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09ENG5.5

Fifth Semester B.Arch. Degree Examination, Dec.2015/Jan.2016
Structures – V

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions.***
2. ***Use of IS 456:2000 and SP-16 is permitted.***
3. ***Use Limit state method unless specified.***

1 a. Explain balanced, under reinforced and over reinforced sections with neat sketches. **(06 Marks)**

b. Find the moment of resistance of a singly reinforced beam section 225 mm wide and 350 mm deep to the centre of the tensile reinforcement. If the permissible stresses in concrete and steel are 7 N/mm^2 and 230 N/mm^2 respectively. The reinforcement consists of 4 bars of 20 mm dia. What max. udl this beam can carry safely on a span of 8 m? Take m = 13.33. **(14 Marks)**

2 a. State assumptions made in working stress method of design of reinforced concrete. **(04 Marks)**

b. Explain the necessity of doubly reinforced beams. **(04 Marks)**

c. The cross section of a singly reinforced concrete beam is 300 mm wide and 400 mm deep to the centre of the reinforcement which consists of 3 bars of 12 mm dia. If the stresses in concrete and steel are not to exceed 7 N/mm^2 and 230 N/mm^2. Determine the moment of resistance of the section. Take m = 13.33. **(12 Marks)**

3 Design a singly reinforced concrete beam to suit the following data:
Data : Clear span = 4 m, Width of supports = 300 mm, Service load = 5 kN/m, Materials : M20 and Fe415. **(20 Marks)**

4 Design a one-way slab with a clear span of 3.5 m simply supported on 200 mm thick concrete masonry walls to support a live load of 4 kN/m^2. Adopt M-20 grade concrete and Fe415 HYSD bars. **(20 Marks)**

5 a. Explain minimum eccentricity and slenderness ratio. **(05 Marks)**

b. Design the reinforcements in a rectangular column of size 300×500mm to support a design ultimate load of 500 kN together with a factored moment of 200 kNm. Adopt the value of fck = 20 N/mm^2 and Fy = 415 N/mm^2. **(15 Marks)**

6 A square column 500×500 mm carries an axial load of 1500 kN. Design the column and a square footing for the column. The safe bearing capacity of the soil is 225 kN/m^2. Use M20 and Fe415. **(20 Marks)**

7 Design one of the flights of a dog-legged stairs spanning between landing beams using following Data: Type of staircase : Doglegged with Waist slab, treads and risers.
Number of steps in the flight = 10
Tread = T = 300 mm, Riser = R = 150 mm.
Width of landing beams = 300 mm
Materials : M-20 concrete and Fe-415 steel. **(20 Marks)**

8 Write short notes on:
a. Advantages of RCC.
b. Water cement ratio.
c. Grades of concrete and steel.
d. Stress strain block diagram for singly reinforced beam. **(20 Marks)**

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.