Code No: **R204101A** **R20** Set No. 1

IV B.Tech I Semester Regular Examinations, January – 2024
ADVANCED STRUCTURAL ENGINEERING
(Civil Engineering)
Time: 3 hours   **Max. Marks: 70**

Answer any FIVE Questions
ONE Question from Each unit
All Questions Carry Equal Marks
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UNIT - I

1 Design a reinforced concrete raft foundation connecting the columns of a multi-storeyed building. The columns are arranged in square grid 16m $\times$ 16m with their spacing's 4m apart. The safe bearing capacity of the soil at the site is 100kN/m^2. The total service load on all the columns is 4800kN. The columns are 400mm by 400mm in section. Adopt M20 grade concrete and Fe 415 HYSD bars. [14]

(OR)

2 Design a cantilever retaining wall (i.e. T-type) to retain earth for a height of 4m. The backfill is horizontal. The density of soil is 18kN/m^3. Safe bearing capacity of soil is 200kN/m^2. Take the coefficient of friction between concrete and soil as 0.6. The angle of repose of earth is 30°. Use M20 concrete and Fe500 steel. [14]

UNIT – II

3 An Intz type water tank is having capacity = 2 lakh litres,
Permissible strength of concrete = M20,
Permissible strength in steel = Fe 415,
Height of tank from ground level =13.1m,
Safe bearing capacity of soil = 100kN/m^2,
Wind Pressure = 40m/s,
Design
       a) Top dome
       b) Top ring beam
       c) cylindrical water tank
       d) Side wall
       e) Bottom ring beam
       f) Conical dome
       g) Bottom spherical dome
       h) Circular girder and Columns [14]

(OR)

4 Design a circular RCC water tank with flexible connection at base for a capacity of 4,00,000 litres. The tank rests on a firm level ground. The height of tank including a free board of 200mm should not exceed 3.5m. The tank is open at top. Use M20 concrete and Fe415 steel. Draw Plan at base Cross section through centre of tank. [14]

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UNIT - III

5   Design an interior panel of a Flat slab of size 5m × 5m without providing a drop and column head. Assume the size of the square column is 500mm. The slab is subjected to a superimposed live load of $4kN/m^2$ in addition to a floor finishing load of $1kN/m^2$ and its own self-weight. Adopt M25 grade concrete and Fe500 grade steel.   [14]

(OR)

6   A Flat slab system consists of 5 m × 6 m panels without drops and column heads. It has to carry a live load of $6kN/m^2$. If the size of the supporting square columns is 500mm and the floor-to-floor height is 4.5m. Calculate the design moments in the interior panel at column and middle strips in both directions. Assume floor finishing load and partition wall load suitably. Adopt M25 grade concrete and Fe500 grade steel.   [14]

UNIT - IV

7   Design a RC chimney using M25 concrete and Fe415 steel for the following requirements and check the stresses at a depth 50m from top. Assume wind load as per IS 875.
External Diameter of chimney = 4.3m,
Internal Diameter of chimney = 4.0m,
Air gap = 100mm,
Thickness of fire brick lining = 100mm,
Temperature difference = 80^0C,
Coefficient of thermal expansion = $11 \times 10^{-6} / ^0C$,
Es = $210 \times 10^3 N/mm^2$,
Unit weight of brick lined = $20kN/m^3$.   [14]

(OR)

8   Design a self-supporting steel chimney of 80m height and 3metres diameter at the top. Adopt the wind force as per IS: 875. The location of the place is such that the intensity of wind pressure up to 30m height is 1.5 kN/m^2.   [14]

UNIT - V

9   A rectangular pressed steel tank is required to store 1.5 Lakh litres of water at a height 15m above ground level. Design the tank and sketch the elevation of tank showing dimensions (excluding staging).   [14]

(OR)

10 A rectangular pressed steel tank is required to store 1.5 Lakh litres of water at a height 15m above ground level. Assume the dimensions of the tank and design the supporting structures if wind force is 1.5kN/m. Draw the Plan showing the arrangement of stays.   [14]

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