Enrollment No: _____ Exam Seat No:_____

C. U. SHAH UNIVERSITY

Summer Examination-2022

Subject Name : Structural Design-II

Subject Code : 4TE08STD1 **Branch: B.Tech (Civil)**

Semester: 8 **Date: 02/05/2022** **Time: 11:00 To 02:00** **Marks: 70**

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.
(5) Use of IS:456, IS:3370, IS:800, IS:875, SP:16 and steel tables are permitted .
(6) Material is M20 grade concrete and Fe 415 Steel for RCC and fy=250 Mpa for steel if not specified.

Q-1 **Attempt the following questions:** **(14)**

a) The beam which are connected to the column are called as_____ 01
(A) Girder (B) Grid beam (C) Column heads (D) Secondary beam

b) Sag rods are used in a roof truss for connecting _____ 01
(a) Purlins (b) Main ties (c) Web and flanges together (d) None of these

c) In Which earthquake zone ductile detailing is required? 01
(a) IV
(b) V
(c) III with Importance factor 1.
(d) All of the above

d) In a plate girder, a web should be checked for shear buckling if 01
(a) $d/t_w > 67€$ (b) $d/t_w \leq 67€$ (c) $d/t_w > 90€$ (d) $d/t_w > 200€$

e) Depth of plate girder is kept as_____of span. 01

f) _____ Failure is occurred in the beam due to less steel provided on tension face. 01

g) Which section is most frequently used for the principal rafter in roof truss? 01

h) What is Buttress wall? 01

i) Write two application of foot over bridge. 01

j) Find the basic wind speed for Ahmedabad city. 01

k) Draw the following sketches 04
1) Double warren truss
2) K-truss
3) Z-truss
4) XB-bracing

Attempt any four questions from Q-2 to Q-8

Q-2		**Attempt all questions**	**(14)**
	(a)	By using following data find the dimension of different component of counterfort retaining wall. Height of wall is 7m above the ground level, γ is 16 kN/m^3, Safe baring capacity 150 kN/m^3 and angle of repose and frictional angle between soil and the base are 30° and 0.6 respectively. Concrete grade are M20 and Fe 415 is used.	**07**
	(b)	Calculate dead load (DL) and live load (LL) for purlin spaced at 1.8m on the rafter inclined at 25º. The purlin supports 1.6 mm thick class-I type GI sheet and truss spacing is 3.5m.	**07**
Q-3		**Attempt all questions**	**(14)**
	(a)	Give the difference between backfill with uniform surcharge and backfill with sloping surcharge condition in lateral earth pressure.	**07**
	(b)	Describe the limiting deflection criteria at mid span for four wheel of gantry girder.	**04**
	(c)	What are the flexible and rigid diaphragms?	**03**
Q-4		**Attempt all questions**	**(14)**
	(a)	Design of underground water tank for 500000 liters is given below. Draw its detail drawing (detailing). Diameter of tank is 13m. Thickness of wall is 200 mm and Steel provided on each circumferential direction is ϕ16 mm at 230 mm c/c. vertical reinforcement on both the sides are ϕ8 mm at 230mm c/c. Main reinforcement in circumferential: At 2 m from top : ϕ12mm at 260 mm c/c At 3 m from top : ϕ16 mm at 300 mm c/c. In the base ϕ 8 mm at 180 mm c/c steel is provided. Concrete grade M20 and steel Fe 415 are used.	**07**
	(b)	Enlist and explain various loads acting on chimneys.	**07**
Q-5		**Attempt all questions**	**(14)**
	(a)	Explain the nine different conditions for two-way slab supported on four sides with tension reinforcement.	**10**
	(b)	Give the difference between plate girder and beam.	**04**
Q-6		**Attempt all questions**	**(14)**
	(a)	What is Intze tank? Draw the neat sketch of Intze tank and locate its various structural components and IS Criteria.	**12**
	(b)	Briefly explain ductility.	**02**
Q-7		**Attempt all questions**	**(14)**
		Determine the wind force on any intermediate frame of a multistory building. Plot the pressure diagram along the height of the building and hence nodal forces at each floor level. Uose the following data: Length of building = 48 m Width of building = 40 m Height of building = 34 m Storey height = 3 m Bay size 4 m × 4 m in both directions Location = Chennai Terrain category = 2	

Slope of ground = 10
Height of hill = 900 m
Location from crest = 200 m
Design life period = 55 years

Q-8 **Attempt all questions** **(14)**

Prepare a typical structural lay out for G+3 storey building having 3 bays 0f 4m in X –direction and 4 bays 0f 5 m in Y-direction. Design a two way slab with one short edge discontinuous. Floor height is 3 m. Draw neat sketch of reinforcement detailing. **14**