GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2022

Subject Code:3170626   **Date:14/06/2022**

Subject Name:Design of Industrial Structures

Time:02:30 PM TO 05:00 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)**	Explain various forces to be considered in design of Gantry Girder	**03**
	(b)	Draw the various Roofing system Provided for industrial building	**04**
	(c)	Explain briefly the factor influencing the height of chimney	**07**
Q.2	**(a)**	Write the various loads and load combinations to be taken for design of steel structures as per codal provisions	**03**
	(b)	Explain the differences in analysis of bunker wall and silo wall	**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)**	Explain different types of transmission tower as per structural action.	**04**
	(b)	Design a circular bunker for storing 22Tonnes of coal if the density of coal is 8.5 kN/m3 . Consider angle of repose $= 30^0$. Design supporting columns and draw reinforcement detailing. Use M-25 grade concrete and Fe-415 grade steel.	**10**
		OR	
Q.3	**(a)**	Explain in details about transmission line tower with neat Sketches.	**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/m2 . Analyze the grid floor by Use Rankine Grashoff or IS method. For moments and shears.	**10**
Q.4	**(a)**	Design a simply supported gantry girder to be used in an Industrial building for the following data: Crane Capacity = 120 kN Weight of crab = 40 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 centre to centre of gantries = 25 m Distance between centre to centre of gantry columns = 6 m Crane type = M.O.T.	**14**
		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 Bhuj with the help of following data: 1. Spacing and height of truss = 3.5 m and 12 m respectively.	**14**

2. Span and rise of truss = 12 m and 2.5 m respectively.
3. Nos. of purlins including Ridge and eaves = 10 Nos.
4. Length of shed =30 m.
5. Roof covering material = A.C.Sheet
6. Probable life of Structure = 25 years.
7. Terrain category and class = Category-II and Class-A
8. Topography of ground = Slope less than 3 degree.
9. Opening of Building = 25% of wall area.

Q.5 (a) What are the parameters which influence the Design of Bunkers? **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) Distinguish between Bunker and Silos. **04**

(b) A cylindrical silo has an internal diameter of 7 m and 20 m deep (cylindrical portion) with a conical hopper bottom. The material stored is wheat with density of 8.5 kN/m3 . 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 25 degree. Design the reinforcements in the walls of silo. Adopt M20 and Fe415 grades. Adopt Janssen's theory for pressure calculations. **10**

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