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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER M.TECH DEGREE EXAMINATION, DECEMBER 2015

Civil Engineering

(Structural Engineering)

01CE6107 Advanced Theory and Design of RC Structures

Max. Marks : 60   Duration: 3 Hours

PART A

Answer any TWO

1. (a) Discuss the provisions in IS 456:2000 by which over reinforced sections are avoided in limit state method of design   (4)
   (b) Discuss the design philosophies of reinforced concrete   (5)

2. (a) Discuss limit state of serviceability   (2)
   (b) Design a rectangular beam of effective span 6 m to carry a live load of 100 kN/m using M20 and Fe415   (7)

3. Design a biaxially eccentrically loaded column section 300 x500 mm carrying an axial load of 1500 kN. Eccentricity with respect to major axis is 60 mm and with respect to minor axis is 40 mm   (9)

PART B

Answer any TWO

4. Estimate the total deflection of a cantilever beam 300 x600 mm, span 4m, subjected to a maximum bending moment of 210 kNm of which 60% is due to permanent loads . Assume tension steel = 1.17 %, compression steel =0.418%, cover to center of steel =37.5 mm, creep factor 1.6, shrinkage strain =0.003, M20 and Fe 415   (9)

5. (a) Discuss the different types of column joints.   (2)
   (b) A doubly reinforced beam 250 x 400 mm, reinforced with 3- 22mm bar in the compression side and 3- 28 mm dia in the tension side, is subjected to a bending moment (midspan under service loads) of 125 kNm . Assuming a clear cover of 30 mm, M20 mix and Fe 415 steel, find the maximum probable crackwidth for the beam.   (7)

6. (a) Explain interaction between structural frame and shear wall with sketches   (2)

   (b) Design the exterior joint with the following details:
   Column 550 X 550 mm with 2% steel with a maximum load on the column 5000kN, bar diameter 30mm.
   Main beam 500 X 600 mm, ultimate capacity 430kNm and tension steel 5 no:, 25mm
   Spandrel beam 450X 750 mm, M 20 and Fe 415. Storey height=3m, reversal of stresses not to be considered   (7)

PART C
Answer any TWO

7.(a) Explain yield line analysis of slabs. Sketch the yield line pattern in square, rectangular, triangular and circular slabs (5)

(b) Explain the concept of strut and tie model for design of RC structures (4)

(c) Discuss the application of strut and tie model in concrete structures (3)

8. (a) Derive the expression for ultimate moment of an isotropic ally reinforced square slab with fixed edges carrying a UDL (3)

(b) Design a single span deep beam to suit the following data:
   Effective span= 6m
   Overall Depth=6m
   Width of support=0.6m
   Width of beam= 0.4m
   Total load on beam including self weight=400kN/m, Use M20 and Fe415 (9)

9. Design a corbel to support a gantry girder reaction of 350 kN at service condition acting at distance of 225mm from the face of a 350mm X 350mm column. Use M20 and Fe415 (12)