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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 = 1500mm, D_f = 120mm, b_w = 300mm, d = 750mm f_{ck} = 20, f_y = 415N/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 3.5m × 4.5m 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 300mm × 600mm 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 × 500mm to support a design ultimate load of 500kN together with a factored moment of 200kN-m. Adopted the value of f_{ck} = 20N/mm^2 and f_y = 415 N/mm^2.   **(10 Marks)**

6   Design a square footing for a short axially loaded column of size 300 × 300mm 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)**

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