Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–VIII • EXAMINATION – SUMMER 2014**

**Subject Code: 180604 Date: 29-05-2014**

**Subject Name: Structural design II**

**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. **Use of IS:800, IS:875,IS:456,IS:3370,SP-16 and steel table is permitted.**
5. **Use M20 grade of concrete and Fe 415 steel in not given any where.**

**Q.1** **(a)** Prepare a typical structural lay out for G+3 storey building having 4 bays of 5 m in X direction and 5 bays of 4 m in Y-direction. Design a two way slab at a typical floor with one long edge discontinuous. Floor height is 3.3 m and live load is 3 $kN/m^2$. Draw neat sketch of reinforcement detailing. **14**

**Q.2** **(a)** A building of size 15 m x 15 m has 16 columns of size 450 mm x 450 mm, spaced at 5 m c/c. Assume 230 mm thick brick masonry wall on periphery only and no internal walls. The building has 3 stories of 4 m each. The plinth level of RCC slab and beam is at 1.0 meter above G.L and footing is provided at 2 meter below G.L. Consider beam size 230 mm x 600 mm in both direction and slab thickness 150 mm. Consider L.L = 4 $kN/m^2$ and F.F = 1.0 $kN/m^2$. The building is located in Vadodara. Calculate wind forces on any one internal frame using IS 875. **07**

**(b)** Explain various types of loads acting on transmission line towers. Under what circumstances torsional load occur on them? **07**

**OR**

**(b)** A circular water tank with flexible base, 12m diameter and 8m height is provided at ground level. Calculate the thickness of cylindrical wall required & design the wall at bottom. Assume concrete grade M25 and Fe415 grade steel. **07**

**Q.3** For the cantilever retaining wall of height 3.5 m, fix the basic dimensions of the various elements. Angle of repose of soil is $35^0$. SBC of soil is 200 $kN/m^2$ and density of soil is 18 $kN/m^3$. Friction coefficient between soil and concrete is 0.55. Do the check for Stability for sliding and overturning Design the Stem of the retaining wall.. **14**

**OR**

**Q.3** Design and detail the following components of overhead circular water tank supported on ring beam having capacity of 5 laces liters water. Assume diameter of tank 10m, height of dome is 1.0m and thickness of top dome as 100mm with LL is of 1.0 $kN/m^2$. Also assume width of top ring beam 250 mm. Design top spherical dome, top ring beam, and cylindrical wall. Show detailing of reinforcement. Use M25 grade of concrete and Fe415 steel. **14**

**Q.4** Roofing system of an industrial shed consists of trusses spaced at 4 m apart. The span of roof truss is 24 m and rise is 6 m. The level of eaves is 8 m above the ground. Assume suitable configuration of truss. Design one inclined member of principle rafter only. Choose suitable section for the inclined member no need to show any check. The shade is situated on flat terrain with sparsely populated buildings. The shed has less than 25 % permeability. **14**

**OR**

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| **Q.4** | A gantry girder of 8 m span is to be designed for crane capacity of 350 kN. The effective span of crane girder is 25 m. Weight of crane girder excluding crab is 150 kN and weight of crab is 90 kN. Take clearance as 1m and wheel base as 3.2 m. Choose suitable section and check for the bending stresses. | **14** |
| **Q.5** | A simply supported welded plate girder of span 27m is subjected to service load of 20kN/m UDL and two fixed point loads of 200 kN each spaced at 9m from each supports. Design the plate girder cross section using the Fy 250 steel plates. Also design load bearing stiffeners. Perform all required checks for cross section as per IS code provisions. | **14** |

**OR**

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|---|---|---|
| **Q.5** | A foot over bridge is of span 24 m and pedestrian load of 5 kN/$m^2$. The clear distance between two trusses is 3.5 m and truss height is 2.2 m. Take dead weight of truss is 1.5 kN/m. Assume suitable configurations of truss and design & detail a cross beam and a top chord near centre. | **14** |

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