



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

WINTER-2024	
Exam Seat No.:	
Academic Year:2024-2025	Semester: I
Class: PG- I	Program: M. Tech
Branch Code: CIV	Pattern: 2024
Name of Course: Advanced Design of Steel Structures	Course Code: 2404504(A)
Max. Marks: 60	Duration: 2.50 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 2 page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required but justify it.
4. Draw the neat, labelled diagrams, wherever necessary.
5. The last columns indicate the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.
6. Use of IS-800-2007 & IS -875-Part-III (2015) is allowed

Marks CO

Question No. 1

- 1a) Explain stepwise procedure for analysis of Hoarding structure (6) CO1

Question No. 2

- 2a) Explain step-by-step procedure for analysis of a microwave tower. (6) CO2

Question No. 3

- 3a) State different classifications of transmission towers & draw neat sketches of any two tower configurations. (8) CO3

OR

- 3b) Explain different load analysis of transmission tower & draw neat sketch showing loading on tower (8) CO3

- 3c) A steel tower is to be erected for transmission line of a single circuit 3-phase 50 cycles/sec, to transmit 50 MW with 0.75 power factor for 259km. Voltage transmission 132 KV. Consider Normal Span of tower = 245m (8) CO3

Power conductor: - 30 mm dia. Aluminum cable Reinforced conductors Consist of 54 strands of 3 mm dia. of Aluminum and 7 strands of 3 mm dia. of Steel to be used.

Unit weight of conductor: - 16.76 N/m , **Permissible Axial Tension:** - 35.6 KN,

Young's Modulus: - $0.842 \times 10^5 \text{ N/mm}^2$ **Coefficient of Expansion:** - 0.00001992/c

Shape factor: - 0.67, **Ground wire:-** 12 mm dia. galvanized steel wire with permissible axial tension = 25.4 KN.

Determine maximum sag of conductor at mid span

OR

- 3d) Find geometry and draw elevation of the tower to be erected for transmission lines for single circuit three phase, 50 cycles /sec to transmit 50 MW at 0.85 power factor with the following data. Voltage Transmission = 132 KV. (8) CO3

Power conductor: - 40 mm dia. Aluminum cable Reinforced conductors Consist of 60 strands of 3 mm dia. of Aluminum and 10 strands of 3 mm dia. of steel to be used.

Unit weight of conductor: - 20N/m, **Permissible Axial Tension:** - 40 KN

Young's Modulus: - $0.85 \times 10^5 \text{ N/mm}^2$ **Coefficient of Expansion:** - $0.00001992/c$,

Shape factor: - 0.67, **Ground wire:-** 12 mm dia. Galvanized steel wire with permissible axial tension = 30 KN

Clearance requirements

Vertical ht. of conductor above ground = 6.5 m. (Min.)

Vertical spacing between power conductors = 3.5 m. (Min.)

Horizontal spacing between power conductors = 6.25 m (Min.)

Question No. 4

- 4a) State advantages of tubular sections over conventional steel sections. (8) CO4

OR

- 4b) Explain stiffened element, unstiffened element, flat width ratio and effective design width with suitable sketches. (8) CO4

- 4c) A tubular truss having joint A at support, the angle between principal rafter (AB) and tie member (AC) 26.566 degrees. The length of principal rafter is 2.3 m, carries 60 KN (compression) and 55 KN (tension). The length of tie member is 1.8 m, carries 80 KN (tension) and 55 KN (compression). Design principal rafter AB and tie BC by using circular tubular section. Draw a neat sketch showing the connection at joint A. (8) CO4

OR

- 4d) Two channel sections with bent lips 200 mm x 80 mm are connected with webs to act as column. The thickness of the channel is 2.5 mm and depth of lips is 25 mm. Effective length of column is 4 m. Determine the safe load carrying capacity of the section. Take $F_y = 235 \text{ N/mm}^2$ and $E = 2 \times 10^5 \text{ N/mm}^2$ (8) CO4

Question No. 5

- 5a) Design a overhead flat bottom water tank of capacity 70000 litres. The available width & length of steel plates are 1.22 m & 6.1 m respectively. (i.e. center to center spacing of T-covers is 1.22m). Consider 0.4m overhang on all sides. Design dimension of tank, bottom Plates & T-Cover. (8) CO5

OR

- 5b) Design staging for overhead water tank of size 6.9 x 4.46 x 2.5m The staging consist of 4 columns with c/c spacing 4.88m x 3.66m .and the bottom of tank is 9.14m above ground level. Consider maximum axial load due to superimposed load on column as 244 KN. The staging is converted into 3 panel of height 2.78m each. Calculate wind pressure on staging, design column, horizontal bracing, design of base plate. depth of upper & lower tier beam are 0.3m & 0.5m respectively. Assume wind pressure intensity as 1.50 KN/m^2 (8) CO5

- 5c) Explain design procedure of overhead Rectangular flat bottom tank. (8) CO5

OR

- 5d) Explain design procedure of staging with base plate of foundation for overhead Rectangular flat bottom tank. (8) CO5

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