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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Fifth Semester, B.E. - Civil Engineering

Semester End Examination; Dec - 2016/ Jan - 2017

Design of RCC Structures

Time: 3 hrs

Max. Marks: 100

Note: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.

ii) Use of IS:456:2000 and SP-16 is permitted.

iii) Missing data, if any, suitably assumed.

UNIT - I

- 1 a. Evaluate the values of stress block parameters in a rectangular section. 7
- b. With neat sketches, explain the different types of R.C. section. 6
- c. Calculate the area of reinforcement for a simply reinforced beam 230 mm wide and 380 mm deep with an ultimate moment of 50 kN-m. Assume M20 concrete and Fe500 steel. Effective cover is 35 mm. 7
- 2 a. Discuss with neat sketches, the different types of steel failure in beams. 8
- b. Design a doubly reinforced beam 300 mm wide and 300 mm deep of grade M20 and Fe415 material to resist an ultimate amount of 87 kN-m. Take effective cover = 40 mm. 12

UNIT - II

- 3 a. Distinguish between working stress method and limit state method. 5
- b. Write a short note on :
 - i) Short term deflection 15
 - ii) Deflection due to shrinkage
 - iii) Crack control.
- 4 a. Obtain the expression for development length in beams and also state the different type of stresses with neat sketches and expression. 15
- b. Calculate the value of L_d for a single Fe250 bar in tension and compression for a 20 mm bar. 5

UNIT - III

5. Design a cantilever beam 4.0 m long carrying a super imposed load of 10 kN/m. Use M20 concrete and Fe415 steel. 20
6. Design a simply supported beam 250 x 300 mm, the depth of beam is restricted, the clear span is 5.0 m. The bearing at each end is 400 mm. Use M20 concrete and Fe415 steel. Take live load of 50 kN/m. 20

UNIT - IV

7. Design a R.C. slab for a room 5 m x 6 m measuring from inside. The thickness of wall is 400 mm the super imposed load exclusive of self weight is 2 kN/m^2 . The slab is simply supported over all the four edges and corners are held down. Use M20 concrete and steel grade being Fe415. 20
8. Design a suitable dog-legged stair for a public building to be located in a size of room 7 m x 3.5 m and 4 m high, with a door of 1.0 m wide in each of the longitudinal walls. The doors face each other and are located with their centres at a distance 1.0 m from the respective corners of the stair case, use M20 concrete and Fe415 steel. The imposed live load is 4 kN/m^2 . 20

UNIT - V

- 9 a. Enumerate the differences between short and long column. 5
- b. Determine the reinforcement for a short column subjected to an ultimate load, $P_u = 2000 \text{ kN}$, ultimate bending moment about X-axis and Y-axis $M_{ux} = 160 \text{ kN-m}$ and $M_{uy} = 120 \text{ kN-m}$ respectively. Assume size of column as 400 x 600 mm. Use M20 concrete and Fe415 steel. 15
10. Design a rectangular isolated footing of uniform thickness for a RC column carrying vertical load of 700 kN and having a base size of 400 x 700 mm. The safe bearing capacity of soil is 150 kN/m^2 . Use M20 concrete and Fe415 steel. 20

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