

GUJARAT TECHNOLOGICAL UNIVERSITY**BE SEM-VIII Examination May 2012****Subject code: 180604****Subject Name : Structural Design-II****Date: 16/05/2012****Time: 10.30 am – 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. Material is M20 grade concrete and Fe 415 Steel for RCC and $f_y=250$ Mpa for steel if not specified.

Q.1 (a) Estimate wind forces for a water tank for the following data. Total height **14**
of tank = 27 m, Which includes height of the supporting shaft=20 m ,
height of the bottom conical portion= 2m , height of cylindrical portion =
4 m and rise of top spherical dome= 1 m, diameter of supporting shaft= 4
m and diameter of cylindrical portion= 10 m, location is Ahmedabad,
Terrain Category= II and class= B, Ground slope= 1 vertical to 7
horizontal, hill height= 280 m, location from crest 100 m windward,
Design life 100 years.

Q.2 (a) Define plate girder. Explain the tension field action in plate girder? **03**

(b) Explain different type of loads acting on transmission line tower. **04**

(c) Fix the basic dimensions of Intz type container of an elevated water tank **07**
to store 7.5 lacs liter of water and design the top dome.

OR

(c) Design a circular tank for the following data. Diameter of tank= 6 m, **07**
Depth of water= 3.75 m. The tank rests on ground. The wall and base slab
are not monolithic.

Q.3 (a) For the cantilever retaining wall of height 4m, fix the basic dimensions of **14**
the various elements. Angle of repose of soil is 30° . SBC of soil is 150
 kN/m^2 and density of soil is 17 kN/m^3 . Friction coefficient between soil
and concrete is 0.55. Design heel of the retaining wall. Stability check for
sliding and overturning are not required.

OR

Q.3 (a) Prepare a typical structural lay out for G+3 storey building having **3 14**
bays of 4m in X –direction and 4 bays of 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.

Q.4 (a) Design a welded plate girder with a clear span of 16 m simply supported **14**
at the ends subjected to following.
Dead load including self weight= 25 kN/m

Imposed Load = 15 kN/m

Two Moving Loads = 200 kN each spaced 2 m apart

Assume that the top compression flange of the plate girder is restrained laterally and prevented from rotating. Design as an unstiffened plate girder with thick webs.

OR

- Q.4 (a)** Suggest a suitable section for the Gantry girder without lateral restraint along its span carrying an overhead travelling crane for the following data. **14**

Centre to centre distance between columns (i.e. Span of Gantry Girder)=8 m

Crane Capacity=250 kN

Self weight of the crane girder excluding trolley = 200 kN

Self weight of the trolley, electric motor, hook etc. = 50 kN

Minimum Hook Approach = 1 m

Distance between wheel centre = 3 m

c/c Distance between gantry rails (i.e Span of Crane)= 15 m

Self weight of the rail section = 300 N/m

Yield stress of steel = 250 Mpa

- Q.5 (a)** Roofing system of an industrial shed consists of trusses spaced at 5 m apart. The span of roof truss is 20 m and rise is 4 m. The level of eaves is 6.5 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 shed is situated on flat terrain with sparsely populated buildings. The shed has less than 20% permeability. **14**

OR

- Q.5 (a)** A through type foot over truss bridge of span 30 m and width 3m carries a live load of 5 kN/m². Assume suitable configuration of bridge and design One member of bottom chord. **14**
