axial pull of 10 kN and a transverse shear force of 5 kN using maximum principal stress theory. Take elastic limit of material in tension = 220 N/mm^2 , factor of safety = 3 and Poisson's ratio = 0.3	CO5	L3	10M