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B.Tech. (Civil Engg.) (Sem. - 6th)

DESIGN OF CONCRETE STRUCTURES - II

SUBJECT CODE : CE - 310

Paper ID : [A0622]

[Note : Please fill subject code and paper ID on OMR]

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 x 2 = 20)*

a) Theoretically, Is it necessary to continue all the steel in a reinforced column into a footing? What are the criteria to be considered?

b) What are the assumptions in design of strap footing?

c) In the case of curved beams, the support sections are designed for maximum negative bending moment and shear. Give your comments.

d) With the aid of sketch, show the behaviour of vertical wall & heel slab in case of counterfort retaining wall.

e) List the loads you will account for design of Domes.

f) Show plan and elevation of cantilever retaining wall.

g) How can you reduce crack width in R.C. members subjected to tension?

h) What are the rules regarding distribution of secondary steel in members in direct tension and bending?

i) Name structural elements of an Intz type water tank.

j) Describe atleast two functions of a shear key.

Section - B

(4 x 5 = 20)

Q2) Design a pad footing (constant depth) for a rectangular column 300 x 450 mm carrying an axial compressive load of 1500 kN. The safe bearing capacity of soil is 120 kN/m^2. Use M20 concrete and Fe 415 steel.

Q3) A building rests on ten columns, each 500 mm square, arranged in two rows of five each, the c/c distance between the columns being 6m in both the directions. The corner columns carry a load of 1000 kN each and other columns carry 1500 kN. Design a mat foundation for the system, considering beam below columns, the spacing between beams along rows being 2m. Use M20 & Fe 415. Take SBC = 80 kN/m^2.

Q4) Design a conical roof for a hall having a diameter of 10 m. The rise of dome is such that angle at base = 30°. Assume LL = 2500 N/m^2. Take allowable stress in tension in concrete = 2MPa and compression in concrete = 5MPa. Stress in steel both in tension & compression = 120 MPa.

Q5) A rectangular tank 5m wide, 10m long and 4m deep has its walls rigidly connected (jointed) at the vertical edges and pin jointed at horizontal edges. The tank is supported on all sides under the wall. Design the tank using M30 concrete.

Q6) What are the stability checks in case of retaining walls? Explain the method of designing a shear key for the wall.

Section - C

(2 x 10 = 20)

Q7) Design a beam slab combined footing for two columns A_1 (400 mm square with 4 number 25 mm ϕ bars) and A_2 (450 mm square with 4 No 28 mm ϕ bars) supporting axial loads of P_1 = 750 kN and P_2 = 875 kN respectively. The column A_2 is an exterior column whose exterior face is flush with property line. The centre to centre distance between A_1 and A_2 is 4.8m. Allowable soil pressure at the base of footing = 180 kN/m^2. Use M 30 grade of concrete for column and M25 for footing. Fe 415 may be used throughout.

Q8) An abutment of a bridge is a reinforced concrete retaining wall of uniform thickness without counterforts. It supports 4.5 m of filling weighing 15 kN/m^3 and having an angle of 30°. The filling carries a live load equivalent of 15 kN/m^2 and vertical reaction due to bridge on the wall is 85 kN/m run. Design the retaining wall if the depth of foundation is 1.5 m. Use M20 grade concrete and MS bars.

Q9) How the beams curved in plan differ from other beams? Derive the equations for Bending Moment, Twisting Moment and Shear Force for a beam circular in plan and supported on columns. Take suitable number of columns.