Register Number:……..

**B.E., DEGREE EXAMINATIONS MAY/JUNE 2013**

Seventh Semester

**CIVIL ENGINEERING**

CEE122: Design of Reinforced Concrete Structures

***(Assume suitable data if not mentioned)***

**Time: Three Hours** **Maximum Marks: 100**

**Answer ALL Questions:-**

**PART A (10x1=10 Marks)**

1. The maximum spacing of the reinforcement being provided in a retaining wall is

   a. 150mm b.250mm c.450mm d.500mm

2. The minimum thickness of stem at the top in a cantilever retaining wall should be

   a. 100mm b.125mm c.200mm d.250mm

3. To reduce the possibility of cracking, generally the minimum grade of concrete used in R.C.C water tank is

   a. M15 b. M20 c. M30 d. M25

4. The hoop tension in R.C.C water tank must be restricted by

   a. Steel only b. Partly steel and partly concrete

   c. Concrete only d. None of the above

5. The minimum number of columns to be designed in a circular elevated water tank is

   a. 4 b.6 c. 5 d.8

6. What is the minimum thickness of vertical wall in a circular tank?

   a. 150mm b.100mm c. 125mm d.230mm

7. For a continuous slab of span (L) the overall minimum thickness of the slab should be

   a. L/35 b. L/30 c. L/25 d. L/20

8. The maximum centre to centre distance between columns above which yield line theory of slab should not be adopted

   a.6m b.5m c.7m d. None of the above

9. The type of bridge construction used up to a span of 8m is

   a. deck slab bridge b. deck girder bridge

   c. balance cantilever bridge d. arch bridge

10. As per Indian Road Congress, B class loading for high way bridge is of the

a. Heaviest type b. Medium type

c. lightest type d. None of these

**PART B (10 x 2 = 20 Marks)**

11. Define key in retaining wall.
12. What are the requirements of stability of retaining wall?
13. What are the loading conditions to be considered in the design of an elevated water tank?
14. What are the various types of water tank based on ground level?
15. What is the function of stagings of elevated water tank?
16. How to design the staging in an overhead water tank?
17. Define yield line.
18. Mention the methods of yield line analysis.
19. What are the types of loads to be considered for the design of bridges?
20. Why kerb is provided in bridges?

**PART C (5 x 14 = 70 Marks)**

21. a) Design the vertical stem and heel slab of a non-surcharged reinforced concrete retaining wall of cantilever type, supporting an earthen embankment 5m high. Density of earth is 18kN/m$^3$ and its angle of repose is 30°. The maximum permissible direct pressure on soil is 150kN/m$^2$ at a depth of 1m. Check for sliding and overturning is not necessary.

**(OR)**

b) A counter fort retaining wall is to retain 8m height embankment above ground level. The foundation is to be taken as 1.5m below where bearing capacity of soil is 180kN/sq.m. The top of earth is horizontal and soil unit weight is 18kN/sq.m with angle of internal friction is 30 degree. Proportion the dimension of retaining wall and check the stability of wall.

22. a) Design an underground rectangular water tank 4m x 10m x 3m deep. The sub soil consists of sand having an angle of repose of 30° and saturated unit weight of 17kN/m$^3$.

The water tank is likely to rise up to ground level. Use M20 concrete and HYSD bars. Take unit weight of water is 9.81kN/m³.

**(OR)**

b) Design a circular water tank of capacity 300,000 litres. The depth is limited to 4 m. The joint between the wall and the base slab is flexible and it rests on ground.

23. a) Design an overhead water tank of size 12m X 6 m X 4 m high. The bottom of the tank is 14m above the ground level. Design the long wall and short wall.

**(OR)**

b) An overhead circular water tank of 3,0,000 litres capacity is constructed 10 m above ground level. Design the foundation

24. a) A RC rectangular slab is 4m X 8m and is simply supported on all four edges. It is isotropic ally reinforced so as to give an ultimate moment of 20 kN-m per metre width. Determine the ultimate UDL it can carry, assuming suitable yield line pattern.

**(OR)**

b) Derive the moment equation for rectangular slab using yield line theory. Assume suitable datas with UDL.

25. a) A two lane slab bridge is to be provided over a clear span of 6 m. Width of each support for the bridge is 0.4 m. Choose appropriate dimensions for clear carriage way width for two lane traffic kerbs and wearing coat. Sketch the position of class AA tracked vehicles for maximum bending moment and calculate the magnitude of the live load bending moment.

**(OR)**

b) A RC slab bridge is 5m span. Clear width of road way is 7m, width of kerb is 500mm and wearing coat is 80mm. Design the slab bridge for bending moment alone for IRC class AA loading.

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