Question Paper Code: R18A21CE02

R18

ANURAG Engineering College

(An Autonomous Institution)

II B.Tech I Semester Supplementary Examinations, Jan/Feb-2024

STRENGTH OF MATERIALS – I

(CIVIL ENGINEERING)

Time: 3 Hours **Max. Marks: 75**

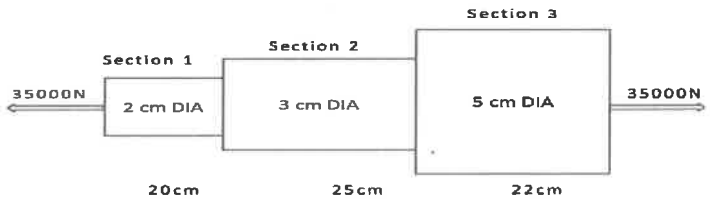
Section – A (Short Answer type questions) (25 Marks)

Answer All Questions		Course Outcome	B.T Level	Marks
1.	Draw the stress – strain diagram for mild steel, specify the terms.	CO1	L1	2M
2.	Define any 3 mechanical properties of material.	CO1	L1	3M
3.	Mention the different types of loading on beams.	CO2	L1	2M
4.	A simply supported beam AB of span 8m carries a point load of 30kN acting at its mid-point. Find reactions and draw the SFD and BMD.	CO2	L2	3M
5.	Write the pure bending equation and define its terms.	CO3	L1	2M
6.	A timber beam is 100mm wide and 150mmdeep. The beam is simply supported and carries a central concentrated load W. If the maximum stress in shear is 2N/mm, what would be the corresponding load W on the beam?	CO3	L2	3M
7.	Explain the two statements of mohr's theorems.	CO4	L2	2M
8.	What is the relation between an actual beam and the corresponding conjugate beam for different end conditions.	CO4	L1	3M
9.	Define principal stress and principal strain.	CO5	L1	2M
10.	State the reasons, which theory of failure is best suited for ductile materials.	CO5	L1	3M

Section B (Essay Questions)

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

11. A)	An axial pull of 35000N is acting on a bar consisting of three lengths as shown in fig. If the young's modulus=2.1×10^5 N/mm², determine stresses in each section and total extension of the bar.	CO1	L3	10M



OR

B)	A tension bar 5m long is made up of two parts, 3m of its length has a cross sectional area of 10cm² while the remaining 2m has a cross sectional area of 20cm². An axial load of 80kN is gradually applied. Find the total strain energy produced in the bar and compare this value with that obtained in a uniform bar of the same length and having the same volume when under the same load. Take E=2×10^5 N/mm².	CO1	L3	10M

12. A)	A simply supported beam of 6m span, is subjected to a udl of 1kN/m and 2kN/m over a length of 2m from left and right hand supports respectively. Also the middle 2m is acted upon by a udl of 3kN/m. in addition to the above, two point loads of 5kN and 4kN act at 2m and 4m from left hand support. Draw the SFD and BMD. Also find the maximum BM and its position.	CO2	L3	10M
	OR			
B)	A cantilever beam 6m long carries a udl of 4kN/m over a length of 2m from free end and a udl of 12kN/m over a length of 3m from fixed end. In addition, it also carries two point loads of 20kN and 15kN at 3.5m from fixed end and at free end respectively. Draw SFD and BMD.	CO2	L3	10M
13. A)	With the reference to the theory of simple bending derive the bending moment equation mention the assumptions used in derivation.	CO3	L2	10M
	OR			
B).	Sketch and explain the variation of shear stress distribution across the following beams sections. circle, rectangle, I and T sections.	CO3	L2	10M
14. A)	A beam of length 5m and of uniform rectangular section is simply supported at its ends. It carries a udl of 9kN/m run over the entire length. Calculate the width and depth of the beam if possible bending stress is $7N/mm^2$ and central deflection is not to exceed 1cm. Take E for beam material = $1x10^4N/mm^2$.	CO4	L3	10M
	OR			
B)	A cantilever of length 3m carries a udl of 80kN/m length over the entire length. If $E=2x10^8kN/m^2$ and $I=1x10^8mm^4$, find the slope and deflection at the free end using conjugate beam method.	CO4	L3	10M
15. A)	Write about any one of the case of Mohr's circle theory with neat sketch.	CO5	L2	10M
	OR			
B)	Determine the diameter of a bolt which is subjected to an axial pull of 9kN together with a transverse shear force of 4.5kN using maximum principal stress theory and maximum principal strain theory. The elastic limit in tension= $225N/mm^2$, factor of safety=3 and poisson's ratio=0.3.	CO5	L3	10M