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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. - 2014
Design of RCC Structures

Time: 3 hrs   *Max. Marks: 100*

Note: i) *Answer any* **FIVE** *full questions, selecting at least* **TWO** *full questions from each part.*
    ii) *Use of IS : 456-2000 and SP-16 is permitted.*

PART – A

1. a. Define factor of safety, characteristic strength and design strength.   6

   b. Explain under reinforced, over reinforced and balanced sections.   6

   c. Derive the stress block parameters and obtain the expressions for moment of resistance.   8

2. a. Explain the various types of shear failure of RC beams with the help of neat sketches.   5

   b. Find the moment of resistance of a singly reinforced concrete beam of 200 mm width and 400 mm effective depth, reinforced with 4 bars of 16 mm diameter of Fe 415 steel. Take M20 concrete. Use IS Code method. Redesign the beam if necessary.   15

3. a. Write a note on cracking in structural members.   5

   b. A rectangular simply supported beam of span 5 m in 300 mm x 65 mm in cross section. It carries a total load of 30 kN/m over its entire span, out of which 10 kN/m is the live load. The beam is reinforced with 3 bars of 20 mm diameter on tension side at an effective cover of 50 mm. Calculate the deflection at central span due to shrinkage and creep. If

   i) Ultimate shrinkage strain = 0.0003,   ii) Creep coefficient = 1.6 Concrete mix of grade M20 and steel Fe 415 are used.   15

4.   Design a reinforced concrete beam supported on two walls 500mm thick, spaced at a clear distance of 6m. The beam carries a super – imposed load of 30km/m. The size of the beam is restricted to 300 mm x 500 mm. Use M 20 concrete and Fe 415 grade steel.   20

PART – A

5.   Design a RC slab for room measuring (4m x 5m) from inside. The slab carries a live load of 2000 N/m^2 and is finished with 20mm thick granolithic topping. M20 concrete and Fe 415 steel. The slab is simply supported at all the four edges, with corners free of lift. Sketch the details of reinforcement.   20

6. a. Design a short axially loaded column 3.8m long restrained in position and direction at both the ends to carry an axial load of 1400 kN. Use M20 and Fe 415 steel.   5

   b. State the assumptions in limit state method of design of compression members.   15

7. a. Design a dog-legged stair for a building in which the vertical distance between floors is 3.6 m. The stair hall measures 2.5 m x 5 m. The live load may be taken as 2500 N/m^2. Use M20 concrete and Fe 415 steel bars.   15

   b. Describe briefly the effective span of stair slab spanning horizontally with neat sketch.   5

8. Design an Isolated footing of uniform thickness of a RC column bearing a vertical load of 600 kN and having a base size of 500 mm x 500 mm. The safe bearing capacity of soil may be taken as 120 kN/m^2. Use M20 concrete and Fe 415 steel bars.   20

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