



Marking Scheme

End-Sem Examination-I, Winter 2025

Academic Year: 2025-2026	Semester: I
Class: F.Y.	Program: M. Tech
Branch Code: CIV	Pattern: 2024
Name of Course: Advanced Design of Steel Structures	Course Code:2404504(A)

Q. No.	Answer Details	Marks
Q.1.	a) Castellated beams and their advantages Definition Advantages-	2 4
Q.2.	Different types of bracings for microwave towers Any six types with sketches	1 for each type
Q.3.	a) Maximum sag of the conductor $T_1 = \text{permissible tension in the conductor} = 35 \text{ kN}$ $W_2 = \text{weight of conductor without wind} = 0.025 \frac{\text{kN}}{\text{m}}$ $L = \text{weight span} = 235\text{m}$ $E = \text{Young's modulus} = 0.85 \times 10^2 \frac{\text{kN}}{\text{mm}^2}$ $t_2 - t_1 = \text{variation of temperature} = 60 - 05 = 55^\circ\text{C}$ $\alpha = \text{coefficient of thermal expansion} = 0.00001992^\circ/\text{C}$ $A = \text{effective cross sectional area} = \frac{\pi}{4} \times D^2$ $= \left(\frac{\pi}{4} \times 3^2 \times 54\right) + \left(\frac{\pi}{4} \times 3^2 \times 7\right) = 431.18 \text{ mm}^2$ $W_1 = \sqrt{0.0302^2 + 0.025^2} = 0.039 \frac{\text{kN}}{\text{m}}$ $T_2 = 20.26 \text{ kN}$ $d = \frac{W_2 L^2}{8T_2} = \frac{0.025 \times 235^2}{8 \times 20.26} = 8.52\text{m}$	1 1 2 3 1
OR		
Q.3	b) Maximum sag of the conductor $T_1 = \text{permissible tension in the conductor} = 41.25 \text{ kN}$ $W_2 = \text{weight of conductor without wind} = 0.020 \frac{\text{kN}}{\text{m}}$ $L = \text{weight span} = 250\text{m}$ $E = \text{Young's modulus} = 0.85 \times 10^2 \frac{\text{kN}}{\text{mm}^2}$ $t_2 - t_1 = \text{variation of temperature} = 50 - 10 = 40^\circ\text{C}$ $\alpha = \text{coefficient of thermal expansion} = 0.00001992^\circ/\text{C}$ $A = \text{effective cross sectional area} = \frac{\pi}{4} \times D^2$	1



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	$= \left(\frac{\pi}{4} \times 3^2 \times 54\right) + \left(\frac{\pi}{4} \times 3^2 \times 7\right) = 431.18 \text{ mm}^2$ $W_1 = \sqrt{0.0377^2 + 0.020^2} = 0.043 \frac{kN}{m}$ $T_2 = 18.61 \text{ kN}$ $d = \frac{W_2 L^2}{8T_2} = \frac{0.020 \times 250^2}{8 \times 18.61} = 8.40m$	1 2 3 1
Q.3	c) Explain following terms- All definition with suitable sketches	2 marks each
	OR	
Q.4.	d) Different loads acting on transmission line towers	
	1. Vertical loads	2
	2. Transverse or Horizontal loads	2
	3. Longitudinal loads	2
	4. Torsional Load	1
	Broken wire condition	1
Q.4.	a) Design member AB and joint A of a roof truss, as shown in the fig. for the following data	
	1. Design of member AB- Compressive member design	6
	2. Design Joint A assuming same cross section	2
	OR	
	b) Capacity of the column	
	1. Properties of the column section	
	2. Computation of effective widths for unstiffened and stiffened elements	2
	3. Determination of form factor Q	2
	4. Determination of Cc and Slenderness ratio	2
	5. Determination of safe load when l = 6m	2
Q.4.	c) Define Stiffened element- Unstiffened Element Flat width ratio- Effective design width-	2 marks each
	OR	
	d) What are the important advantages of tubular structures? Any eight points	1 mark each
Q.5	a) The flat bottom overhead water tank of 80,000 litres capacity is to be erected. Design dimensions of tank, bottom plates and T-covers	
	1. Dimensions of the tank	2
	2. Thickness of plates	2
	3. Design of T-covers	4
	OR	
Q.5	b) Staging of overhead water tank	
	1. Design of column	
	2. Design of bracings	
	3. Design of base plate of foundation	
	4. Design of foundation and anchor bolts	2 marks each
	c) i) loads acting on water tanks	4



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	ii) Types of tanks	4
	OR	
	d) Codal provisions 1. Scope and Applicability 2. Materials and Workmanship 3. Loads to be Considered 4. Permissible Stresses and Method of Design 5. Design of Flat Bottom Plates 6. Design of Joints and Welding 7. Corrosion Protection and Painting 8. Serviceability and Safety Provisions	1 mark each