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09ENG5.5

Fifth Semester B.Arch. Degree Examination, June/July 2019
Structures - V

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions.**
2. IS : 456 and SP16 is allowed.
3. Use limits state method unless specified.

- 1 a. Explain balanced, under reinforced and over reinforced sections. (06 Marks)
 b. Find the moment of resistance of a singly reinforced beam section 225mm wide and 350mm 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 20mm dia. What max udl this beam can carry safely on a span of 8m? Take $m = 13.33$ (Use WSM). (14 Marks)
- 2 a. Determine the reinforcement required for T-beam subjected to an ultimate moment of 500kN.m for the following sectional dimensions. $b_f = 1500\text{mm}$, $D_f = 120\text{mm}$, $b_w = 300\text{mm}$, $d = 750\text{mm}$ $f_{ck} = 20$, $f_y = 415\text{N/mm}^2$. (12 Marks)
 b. Explain the philosophy of limit state method. (08 Marks)
- 3 A reinforced concrete beam is to be designed over an effective span of 5m to support a design service load of 8kN/m. Adopt M20 grade of concrete and Fe415 HYSD bars and design the beam to satisfy the collapse and serviceability limit states. (20 Marks)
- 4 Design a two way slab for an office floor of size $3.5\text{m} \times 4.5\text{m}$ with discontinuous and simply supported edges on all the sides with corners prevented from lifting and supporting a service live load of 4 kN/m^2 . Adopt M20 concrete and Fe415 steel. (20 Marks)
- 5 a. A rectangular reinforced concrete column of cross sectional dimension $300\text{mm} \times 600\text{mm}$ is to be designed to support an ultimate axial load of 200kN. Design suitable reinforcements in the column using M20 concrete and Fe 415 steel. (10 Marks)
 b. Design the reinforcements in a rectangular column of size $300 \times 500\text{mm}$ to support a design ultimate load of 500kN together with a factored moment of 200kN-m. Adopted the value of $f_{ck} = 20\text{N/mm}^2$ and $f_y = 415 \text{ N/mm}^2$. (10 Marks)
- 6 Design a square footing for a short axially loaded column of size $300 \times 300\text{mm}$ carrying 600kN load. Use M20 and Fe415 steel. SBC of soil is 180kN/m^2 . (20 Marks)
- 7 Design one of the flights of a dog legged stairs spanning between landing beams using following data :
 Data : No. of steps in the flight = 10
 Tread = 300mm, Riser = 150, = mm
 Width of landing beams = 300mm
 Materials : M20 and Fe415 grade for concrete and steel resp. (20 Marks)
- 8 Write short notes on :
 a. Water cement ratio
 b. Workability of concrete
 c. Advantages of RCC
 d. Grades of concrete and steel. (20 Marks)

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.