[This question paper contains 3 printed pages.]

Your Roll No. .....

3318 **J**

B.Tech./III

Paper ECE–301—DESIGN OF STRUCTURES

Time : 3 *Hours* *Maximum Marks* : 70

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question no. 1 *is compulsory.*

Answer **two** *questions from Part A and* **two** *questions from Part B. IS 456, SP16, IS3370, IS-800 and Steel Tables are permitted. Draw neat sketches to illustrate your design.*

I. (a) What are the advantages of Limit State Design over the other methods ? 4

(b) Describe the method of design of Slender R.C.C. and Steel Columns. 4

(c) Describe the foundation for heavily loaded steel columns with sketches. How are they designed ? 4

(d) What are the stresses used for the limit state method of design of steel structures ? 4

Part A

II. Design a short column 700 × 500 mm subjected to P_u = 2200 KN, M_{ux} = 180 kNm and M_{uy} = 110 kNm. Use M 25 concrete and Fe 415 steel. 13

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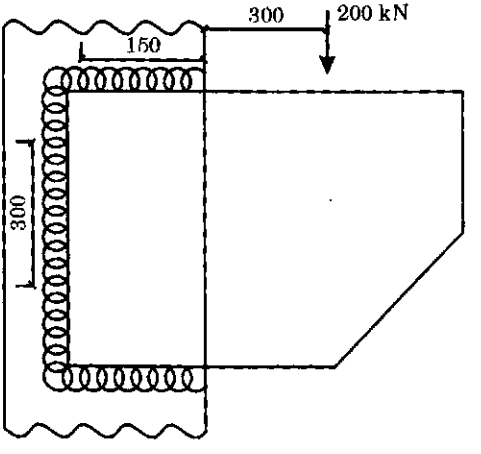
III. A column 350 × 350 mm has to carry an axial load of 1050 kN (factored). The bearing capacity of soil 120 kN/m^2, unit weight of soil 14 kN/m^3 and angle of repose of soil is 32°. Design a suitable isolated footing for the column. Use M 25 concrete and Fe 415 steel. Design for moment, one way sheat, punching sheat and bond. 13

IV. Design a rectangular water tank for a capacity 120000 litre resting on ground. The tank is continuous at bottom and free at the top. Use M 20 concrete and Fe 415 steel. 13

Part B

V. (a) What are the relative merits of welded and bolted connections ? 3

(b) Two bracket plates are welded to both sides of ISHB 300 as shown in fig. Calculate the size of weld required to support a total load of 200 kN. 11



VI. 4 angles 200 × 200 × 12 are used to make a column 800 × 800, 8 m high fixed at both ends. Determine the axial load it can carry. Design a suitable batten plate for the column. 14

VII. (a) What are laterally restrained beams ? 2

(b) Determine the moment carrying capacity of a laterally unrestrained beam ISMB 500 for a span of 5 m. 12