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Question Paper Code: 55103

B.E./B.Tech. DEGREE EXAMINATION, NOV 2018

Fifth Semester

Civil Engineering

15UCE503- DESIGN OF REINFORCED CONCRETE ELEMENTS

(IS456-2000 and SP16 Permitted)

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. If $M_{ulim} > M_u$, the beam shall be designed a CO1- R
 - (a) Singly Reinforced Section
 - (b) Doubly Reinforced Section
 - (c) Balanced Section
 - (d) Under reinforced section
2. The width of the flange of a T-beam, which may be considered to act effectively with the rib depends upon CO2- R
 - (a) Breadth of the rib
 - (b) Overall thickness of the rib
 - (c) Span of the T-beam
 - (d) All the above
3. The diameter of longitudinal bars of a column should never be less than CO3- R
 - (a) 6mm
 - (b) 8mm
 - (c) 10mm
 - (d) 12mm
4. In a combined footing if shear stress exceeds 5 kg/cm^2 , the nominal stirrups provided are CO4- R
 - (a) 6 legged
 - (b) 8 legged
 - (c) 10 legged
 - (d) 12 legged
5. For stairs spanning horizontally, the minimum waist provided is CO5- R
 - (a) 10cm
 - (b) 8cm
 - (c) 12cm
 - (d) 10cm

PART – B (5 x 3= 15Marks)

6. What are the advantages of limit state method over working stress and ultimate load methods? CO1- U
7. Define bond stress. CO2- R
8. Briefly explain uniaxial and biaxial eccentricity. CO3- U
9. Name the common types of foundations. CO4- R
10. List out the different types of staircases with neat sketch. CO5- R

PART – C (5 x 16= 80Marks)

11. (a) Explain the working stress and limit state methods of design of RC structures. CO1-U (16)

Or

- (b) Design a simply supported singly reinforced concrete beam to suit the following data: CO1-App (16)

Clear Span = 4m, Width of supports = 300 mm,
Live load = 5 kN/m, Adopt M 20 and Fe 415 grade.

12. (a) Write down the step by step procedure for a Flanged beam section in Limit state method. CO2-U (16)

Or

- (b) A Reinforced concrete beam of rectangular section with a width of 300mm and overall depth of 600mm is subjected to a factored bending moment of 115kN-m, factored torsional moment of 45kN-m and factored shear force of 95kN. Using M20 and Fe415 bars and side, top and bottom covers of 50mm, design suitable reinforcement in the section. CO2-App (16)

13. (a) Design the reinforcement in a spiral column of 300mm diameter subjected to a factored load of 800kN. The column has an unsupported length of 3m and is braced against side way. Use M20 concrete and Fe415 steel. CO3-App (16)

Or

- (b) A column 300mmx500mm it is subjected to a design ultimate load of 500 kN and an factored moment of 200kNm about the major axis. Design the longitudinal reinforcement and lateral ties. Use concrete M20 and steel Fe415. CO3-App (16)

14. (a) A rectangular column 300mmx500mm carries a factored load of 1500kN. Design a suitable footing for the column. The safe bearing capacity of the soil is 185kN/m². Use concrete M20 and steel Fe415. CO4-App (16)

Or

- (b) Design a combined rectangular footing for two columns 300mmx300mm spaced at 4m centers, each supporting a factored load of 750kN. safe bearing capacity of soil = 225kN/m². Use concrete M20 and steel Fe415. CO4-App (16)

15. (a) Design one of the flight of stair for a school building using following data: CO5-App (16)

Type of stair case : Waist slab

No. of steps in flight :12

Risers are 160mm & Treads are 300mm

Width of landing beams=300mm

Materials: M-20 Grade of concrete & Fe-415 HYSD Bars.

Or

- (b) Design a dog legged staircase in a public building to be located in a staircase room 6m long & 3m wide. CO5-App (16)

Height between floors = 3.3m

No. of steps in flight =10

Width of landing beams=300mm

Tread =300m

Rise = 150mm

Live load = 5 kN/m²

Adopt M-20 Grade of concrete & Fe-415 HYSD Bars.

