APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER M.TECH DEGREE EXAMINATION

Civil Engineering

(Geomechanics and Structures)

04 CE 6307 Advanced Design of Concrete Structures

Max. Marks: 60 Duration: 3 Hours

Answer all Questions
Use of IS-456-2000, IS 13920:1993 and Interaction curves are permitted.
Assume suitable data wherever necessary

PART A

1. Explain effective length of a column.
2. What are yield lines? State the characteristic features of yield line.
3. What are grid floors?
4. What are the assumptions in the portal method of analysis of building frames subjected to horizontal loads?
5. What do you mean by moment redistribution?
6. Explain the curvature of a member at section with reference to figure. Draw moment (M) and curvature (Ø) for a singly reinforced beam section.
7. Write a short note on the fire resistance of structural members.
8. Draw the ductile detailing of a beam-column joint.

(8x3marks=24)

PART B

9. A simply supported reinforced concrete beam of rectangular cross section 250mm wide and 450mm deep is used for an effective span of 4m. The beam is reinforced with 3 nos of 20mm diameter bars at an effective depth of 400mm. Self-weight of the beam together with dead load on the beam is 4kN/m. Live load is 10kN/m. Using M20 grade concrete and Fe415 grade steel, compute short term deflection.

OR

10. Design a corbel to carry a girder reaction of 450kN at a distance of 200mm from the face of the column of size 300mmx300mm. Assume M20 grade concrete and mild steel reinforcement. Sketch the reinforcement details also.
11. Design the interior panel of the flat slab for an office floor to suit the following data.
    Size of office floor- 25mx25m
    Size of panel- 5mx5m
    Loading class- 4kN/m^2. Use M20 concrete and Fe 415 grade steel. Calculate the thickness of slab for the column strip and middle strip and the reinforcements.

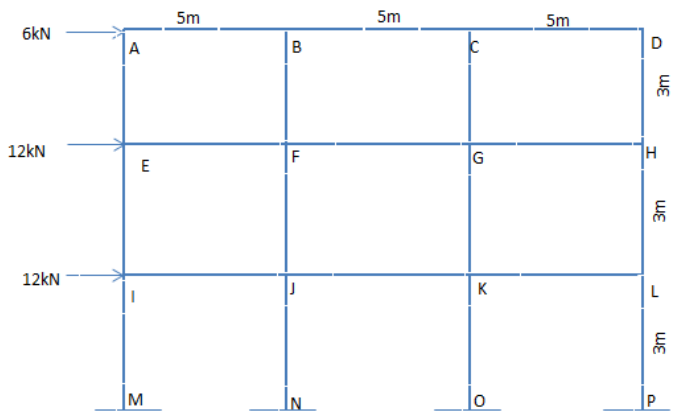
OR

12. Design the interior panel of a flat slab for a live load of 4000N/m^2. The slab is provided with a floor finish of 1000N/m^2.The panels are 6mx6m. Drops shall be provided. Use M20 concrete and Fe 415 steel.
13. Two shear walls are to be provided in each direction in a 10-storey building to resist the following loadings. Floor-Floor height = 3m. Design the ductile shear wall to resist the forces using M25 grade concrete and TOR steel (Fe415 grade). Thickness of wall = 250mm, Length = 4.16m.

Loading	Axial force (kN)	Moment (kNm)	Shear(kN)
1. D.L + L.L	1950	600	20
2. Seismic Load	250	4800	700

OR

14. An RC grid floor is to be designed to cover a floor area of 12mx18m. 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).
15. Analyze the frame shown in figure by cantilever method.



OR

16. Consider an intermediate frame of a multistory building. The frames are spaced at 4m c/c. Take live load as 3kN/m^2 and the slab thickness as 100mm. Analyze floor level ABCD using substitute frame method. The height of columns above and below the floor ABCD is 3m. Span AB=6m, BC=3m, CD=4m. Analyze span AB and BC.
17. A beam AB of 4m span and fixed at one end and freely supported at the other end carries a udl of 30kN/m. Draw the maximum bending moment diagram as per recommendations of IS 456: 2000.

OR

18. Calculate moment curvature for flanged beam T section; b_f= breadth of flange=1400mm, b_w= breadth of web=300mm, effective depth d= 750mm, Df= depth of flange =150mm. A_{st}= area of steel at mid span=1700mm^2. Use M30 and Fe 415.
19. 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 x 600mm with 8nos 25 mm diameter bars. Column factored load is 1400KN, Storey height=3m.Beams on either side are 400mm x 500mm with 3 bars of 28 mm diameter (1846mm^2) at top and 3 bars of 25 mm diameter at bottom (1473mm^2).Assume fck = 25 N/mm2 fy= 415 N/mm2. Design the joint with respect to strength, stability and shear.

OR

20. Explain strengthening of RC structures.

(6x6marks=36)