Total number of printed pages: 02

D/5th Sem/ DCE 504

2023

SUBJECT NAME: Design of RCC Structures (DCE 504)

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. a) What is the fundamental assumption in flexural theory? Is it valid at the ultimate state? Explain the concepts of transformed section as applied to the analysis of reinforced concrete beams under service loads. Define modular ratio. 10

   b) Define neutral axis depth. How do you determine neutral axis depth of a singly and doubly reinforced beam sections? How do you determine ultimate moment of resistance if the beam section is over-reinforced section? 10

2. Explain singly and doubly reinforced section with diagram. A doubly reinforced beam section has a size of 250 X 400 mm total depth. It is reinforced with 3-25 Φ as compression reinforcement and 4-28 Φ as tensile reinforcement. Assume M25 concrete and Fe 415 steel and clear cover as 30 mm. Determine the stresses in concrete, compression steel and tension steel. Also determine a) allowable moment of resistance and ii) ultimate moment of resistance. 3+17 = 20

3. A simply supported beam of span 6.5 m carries a dead load of 5 kN/m (exluding self-weight), live load of 10 kN/m and surface finish of 1 kN/m. Design the beam as balanced section by a) WSM and b) LSM, by assuming M25 concrete and Fe 415 steel and width of the beam is 250 mm. 20

4. What do you mean by shear reinforcement. A beam of span 7 m has a size of 250 X 500 mm effective carries an udl of 25 kN/m excluding self-weight of beam. Design the beam for shear reinforcement at a) support and b) at midspan. Assume M 25 concrete and Fe 415 steel. The beam is reinforced with 4 - 20Φ as tensile reinforcement. 20

5. a) Define one way and two-way slab. Write the procedure to design a two-way slab. 10

   b) What do you mean by slenderness ration. Classify column based on i) type of reinforcement and ii) slenderness ratio. Define effective length and unsupported length of a compression member. 10

6. Determine the a) allowable moment of resistance and b) ultimate moment of resistance of the beam section of size 350 X 700 total depth and reinforced with 2 nos. of 25mm diameter bars and 2 nos. 28 mm diameter bars as tension reinforcement, 30 mm clear cover, considering: 20

i) M25 concrete and Fe 250 steel

ii) M25 concrete and Fe 415 steel

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