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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. - 2015

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 and SP 16 is permitted.

UNIT - I

1 a. Under what circumstances doubly reinforced beam is recommended. Give few example of DRS. 4

b. Design a doubly reinforced section for a clear span of 6 m. The beam is supported on 230 mm walls and carries an all inclusive load of 40 kN/m at service. The width and depth are to be proportioned based on practical requirements. Use M25 standard concrete and Fe 415 steel. Sketch the details at the center of cross section. Show the longitudinal details as well. 16

2 a. Discuss with the help of neat diagrams the different types of shear failures in case of beam. 5

b. Determine the moment of resistance of a T-beam for the following data:
Width of flange = 1200 mm, Depth of flange = 120 mm, width of rib = 300 mm,
Effective depth of beam = 550 mm. The beam consists of 4 - #20 as tension steel. Use M20 concrete and Fe 415 steel. What is the balanced MOR of the section and the corresponding steel? 15

UNIT - II

3 a. Distinguish between working stress method and the limit state method with regard to under reinforced, balanced and over reinforced section with the help of stress and strain diagram across the section. 10

b. Write a note on;
i) Deflection control 10
ii) Crack control in case of beam.

4 a. Distinguish between local bond, average bond and development length for beam subjected to bending with the help of neat sketch. 12

b. Obtain an expression for development length in tension reinforcement. 4

c. Determine the development in case of 20 mm bar, Fe 500, HYSD type, embedded in concrete of standard strength 30 N/mm^2 subjected to compression. 4

Contd…….2

UNIT - III

5 a. Determine the moment of resistance of a rectangular beam of effective cross section 300 x 400 mm and 6 - # 20 in tension side and 2 - #20 in compression side with an effective cover of 50 mm. Use M20 concrete and Fe 415 steel. 15

b. Write a note on reinforcement for torsion in case of rectangular beam. 5

6. Rectangular beam of clear span 8 m is subjected to working load of 30 kN/m. Design the tension reinforcement if it is singly reinforced. Also design the shear reinforcement consisting of vertical stirrups and bent up bars. Sketch the details longitudinally and transversely in the beam. Use M25 concrete and Fe 415 steel. 20

UNIT - IV

7. Design a two way slab for a hall 6 m x 8 m supported on 300 mm walls. The imposed load on slab is 3 kN/m^2 with a finish load of 1 kN/m^2. Use M20 concrete and Fe 415 steel. Assume that the beam is simply supported and corners are held down. Sketch the details of steel along shorter span. Assume 300 mm wall as support. 20

8. Design a dog legged stair case for a building in which vertical distance between floors is 3.6 m. the Stair hall measures 2.5 m x 5.0 m. The live load is taken as 3 kN/m^2. Use M20 concrete and Fe 415 Steel. The stair is supported by landing beams at the ends of flights. Design the second flight only and detail the reinforcement. 20

UNIT - V

9. Design a rectangular column to carry an axial of 1000 kN at working condition. The unsupported length of column is 6 m. The ends of column are effectively held in position and restrained against rotation. Sketch the details across and along the column Use M20 concrete and Fe 415 Steel. 20

10. A rectangular column of size 300 x 600 mm carries a service load of 1000 kN. The column consists of 6 - # 20 in cross section. Design a suitable rectangular footing and sketch the details of steel in elevation and plan. Use M20 concrete and Fe 415 steel. Take SBL of soil as 200 kN/m^2 and density of soil 16 kN/m^3. ϕ for soil = 30^o 20

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