Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2024

Subject Code:3170626 Date:19-11-2024

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.**

Q.1	**(a)**	Give the difference between a Bunker and a Silo.	**03**
	(b)	Give the classification of industrial chimneys.	**04**
	(c)	Explain briefly the factor influencing the height of chimney.	**07**
Q.2	**(a)**	Explain the differences in analysis of bunker wall and silo wall.	**03**
	(b)	Fix the configuration of a roof truss for span 20 m for an industrial building.	**04**
	(c)	Write down the design procedure adopted for the foundation of chimney.	**07**
		OR	
	(c)	Design an angle section for a continuous purlin having a segment span of 3m. It is subjected to UDL of 3 kN/m. Take angle of roof truss is 27^{o}.	**07**
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 2.5 kN/m^2. Analyze the grid floor by Use Rankine Grashoff or IS method. For moments and shears.	**10**
		OR	
Q.3	**(a)**	Explain various types of loads acting on the transmission line towers. Under What circumstances torsional load occur on them?	**04**
	(b)	Design a circular bunker to store 21 tonnes of coal. Density of coal is 8 kN/m^3 and angle of repose is 30^{o}. Use limit state method of design and adopt grades M20 and Fe 415. Show reinforcement detailing with neat sketch.	**10**
Q.4	**(a)**	A square bunker having size 3.2m X 3.2m is to be used to store 350 kN coal. Density of coal is 9.5 kN/m^3 and angle of repose is 30^{o}. Considering grade of concrete and steel as M20 and Fe 415 respectively, design and detail the following. (A)side walls (B) Hopper bottom	**14**

OR

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 C/C of gantries = 25 m Distance between Centre to Centre of gantry columns = 6 m Crane type = M.O.T. **14**

Q.5 **(a)** Briefly explain the approximate analysis of Grid Floors according to IS: 456:2000. **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/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 25º. Design the reinforcements in the walls of silo. Adopt M20 and Fe415 grades. Adopt Janssen's theory for pressure calculations. **10**

OR

Q.5 **(a)** Enlist structural uses of steel towers. **04**

(b) A reinforced concrete chimney 95 m high above ground has an outside diameter of 6 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 350 kN. Find the stresses developed due to wind and dead load at the base of chimney. Use M25 concrete and Fe500 steel. **10**

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