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**Fifth Semester B. Arch Degree Examination, June/July 2015**  
**Structures - V**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions,**

- 1
  - a. Define workability of concrete and explain factors affecting it. (06 Marks)
  - b. Explain the importance of water cement ratio. (06 Marks)
  - c. Specify groups of concrete based on grades of concrete as per code. Also specify minimum grade of concrete for every severe exposure and extreme exposure mention relevant code clauses. (08 Marks)
  
- 2 Determine the moment of resistance of a singly reinforced beam 160mm wide and 300mm deep to the centre of reinforcement, if the stresses in steel and concrete are not to exceed  $140 \text{ N/m}^2$  and  $5 \text{ N/m}^2$ . The reinforcement consists of 4 bars of 16mm diameter take  $m = 18$ . If the above beam is used for an effective span of 5m, find the maximum load the beam can carry. (20 Marks)
  
- 3 Design the necessary reinforcement for a reinforced concrete beam  $300 \times 450\text{mm}$  to carry a u.d.l of  $25 \text{ kN/m}$  over a span of 4m. The beam is supported on a 400mm thick wall at ends use  $M_{20}$  concrete and  $Fe_{415}$  steel. Take effective cover as 40mm. (20 Marks)
  
- 4 A T-beam of span 8m carries a live load of  $10 \text{ kN/m}^2$  and a floor finish of  $0.6 \text{ kN/m}^2$ . Spacing of T-beam is 3.2m. Thickness of slab is 125mm width of web is 300mm. Total depth of beam is 450mm, load factor is 1.5 use  $M_{20}$  concrete and  $Fe_{415}$  steel. Design the beam take effective cover as 50mm. (20 Marks)
  
- 5
  - a. Design an R.C.C slab of  $4\text{m} \times 12\text{m}$  supported on a brick massonary wall 300mm thick. Live load on the slab is  $3 \text{ kN/m}^2$  and floor finish =  $1 \text{ kN/m}^2$ . Use  $M_{20}$  and  $Fe_{415}$ , take thickness of slab as 125 mm and effective cover as 20mm. (10 Marks)
  - b. Design a R.C slab of  $5\text{m} \times 9\text{m}$  supported on brick massonary 300mm thick. Live load on the slab is  $3 \text{ kN/m}^2$  and floor finishing is  $1 \text{ kN/m}^2$ . Use  $M_{20}$  and  $Fe_{415}$ , take thickness of slab as 125 mm and effective cover as 105mm. (10 Marks)
  
- 6
  - a. Design the necessary reinforcement for a circular column of diameter 450mm. the column is to carry a factored load of 1500 kN. Use  $M_{20}$  and grade-1 mild steel. (10 Marks)
  - b. Design the necessary reinforcement for an R.C column  $300 \times 450\text{mm}$  of length 3.4m to carry an axial load of 1200kN  $M_{20}$  and  $Fe_{415}$  are used. (10 Marks)
  
- 7 Design a dog-legged staircase for a public building using  $M_{20}$  concrete and  $Fe_{415}$  steel. The distance between two floor is 3.2m size of the staircase room is  $3\text{m} \times 4.5\text{m}$ . (20 Marks)
  
- 8 A rectangular column of size  $350\text{mm} \times 550\text{mm}$  carries a live load of 1800kN. The safe bearing capacity of soil is  $150 \text{ kN/m}^2$  use  $M_{25}$  and  $Fe_{415}$  steel. Design a rectangular footing to support the column and sketch the details of reinforcement. (20 Marks)