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**E Reg. No. :**

**Question Paper Code: 51P62**

M.E. DEGREE EXAMINATION, NOV 2017

 First Semester

Structural Engineering

15PSE102 - CONCRETE STRUCTURES

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

(IS456-2000, IS875 (1-5) 1987, SP (16) - 1980, SP (34) 1987 and IS13920- 1993 are permitted)

 (5 x 20 = 100 Marks)

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| 1. | (a) | Estimate the total deflection of a cantilever beam of breadth 300mm total depth 550mm, span 4m subjected to a maximum BM due to characteristic dead and live loads of 210 kN-m, of which 60% is due to permanent loads. Assume tension steel is 1.117%, compression steel is 0.418%, cover to centre of steel is 37.5mm, creep factor is 1.6, and shrinkage strain is 0.0003. Adopt M15 and Fe415 grades. | CO-1 App | (20) |
|  |  | Or |  |  |
|  | (b) | Design a short column under biaxial bending with the size of column is 450mm x 450mm and factored load is 1000 kN. The total factored moment is Mux = 75 kN-m and Muy = 60 kN-m. Use M20 concrete and Fe415 steel.  | CO-1 App | (20) |
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| 2. | (a) | Explain the factors affecting the behaviour of slender columns. | CO-2 U | (20) |
|  |  | Or |  |  |
|  | (b) | Explain the limitations of the traditional working stress method with regard to the design of axially loaded reinforced concrete column. | CO-2 U | (20) |
|  |  |  |  |  |
| 3. | (a) | Design the simply supported rectangular slab of size 4m x 3m using yield line theory. The slab is subjected to a live load of 3.5 kN/m2 and floor finish of 1 kN/m2. Use M20 grade of concrete and Fe 415 grade of steel. | CO-3 App | (20) |
|  |  | Or |  |  |
|  | (b) | Design a rectangular slab 6.5 m x 4.5 m in size and simply supported at edges for a service live load of 4.5kN/m2. Assume co-efficient of orthotrophy (μ) as 0.7. Use M20 and Fe415 grades. | CO-3 Ana | (20) |
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| 4. | (a) | Derive the expression an moment curvature relation for reinforced concrete section. | CO-4 App | (20) |
|  |  | Or |  |  |
|  | (b) | A continuous beam has two spans of each 8m. The characteristics dead load is 15 kN/m and the characteristics live load is 25kN/m. Draw the bending moment envelopes after maximum redistribution.  | CO-4 U | (20) |
|  |  |  |  |  |
| 5. | (a) | The following are the details of an internal beam column of type 1 joint, subjected to reversals which are not due to earthquakes. Column 600 x 600mm with 8 no’s of 28mm bars, column factored load is 1500 kN, storey height is 4m, beams on either side are 400 x 500mm with 3 bars of 28mm (1846 mm2) on the top and 3 bars of 25mm (1473 mm2) at the bottom. Assume M30 grade of concrete and Fe415 grade of steel. Design the joint. | CO-5 Ana | (20) |
|  |  | Or |  |  |
|  | (b) | Describe about the fire resistance of reinforced concrete members..  | CO-5 Ana | (20) |
|  |  |  |  |  |