Paper ID [CE310]

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B.Tech. (Sem. - 6th)

DESIGN OF CONCRETE STRUCTURES - II (CE - 310)

Time : 03 Hours **Maximum Marks : 60**

Instruction to Candidates:

1) Section - A is **Compulsory**.
2) Attempt any **Four** questions from Section - B.
3) Attempt any **Two** questions from Section - C.

Section - A

Q1) *(10 × 2 = 20)*

a) Briefly explain the effect of openings in Domes.

b) What do you mean by inclined surcharge with regards to retaining wall design?

c) What are the elements of a cantilever retaining wall?

d) What is Raft Footing? When do we prefer it?

e) In limit state design to determine the area of an isolated footing for a given column load and safe bearing capacity of soil, should we use factored load or the service load as the basis of calculation?

f) Where do we prefer shell roofs?

g) How side walls of elevated water tanks designed?

h) 'Reinforced concrete slabs are generally singly reinforced'. Give your comments.

i) How the 'counterfort' and 'cantilever' retaining walls structurally differ from each other?

j) What is a strap footing? Show its sketch.

Section - B

(4 × 5 = 20)

Q2) A conical dome has a base diameter of 9.00 metres. It carries a uniformly distributed load of 4500 N/m^2 and a concentrated load of 8500 N at the vertex. The height of dome is 4.3 m. Design the dome using M 20 and HYSD bars (Fe 415).

Q3) Design a combined column footing with a strap beam for two RCC columns of size 300 mm by 300 mm spaced 4 m c/c and each supporting a service axial load of 500 kN. Safe bearing capacity of soil = 200 kN/m². Adopt M 20 and Fe 415 HYSD bars.

Q4) Design the stem of counterfort type retaining wall for data mentioned:
Height of wall above ground = 6 m
SBC = 150 kN / m²
Angle of Internal Friction = 33°
Density of soil = 16 kN/m³
Spacing of counterforts = 3 m c/c
Materials : M 20 and Fe 415.

Q5) A 40×60 cm foundation ring beam curved in plan is supported on 6 columns located equidistant on a circle of 7 m mean diameter. If the service loads intensity underneath the ring beam is 125 kN/m and the diameter of the column is 40 cm, design the ring beam. Use M 20 concrete and Fe 415 steel.

Q6) An open tank (square) 5 m × 5 m × 3 m is supported on brick masonry walls 230 mm thick alround. Design the tank using M 25 and Fe 500.

Section - C

(2 × 10 = 20)

Q7) Design a cantilever retaining wall to support a bank of earth 4 m high above GL. Consider backfill level subjected to surcharge pressure 40 kN/m². Good soil is available at a depth of 1.25 m below GL with SBC = 150 kN/m². Density of backfill = 16 kN/m³ and angle of shearing resistance = 30°. Assume coefficient of friction between soil and concrete = 0.5. Adopt M 20 concrete and Fe 415 steel.

Q8) Write short notes on :
(a) Design of cylindrical shells supported on edge beams.
(b) Different types of Joints to be provided in different components of Reservoir (show sketches also).

Q9) An underground water tank has an internal dimension of 4.5 m × 4.5 m × 3m. The top of the tank is in flush with the ground and is free. The tank is supported by RCC slab resting on walls of the tank. The backfill around the tank has unit weight of 18 kN/m³ and angle of internal friction = 30°. The water level during rainy season may go up to a level of 0.5m below GL. A free board of 0.3 m may be used. SBC = 150 kN/m². Design (a) tank walls (b) tank floor slab. Perform necessary checks for stability of the tank. Use M25 and Fe415. Draw (i) section across the tank (ii) Elevation of tank wall showing reinforcement details.

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