Reg. No. : | | | | | | | | | | | | |

Question Paper Code: R3103

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Third Semester

Civil Engineering

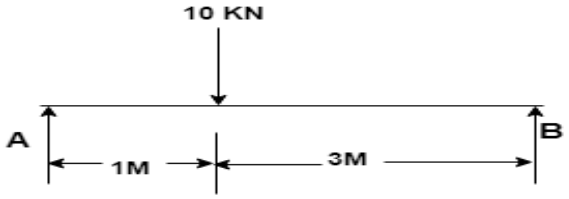
R21UCE303 - STRENGTH OF MATERIALS

(Regulations R2021)

Duration: Three hours | Maximum: 100 Marks

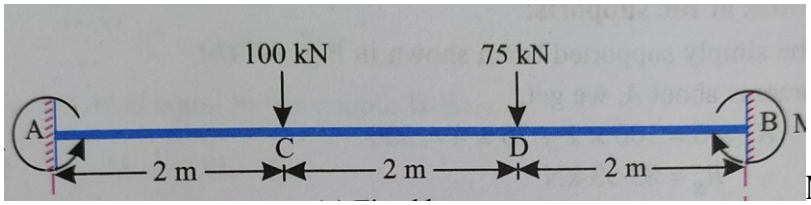
Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1.	If a material had a modulus of elasticity of 2.1 kgf/cm^2 and a modulus of rigidity of 0.8 kgf/cm^2 then what will be the approximate value of the Poissons ratio?	CO3-App
2.	Define Principal stresses and principal planes.	CO1- U
3.	Find the reaction at simple support B? 	CO2-App
4.	Discriminate the types of beam with neat sketch	CO1- U
5.	Calculate the maximum deflection of a fixed beam carrying udl of 5 kN/m. The span of beam is 6 m. Take E = 200kN/m^2 & I = 5×10^7 mm^4.	CO3-App
6.	Find the maximum bending moment in the beam. A beam 7 metres long is fixed at it ends. It carries a udl of 6 kN/m.	CO3-App
7.	Draw the End Conditions of Euler's theory of column.	CO1- U
8.	Compare axially loaded and eccentric loaded column.	CO3-App
9.	Differentiate between symmetrical and unsymmetrical bending	CO1- U
10.	Write shear center formula for I section and Channel Section	CO1- U

PART – B (5 x 16= 80 Marks)

11.	(a)	A circular solid shaft transmits 500 KN at 350 r.p.m Permissible shear stress id 50 Mpa. & Angle of twist 2^o in a length of 5 m. Determine the diameter of the shaft. Take G=1x10^5 Mpa.	CO3- App	(16)
		Or		
	(b)	Calculate : i) change in diameter ii) Change in length iii) Change in volume of a thin cylindrical shell 100cm diameter , 1cm thick and 5m long when subjected to a internal pressure of 3N/mm^2.Take E=2X10^5 N/mm^2 and poisons ratio as 0.3	CO3- App	(16)
12.	(a)	A cantilever beam 2.5m long is loaded with point load of 2KN, 4KN and 6KN at 1m and 0.5m from left end. Draw 4 SFD and 6 BMD.	CO2-App	(16)
		Or		
	(b)	A simply supported beam of span 6m is subjected to a concentrated load of 45 KN at 2m from the left support. Calculate the deflection under the load point. Take E=200x10^6 N/mm^2 and I=14x10^6 m^4	CO2-App	(16)
13.	(a)	A continuous beam ABC covers two consecutive span AB and BC of lengths 5m and 6m, carrying udl of 6 kN/m and 10 kN/m respectively if the ends A & C are simply supported, find the support moments at A ,B & C. Draw also BM and SF diagrams.	CO2- App	(16)
		Or		
	(b)	A fixed beam AB of length 6m as shown in fig. Draw BMD and SFD.	CO2- App	(16)



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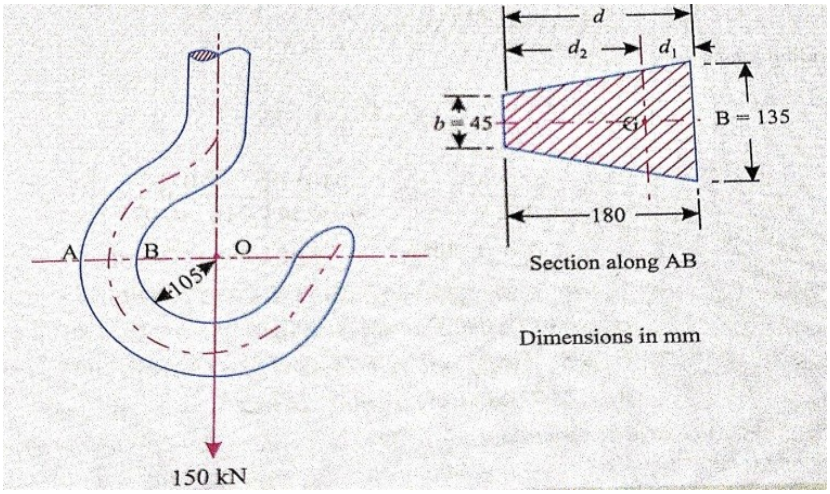
14.	(a)	Compare the crippling loads given by Euler's and Rankine's formula for a tubular cast iron strut 3m long having outer diameter and inner diameter 40mm and 30mm loaded through pin joints at the ends. Take E=1.2 X10^5 N/mm^2, σ = 550 N/mm^2 and α = 1/1600	CO4-Ana	(16)
		Or		

(b) A hollow CI column whose outside diameter is 200mm has a wall thickeness of 25mm.It is 4.5m long and fixed at both ends .Calculate slenderness ratio ,safe load by Euler's formula with a factor of safety of 3 and safe load by rankine's formula with a factor safety of 4. Take $\alpha = 1/7500$, Yield stress $\sigma = 330$ N/mm^2 and E= 2.1 X10^5 N/mm^2 — CO4-Ana — (16)

15. (a) A fig shows a crane hook lifting a load of 150KN.Determine the Maximum compressive and tensile stresses in the critical section of the crane hook. — CO3- App — (16)



Or

(b) A cylindrical shell of mild steel plate and 1.2 m in diameter is to be subjected to an internal pressure of 1.5MN / m^2. If the material yield 200 MN / m^2. Calculate the thickness of the p[late on the basis of the following three theories, assuming the factor of safety 3 in each case — CO3- App — (16)

i) Maximum principal stress theory

ii). Maximum shear stress theory

iii) Maximum shear strain energy theory.

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