Code: R7420101

R7

B.Tech IV Year II Semester (R07) Advanced Supplementary Examinations June 2012
ADVANCED STRUCTURAL DESIGN
(Civil Engineering)

Time: 3 hours Max Marks: 80

Answer any FIVE questions
All questions carry equal marks
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1 Design a counterfort type retaining wall to suit the following data
Height of wall above ground level = 6 m
Safe bearing capacity of soil at site = 160 kN/m^2
Angle of internal friction = 33^0
Density of soil = 16 kN/m^3
Spacing of counterforts = 3 m c/c
Materials: M-20 grade concrete and FE-415 hysd bars
Sketch the details of reinforcements in the retaining wall.

2 A rectangular water tank 4.5 m long, 2.25 m wide and 2.25 m high has its walls rigidly jointed at the vertical edges and pin jointed at their horizontal edges. Design the tank if it is supported on all sides under the wall. Use M-20 concrete and mild steel reinforcement.

3 Design an overhead square tank of riveted steel, for a capacity of 60000 liters. The tank is to be supported on four columns, each of 9 m height. The tank is to be built at Mumbai.

4 A coal bunker is to be designed to store 300 kN of local having a unit weight of 8 kN/m^3.
The bunker should be square with 3 m sides. The stored coal is to be surcharged at an angle of repose which is 30 degrees for coal. Adopt M-25 grade concrete and Fe 415 steel and design the side walls and hopper bottom and sketch the details of the reinforcements.

5 Design a reinforced concrete slab culvert for a state highway to suit the following data
Carriage way: Two lane 7.5 m wide
Materials: M-25 grade concrete and FE-415 HYSD bars.
Kerbs: 600 mm wide
Clear span: 6 m, wearing coat = 80 mm
Width of bearing = 400 mm loading: I.R.C class A or AA, whichever gives the worst effect. Design the reinforced concrete deck slab and sketch the details of reinforcements in the longitudinal and cross sections of the slab. The design should confirm to the specifications of the bridge code IRC: 21-1987.

6 Using the following particulars design a plate girder bridge for a broad gauge track.
Span: 20 m
Top level of the railway embankment: 115 m
Bed level of the stream: 100 m
Ground level suitable for foundation: 98 m
Stream bund top level: 101.50 m.

7 Explain briefly design procedure of steel truss bridges with railway loading.

8 Explain the portal method for analyzing a building frame subjected to horizontal forces.

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