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Total No. of Pages : 02

Max. Marks: 50

Total No. of Questions : 10

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B. Architecture (Sem.-3) STRUCTURE DESIGN-III Subject Code : AR-231 M.Code : 45025

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES :

- 1. Attempt five questions taking any one question from each unit. All questions are of equal marks.
- 2. Use of IS-456, Scientific Calculator is allowed. Assume missing data if any. Draw neat diagrams.

UNIT-I

- Find moment of resistance of concrete beam at balance condition- beam section 600mm overall depth and 300 mm wide. Find area of steel required for balanced section. Use 20mm dia bars and 35mm clear cover to find effective depth, draw neat sketches. Assume M30 concrete, yield strength of steel primary or secondary Fe 500. (10)
- 2. a) What do you understand by doubly reinforced beam? Explain with sketches. (5)
 - b) Simply supported concrete beam span 6m carries U.D.L of 40kN per m, design shear reinforcement at support. The concrete beam section is 300mm wide, 600mm overall depth, percentage of tension steel is 1.2%.

UNIT-II

- 3. A room 17.5 m \times 10 m has brick walls all around and is to be covered with reinforced concrete slab supported on walls and on central beam in the east west to north south direction along the middle of room. Assume live load on floor 4Kn/m2, Density of concrete 25 kN /cubic meter. Use M25 concrete strength and steel of min yield stress of 500n/mm². (10)
- a) Determine the value of Bending moment coefficients for a rectangular panel with Lx/Ly ratio of 1.2 with two adjacent side discontinues by using tale 22 of IS456. Draw sketches for explaining.
 (5)
 - b) Explain with sketches, the distribution of slab load on edges for one way slab and two way slab. (5)

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UNIT-III

- Design concrete waist slab of stair case with 150mm riser and 300mm tread, total steps are 20 and landing is 1200mm. Take width of stair 1200mm. Assume live load as 4.0 Kn/m² & density of concrete 24 kN /cubic meter. Draw sketch. (10)
- 6. Design a straight flight staircase in a residential building that is supported on reinforced concrete walls 1.5m apart (center-to-center) on both sides and carries a live load of 3.0 kN/m². The risers are 16 cm and tread are 30 cm. Treads are provided with 3 cm thick marble finish while 2 cm thick plaster is applied to both the risers and bottom surfaces of the slab. Assume density of concrete 24 kN /cubic meter, finishes 22kN /cubic meter plaster 20 kN /cubic meter , concrete M25 , reinforcing steel fe500. Draw sketch of design. (10)

UNIT-IV

7.	a)	What is interaction diagram in column design?	(5)
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- b) Explain slender and short columns.
- 8. Construct the interaction diagram for a column od size b xD with steel ratio p/fck = 0.1 for d'/D =0.1 and Fe 250. Assume steel is placed equally on all sides. (10)

UNIT-V

- 9. a) What causes failure of foundations? (4)
 - b) What are the assumption made in design of footing? (2)
 - c) What are the difference between strap and Mat footing? Describe situations where these could use. (4)
- A square footing has to transfer a dead load of 1000kN and an imposed load for a square column of size 400mm. Assume the safe bearing capacity of soil 120 kn/m². Design square footing to support the above column Adopt M20 concrete and fe-415 grade steel. (10)

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

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