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SAINTGITS COLLEGE OF ENGINEERING
KOTTAYAM, KERALA

(AN AUTONOMOUS COLLEGE AFFILIATED TO
APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM

FIRST SEMESTER M.TECH. DEGREE EXAMINATION (R), MARCH 2021
(STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT)

Course Code: 20CESCT107

Course Name: ADVANCED DESIGN OF CONCRETE STRUCTURES

Max. Marks: 60 **Duration: 3 Hours**

(Answer all full questions)

MODULE I

1. (a) What are the main factors that affect the structural behaviour of slender columns ? (3)

   (b) Design a two-span continuous deep beam for effective span of 6m, overall depth 4m and width of supports=600mm. Total load on beam including self-weight is 400kN/m. Sketch reinforcement details. (6)

OR

2. Design an R.C.C column to the following particulars: (9)

   Ultimate axial load=1250kN
   Ultimate moment at top about x axis = 40kNm
   Ultimate moment at top about y axis = 15kNm
   Ultimate moment at bottom about x axis = 25kNm
   Ultimate moment at bottom about y axis = 15kNm
   Unsupported length of the column = 6m
   Effective length about x-axis= lex=4.75m
   Effective length about y-axis = ley=4.5m
   size column= 300mm × 350mm
   Use M20 concrete and Fe415 steel

MODULE II

3. Design an interior panel of flat slab with panel size 4.5m × 6m supported by columns of size 500mm×500mm. Provide suitable drop. Take live load as 4kN/m^2. Use M20 concrete and Fe415 steel. (9)

OR

4. (a) Draw the Yield line pattern of: (4)
   i) Square Slab with simply supported edges and acting udl of w/unit area.
   ii) Rectangular slab with two edges simply supported and other two adjacent edges are fixed acted upon a udl of W/ unit area

   (b) Calculate the Mu of an orthogonal reinforced rectangular slab subjected to uniformly distributed load of w/unit area using yield line analysis. (5)

MODULE III

5. Design a shear wall for the following data. (9)
Length = 4.5m, Thickness = 200mm
Materials: M20 concrete & Fe415 grade steel.

Load	Axial Force	Moment	Shear
DL+LL	1950	600	20
Seismic Load	250	4800	700

OR

6. An RC grid floor is to be designed to cover a floor area of 12m × 18m. The spacing of ribs in mutually perpendicular direction is 1.5m c/c. Live load on floor is 2kN/m^2. Analyze the grid floor by IS-456 method. Design the suitable reinforcements (only for flexure). (9)

MODULE IV

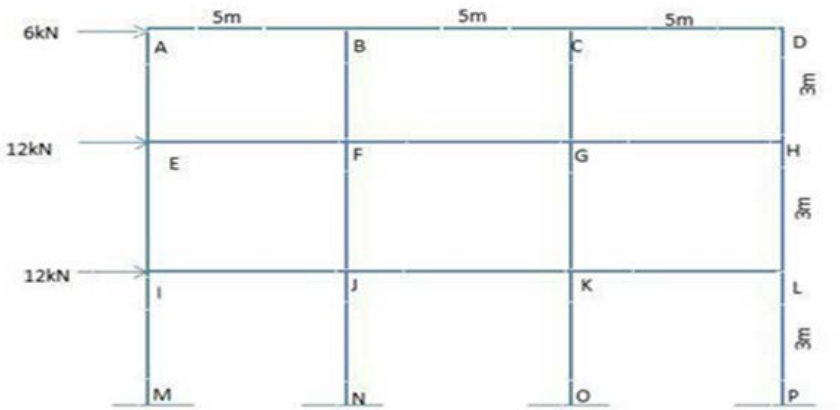
7. A substitute frame has to be analysed for maximum sagging and hogging moment in the bays of spans 4m, 5m and 4m respectively. Using the following data, estimate the maximum moments in beams and columns. The beams are placed at 3m. Thickness of floor is 100mm, LL= 2kN/m^2, Floor finish = 0.6kN/m^2, Size of beam = size of column = 200mm × 400mm, floor height = 3.5m. (9)

OR

8. (a) List the assumptions made in i) Portal method and ii) Cantilever method (2)

(b) Analyse the building frame subjected to horizontal forces as shown in the figure below using Cantilever method and determine: (7)

a) Moments at the end of columns
b) Axial force in columns
c) Shear at the ends of beams.



MODULE V

9. (a) Briefly describe about moment redistribution in continuous beam (5)

(b) Calculate moment curvature for flanged beam T section; bf=breadth of flange=1400mm, bw= breadth of web=300mm, effective depth d= 750mm, D_f = depth of flange =150mm. A_{st}= area of steel at mid span=1700mm^2. Use M30 and Fe 415. (7)

OR

10. A Continues beam ABC of span 5m each, A & B simple supported and continuous over support B, carries a uniformly distributed service load of DL= 20kN/m and LL= 13kN/m. Draw the bending moment envelop diagram as per recommendations of IS 456:2000. (12)

MODULE VI

11. (a) Draw the Ductile detailing diagram of beam column junction and column. (6)

(b) Explain the different procedures for strengthening of existing structures. (6)

OR

12. Following are the details of an internal beam column joint of type (1) joint, subjected to reversals which are not due to earthquake. Column: 600mm × 600mm with 8nos 25 mm diameter bars. Column factored load is 1400KN, Storey height=3m. Beams on either side are 400mm × 500mm with 3 bars of 28 mm diameter (1846mm^2) at top and 3 bars of 25 mm diameter at bottom (1473mm^2). Assume f_{ck} = 25 N/mm^2 f_y= 415 N/mm^2. Design the joint with respect to strength, stability and shear. (12)

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