Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering - SEMESTER - VII EXAMINATION - WINTER 2025

Subject Code: 3170626 **Date: 13-11-2025**

Subject Name: Design of Industrial Structures

Time: 10:30 AM TO 01:00 PM **Total Marks: 70**

Instructions

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**
5. **Use of IS 456: 2000, IS 13920: 2016, IS 800:2007, IS 4995 Part 1, 2, SP-16, Steel Table, IS 875 Part 3 2015 are permitted**

			Marks
Q.1	**(a)**	Write down structural applications of steel towers.	**03**
	(b)	Briefly explain "the approximate analysis of Grid Floors according to IS: 456:2000."	**04**
	(c)	Explain the design procedure adopted for the foundation of chimney.	**07**
Q.2	**(a)**	List major components of Industrial Building	**03**
	(b)	Explain design steps for Purlin	**04**
	(c)	Describe various parts of Roof Truss showing schematic diagram	**07**
		OR	
	(c)	Design an angle section purlin having 3.2 m span. It is supported on five supports and carries load of 3 kN/m. The angle of roof truss is 26^0	**07**
Q.3	**(a)**	A Grid Floor of Reinforced Concrete Slab is to be designed for the following data: The hall has a size of 12 m x 18 m. The spacing of ribs is 2.0 m center to center in mutually perpendicular directions. The live load on the floor is 1.5 kN/m^2. Use M20 grade Concrete and Fe415 grade steel Decide appropriate preliminary dimensions	**03**
	(b)	Carry out analysis for data given above for Grid Floor	**04**
	(c)	Design beams for data given above for Grid Floor	**07**
		OR	
	(a)	A bunker is to be designed to store 300 kN of coal for the following data Density of coal is 8.9 kN/m^3 and angle of repose is 30^o.Adopt grades as M20 and Fe 415 for concrete and steel respectively . Decide dimensions and prepare basic schematic diagram	**03**
	(b)	Design side wall for above said bunker	**04**
	(c)	Design hopper bottom for above said bunker	**07**
Q.4	**(a)**	Explain various force components acting on RCC chimney	**03**

(b) Explain various steps for design of RCC chimney **04**

(c) A reinforced concrete chimney 50 m high above ground has an outside diameter of 4 m. The thickness of the shell is 280 mm throughout. Vertical steel is taken as 1% of the cross sectional area throughout. The total wind load above the base may be taken as 100 kN. Find the stresses developed due to wind and dead load at the base of chimney. Assume modular ratio =13. **07**

OR

(a) A steel roof truss is to be provided for factory in Vadodara with the help of following data: **03**

1. Spacing and height of truss = 4 m and 12 m respectively.
2. Span and rise of truss = 15 m and 3 m respectively.
3. 10 Nos.of purlins including Ridge and eaves.
4. Length of shed =30 m.
5. Roof covering material = A.C. Sheet
6. Probable life of Structure = 25 years.
7. Terrain data: Category-III and Class-B
8. Topography of ground = Plain ground with upwind slope less than 3^0.
9. Opening of Building = 10% of wall area.

Calculate Dead load per panel point

(b) Calculate Live load per panel point **04**

(c) Calculate Wind load per panel point **07**

Q.5 **(a)** Prepare a list of structural uses of Steel Towers **03**

(b) Explain in brief the factors governing the height of transmission line tower. **04**

(c) Describe loads & load combinations to be considered while doing Analysis and design of tower & their foundations **07**

OR

(a) A simply supported gantry girder is to be designed for an Industrial building using following data: **03**

Crane Capacity = 160 kN

Weight of crab = 40 kN

Weight of crane (excluding crab) = 200 kN

Minimum clearance between crane hook and gantry girder = 1.2 m

Wheel base = 3 m

Distance between C/C of gantries = 20 m

Distance between centre to centre of gantry columns = 7 m

Crane type = M.O.T.

Carryout basic load calculation and decide maximum wheel load on Gantry Girder

(b) In the above example Select appropriate section based on Maximum S.F. and Maximum B.M. **04**

(c) For the above decided section provide checks for Bending Capacity, Shear Capacity, Buckling Resistance and Deflection **07**

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