Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2023

Subject Code:3170626 Date:01-12-2023

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. **Permit use of IS 456: 2000, IS 13920: 2016, IS 800:2007, IS 4995 Part1, 2, SP-16, Steel Table, IS 875 Part3 2015**

			Marks
Q.1	**(a)**	Give the difference between Bunker and Silo.	**03**
	(b)	Describe the importance of Bracings in industrial structures.	**04**
	(c)	Explain various loads acting on Transmission Line Towers.	**07**
Q.2	**(a)**	Draw the various roofing system provided for industrial building.	**03**
	(b)	Give the classification of industrial chimneys.	**04**
	(c)	Why it is necessary to design truss member for both compression and shear forces.	**07**
		OR	
	(c)	Write down the design procedure adopted for the foundation of chimney.	**07**
Q.3	**(a)**	Enlist the different types of communication towers based on their structural action.	**04**
	(b)	A cylindrical silo has an internal diameter of 6 m and 20 m deep (cylindrical portion) with a conical hopper bottom. The material stored is wheat with density of 8 kN/m^3. The coefficient of friction between wall and material is 0.444. The ratio of horizontal to vertical pressure is 0.40. Angle of repose is 30^0. Design the reinforcements in the walls of silo. Adopt M20 and Fe415 grades. Adopt Janssen's theory for pressure calculations.	**10**
		OR	
Q.3	**(a)**	Enlist structural uses of steel towers.	**04**
	(b)	Design a circular bunker to store 25 tonnes of coal. Density of coal is 10 kN/m^3 and angle of repose is 30^0. Use limit state method of design and adopt grades M20 and Fe 415. Show reinforcement detailing with neat sketch.	**10**
Q.4	**(a)**	Design a simply supported gantry girder to be used in an Industrial building for the following data: Crane Capacity = 140 kN Weight of crab = 40 kN Weight of crane (excluding crab) = 150 kN Minimum clearance between crane hook and gantry girder = 1.5 m Wheel base = 3 m Distance between C/C of gantries = 25 m	**14**

Distance between centre to centre of gantry columns = 6 m Crane type = M.O.T.

OR

Q.4 **(a)** Calculate Dead load, Live load & Wind load per panel point for a steel roof truss to be provided for factory at Ahmedabad with the help of following data: **14**

1. Spacing and height of truss = 3.5 m and 12 m respectively.
2. Span and rise of truss = 12 m and 2.5 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-II and Class-B
8. Topography of ground = Slope less than 3^0.
9. Opening of Building = 25% of wall area.

Q.5 **(a)** Write requirements for analysis of In-situ Ribbed Slab (Grid Slab) for using IS 456-2000 method. **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 3.5 kN/m^2. Analyze the grid floor by Use Rankine Grashoff method. For moments and shears. **10**

OR

Q.5 **(a)** Explain the differences in analysis of bunker wall and silo wall. **04**

(b) A reinforced concrete chimney 50 m high above ground has an outside diameter of 4 m. The thickness of the shell is 250 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 200 kN. Find the stresses developed due to wind and dead load at the base of chimney. Assume modular ratio =13. **10**

****