Question Paper Code: R22A21CE03

R22

ANURAG Engineering College

(An Autonomous Institution)

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

STRENGTH OF MATERIALS - I

CIVIL ENGINEERING

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

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

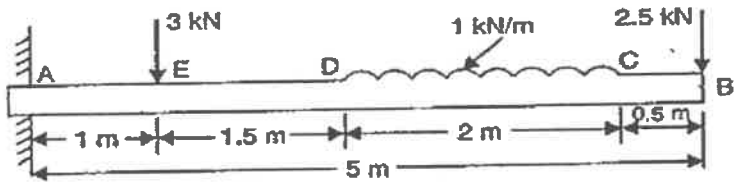
Answer All Questions

		Course Outcome	B.T Level	Marks
1.	State Hooke's law?	CO1	L1	1M
2.	Write the relation between E, G and K and explain the terms?	CO1	L1	1M
3.	What are different types of loads acting on a beam?	CO2	L1	1M
4.	What are the sign conventions for shear force and bending moment in general?	CO2	L2	1M
5.	What do you understand by neutral axis?	CO3	L1	1M
6.	sketch the distribution of shear stress for T-section?	CO3	L2	1M
7.	What are the different methods of finding of slope and deflection of a cantilever?	CO4	L1	1M
8.	Explain Conjugate beam method?	CO4	L2	1M
9.	Define the term 'Obliquity'	CO5	L1	1M
10.	Write a short note on Mohr's circle of stresses?	CO5	L1	1M

Section B (Essay Questions)

Answer all questions, each question carries equal marks. **(5 X10M = 50M)**

11. A)	Calculate the modulus of rigidity and bulk modulus of a cylindrical bar of diameter 30 mm and of length 1.5 m. If the longitudinal strain in a bar during a tensile stress is four times the lateral strain. Find the change in volume, when the bar is subjected to a hydrostatic pressure of 100 N/mm^2 Take E = 1 x 10^5 N/mm^2	CO1	L2	10M
	OR			
B)	Derive an expression for strain energy stored in a body when the load is applied with Impact?	CO1	L2	10M
12. A)	A cantilever of length 5 m is loaded as shown in figure. Draw SFD and BMD for the cantilever.	CO2	L3	10M



OR

B)	A simply supported beam of length 8 m rests on supports 6 m apart, the right hand end is overhanging by 2 m. The beam carries a UDL of 1500 N/m over the entire length. Draw SFD and BMD and find the point of contraflexure, if any.	CO2	L3	10M

13. A)	i) Derive the section modulus for Rectangular and Circular Sections. ii) A rectangular beam 300 mm deep is simply supported over a span of 4 metres. Determine the UDL per metre which the beam may carry, if the bending stress should not exceed 120 N/mm^2.Take $I = 8x10^6$ mm^4	CO3	L2	5M 5M
	OR			
B)	The shear force acting on a section of a beam is 100 KN. The section of the beam of T-shaped of dimensions 200 mm x 250 mm x 50 mm. The flange thickness and web thickness are 50 mm. Moment of Inertia about the horizontal neutral axis is $1.134 x10^8$ mm^4 .Find the shear stress at the neutral axis and at the junction of the web and the flange.	CO3	L2	10M
14. A)	A beam of length 5 m and of uniform rectangular section is simply supported at its ends. It carries a UDL of 9 KN/m run over the entire length. calculate the width and depth of the beam if permissible bending stress is 7 N/mm^2 and central deflection is not to exceed 1 cm.	CO4	L3	10M
	OR			
B)	A beam of length 6 m is simply supported at its ends and carries two-point loads of 48 KN and 40 KN at a distance of 1 m and 3 m respectively from the left support. Find: (i) deflection under each load (ii) maximum deflection and (iii) the point at which maximum deflection occurs. Take $E = 2 \times 10^5$ N/mm^2 and $I = 85 \times 10^6$ N/mm^4.	CO4	L3	10M
15. A)	A rectangular block of material is subjected to a tensile stress of 100 N/mm^2 on one plane and a tensile stress of 50 N/mm^2 on a plane at right angles together with shear stresses of 60 N/mm^2 on the faces. Find: (i) The direction of principal planes, (ii)The magnitude of principal stresses and (iii) Magnitude of the greatest shear stress.	CO5	L2	10M
	OR			
B)	Derive an expression for the distortion energy per unit volume when a body is subjected to principal stresses $\sigma1$, $\sigma2$ and $\sigma3$.	CO5	L2	10M