Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER- VII EXAMINATION-SUMMER 2023

Subject Code: 3170626 Date: 21/06/2023

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. **IS:456(2000),IS:800 (2007), SP 6(1), IS-1893-1(2016), IS-875 (Part 3) & other relevant codes are permitted in the examination**

			Marks
Q.1	**(a)**	Describe the importance of Bracings in industrial structures.	**03**
	(b)	Differentiate between Bunker and Silos.	**04**
	(c)	Explain briefly the factor influencing the height of chimney.	**07**
Q.2	**(a)**	Draw the various roofing system provided for industrial building.	**03**
	(b)	Give various loads and load combinations for design of steel structures as per codal provisions.	**04**
	(c)	Write down the design procedure adopted for the foundation of chimney.	**07**
		OR	
	(c)	Why it is necessary to design truss member for both compression and shear forces	**07**
Q.3	**(a)**	Give different types of transmission tower as per structural action.	**04**
	(b)	Design a circular bunker to store 20 tonnes of coal. Density of coal is 9 $kN/m^3$and angle of repose is 30 degree. Use limit state method of design and adopt grades M20 and Fe 415. Show reinforcement detailing with neat sketch.	**10**
		OR	
Q.3	**(a)**	Enlist structural uses of steel towers.	**04**
	(b)	Design a circular bunker for storing 22 Tonnes of coal if the density of coal is 8.5 kN/m^3. Consider angle of repose= 30^0. Design supporting columns and draw reinforcement detailing. Use M-25 grade concrete and Fe-415 grade steel	**10**
Q.4	**(a)**	Design a simply supported gantry girder to be used in an Industrial building for the following data: Crane Capacity = 150 kN Weight of crab = 50 kN Weight of crane (excluding crab) = 165 kN Minimum clearance between crane hook and gantry girder = 1.5 m Wheel base = 3 m Distance between C/C of gantries = 25 m Distance between centre to centre of gantry columns = 6 m Crane type = M.O.T.	**14**

OR

Q.4 **(a)** An industrial building of size 15 m x 44 m is situated in Ahmedabad. It is on the ground having terrain category 3 and class A. Spacing between two trusses is 5 m c/c. Rise of truss is 3.5 m. Consider 20% wall openings. The truss has total 10 segments. Roofing material is Corrugated GI Sheets with weight 150 N/m^2. Height of eaves above ground level is 18 m. Assuming required suitable data (if necessary) carryout the following. Fix the configuration of the truss. **03**

(b) Calculate Dead Load, Live Load and Wind Load per panel point. **04**

(c) Design members meeting at support. **07**

Q.5 **(a)** Write requirements for analysis of In-situ Ribbed Slab (Grid Slab) for using Indian Standard codal provision. **04**

(b) A reinforced concrete chimney 90 m high above ground has an outside diameter of 5.5 m. The thickness of the shell is 25 cm throughout. Vertical steel is taken as 1.15 % of the cross sectional area throughout. The total wind load above the base may be taken as 300 kN. Find the stresses developed due to wind and dead load at the base of chimney. Use M25 concrete and Fe500 steel. **10**

OR

Q.5 **(a)** Explain various types of loads acting on the transmission line towers. Under What circumstances torsional load occur on them? **04**

(b) A Reinforced Concrete Grid Floor for a hall has a size of 12 m x 18 m. The spacing of ribs is 1.5 m centre to centre in mutually perpendicular directions. The live load on the floor is 3 kN/m^2. Analyze the grid floor by Use Rankine Grashoff or IS method. For moments and shears. **10**

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