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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, February/March - 2022
ADVANCED STRUCTURAL DESIGN
(Civil Engineering)

Time: 3 Hours   **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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Note: Use of IS 456, IS 3370, IS 800, IRC 6, IRC 112 and Steel Tables is allowed.

1. Design a cantilever retaining wall to support a bank of earth 6 m above basement level. Consider the backfill surface to be inclined at 18^0 with the horizontal. The angle of repose of soil is 30^0. The unit weight of the soil is 18 kN/m^3. The coefficient of friction between the soil and concrete is 0.5. Bearing capacity of the soil is 250kN/m^2. Use M 30 grade concrete and Fe 500 grade steel. Sketch the reinforcement details. [15]

2. Design a Counterfort retaining wall to support an earth fill of 7 m above the ground level. The depth of foundation is 2 m below ground level. The SBC of soil is 200 kN/m^2. The angle of repose of soil is 35^0. The unit weight of the soil is 19 kN/m^3. The coefficient of friction between the soil and concrete is 0.55. Spacing of counterforts = 3 m c/c. Use M 25 grade concrete and Fe 500 grade steel. Sketch the reinforcement details. [15]

3. Design the exterior panel of a flat-slab floor system for a proposed office building 30 m × 30 m divided into panels of 5 m × 5 m. Loading = 6 kN/m^2. Use M 25 concrete and Fe 500 grade steel. Use 450 mm × 450 mm size columns. Assume the height of the storey as 3.5 m. [15]

4. An RC grid roof slab is to be designed for a live load of 3 kN/m^2, for a conference hall of 12 m × 14 m. The spacing of ribs in the mutually perpendicular directions is 2 m c/c. Use M 25 concrete and Fe 500 grade steel. Analyse the grid floor and design the reinforcement in the Rib and slab. Sketch the reinforcement details. [15]

5. Design a circular water tank of capacity 600 kilo liters resting on ground and having a flexible base condition. Use M 30 grade concrete and Fe 500 grade steel. Bearing capacity of the soil at the site is 300 kN/m^2. Design the tank as per IS 3370. Sketch the reinforcement details. [15]

6. Design a circular water tank of 15 m diameter and 3.5 m height. Free board is 300 mm. The tank rests on firm ground. The walls are fixed at base and free at top. Use M 35 grade concrete and Fe 500 grade steel. Bearing capacity of the soil at the site is 350 kN/m^2. Design the tank as per IS 3370. Sketch the reinforcement details. [15]

7. Design a reinforced concrete (RC) slab culvert for a state highway to suit the following data:
Carriage way = Two Lane (7.5 m wide)
Use M30 concrete and Fe 500 grade steel. Kerbs = 600 mm wide, Clear span = 7.3 m, Wearing coat = 75 mm. Width of bearing = 0.4 m. Loading = IRC Class AA. Design the RC deck slab and sketch the reinforcement details. [15]

8. Design a simply supported Gantry girder to carry an electric overhead travelling crane, for the following data:
Span of the gantry girder = 7.5 m; Span of crane girder = 18 m; Crane capacity = 250 kN; Self weight of crane girder excluding trolley = 200 kN; Self weight of trolley = 60 kN; Minimum hook approach = 1.2 m; Distance between wheels = 3.5 m; Self weight of rails = 0.3 kN/m. Design the Gantry girder and draw a sketch showing its cross section details along with welding details. [15]

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