HALL TICKET NUMBER

PACE INSTITUTE OF TECHNOLOGY & SCIENCES::ONGOLE (AUTONOMOUS) II B.TECH I SEMESTER END REGULAR EXAMINATIONS, JAN - 2023 SOLID MECHANICS

(CE Branch)

Time: 3 hours

Max. Marks: 70

Answer all the questions from each UNIT (5X14=70M)

Q.No.		Questions	Marks	CO	KL			
UNIT-I								
1.	a)	Assess the relationship between the modulus of elasticity and modulus of rigidity.	[7M]	1	3			
	b)	Outline the stress-strain diagram for mild steel material and indicate salient	[7M]	1	3			
		points.						
OR								
2.		A reinforced concrete column is 300 mm x 300 mm in section. The column	[14M]	1	3			
		is provided with 8 bars each of 20 mm diameter. The column carries a load						
		of 360 kN. Calculate the stresses in concrete and the steel bars. Take $Es = 210 \text{ GN/m}^2$ and $Ec = 14 \text{ GN/m}^2$						
3		A cantilever beam of 2 m long carries a uniformly distributed load of 1.5	[14M]	2	3			
5.		kN/m over a length of 1.6 m from the fixed end and 2 kN at free end. Draw		2	5			
		shear force and bending moment diagrams for the beam.						
OR								
4.		A simply supported beam of 2 m long carries a uniformly distributed load of	[14M]	2	3			
		1.5 kN/m over a length of 1.6 m from the right end. Draw shear force and						
		bending moment diagrams for the beam.						
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5.		A rectangular beam 300 mm deep is simply supported over the span of 4 m. Evaluate the uniformly distributed load per metre which the beam may carry	[14M]	3	3			
		if the bending stress should not exceed 120 N/mm ² . Take $I = 8 \times 10^4 \text{ mm}^4$.						
		OR						
6.		A 100 mm X 200 mm rolled steel I section has the flanges 12 mm thick and	[14M]	3	3			
		web 10 mm thick. Find (i) The safe udl the section can carry over a span of 6						
		m if the permissible stress limited to 150 N/mm^2 (ii) The maximum bending						
		stress when the beam carries a central point load of 20 kN.						
UNIT-IV								
7.		Three planks of each 50 mm x 200 mm timber are built	[14M]	4	3			
		up to a symmetrical I section for a beam. The maximum						
		rectangular section of the same material so that the						
		maximum shear stress developed is same in both						
8.		A simply supported beam of span 6 m is subjected to a UDL of 15 kN/m	[14M]	4	3			
		over its entire length. The cross section of beam is 20 cm wide and 30 cm	r1	-	-			
		deep. Analyze and sketch the variation of shear stress in the beam cross						
		section.						
UNIT-V								

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9.	 A beam of length 5 m is simply supported at its ends and carries two point loads of 47 kN and 30 kN at a distance of 1.1 m and 3.2 m respectively from the left support. Identify (i) Deflection under each load (5 marks) (ii) Maximum deflection (5 marks) Take I = 85×10⁶ mm⁴; E = 2×10⁵ N/mm² Use double integration method 	[14M]	5	3
	OR			
10.	Indicate and solve the slope and deflection at the free end of the cantilever shows in figure. Take $EI = 1 \times 10^{10} \text{ kN/mm}^2$.	[14M]	5	3
