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09ENG 5.5

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 $140\,N/m^2$ and $5\,N/m^2$. 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 300×450mm to carry a u.d.l of 25 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 $10\,kN/m^2$ and a floor finish of $0.6\,kN/m^2$. 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 $4m \times 12mm$ supported on a brick massonary wall 300mm thick. Live load on the slab is $3kN/m^2$ and floor finish = $1kN/m^2$. 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 $5m \times 9m$ supported on brick massonary 300mm thick. Live load on the slab is $3kN/m^2$ and floor finishing is $1kN/m^2$. 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 450m. 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 300×450mm 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 $3m \times 4.5m$. **(20 Marks)**

8 A rectangular column of size 350mm $\times$ 550mm carries a live load of 1800kN. The safe bearing capacity of soil is $150kN/m^2$ use M_{25} and Fe_{415} steel. Design a rectangular footing to support the column and sketch the details of reinforcement. **(20 Marks)**

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