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. What are deep beams?
2. A square slab simply supported on all edges is subjected to single concentrated load at the center of the slab. The slab consists of isotropic reinforcement. Find the collapse load.
3. What are grid floors?
4. What are the assumptions in the cantilever method of analysis of building frames subjected to horizontal loads?
5. Explain moment rotation curves with an example.
6. What do you mean by moment redistribution?
7. Brief on the methods used to achieve quality control of concrete in construction.
8. How fire resistance is ensured in buildings?

(8x3marks=24)

PART B

9. Design the reinforcement for a braced column, 300mm x 400mm subject to a factored axial load of 1500kN and factored moments of 60kNm and 40kNm w.r.t. the major and minor axes respectively at the top end. Assume that the column is bent in double curvature in both directions, with the moments at the bottom end equal to 50% of the corresponding moments at the top. Assume an unsupported length of 7m. Use M20 concrete and Fe415 steel.

OR

10. Calculate the total deflection for the slab with following details. Assume 40 % of live load to be permanent. Simply supported slab, span =4 m, overall depth D= 130mm, effective depth (d)= 110mm, A_{st}= 785mm^2, Live load = 2kN/m^2, floor finish (F.F) = 1kN/m^2, f_{ck}=20N/mm$^{2.}$

11. Design a circular slab of diameter 4m which is fixed at the edges. Adopt a service load of 4kN/m^2 .Use M 20 concrete and Fe 415 steel.

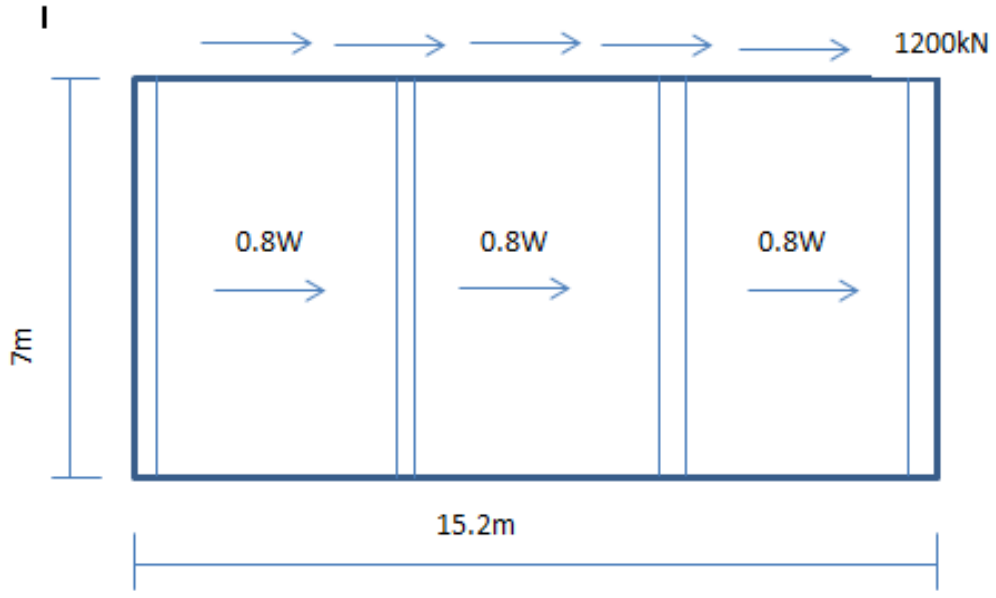
OR

12. A walkway consists of a slab 5.4m between edges supported on spandrel beams 200mmx600mm in size which in turn is carried on 360x200mm columns spaced at 7m c/c. Assuming the factored load on the walkway is 6KN/m^2 and slab thickness is 150mm. Determine the design torsion moment in the spandrel (edge) beam and walkway slab.

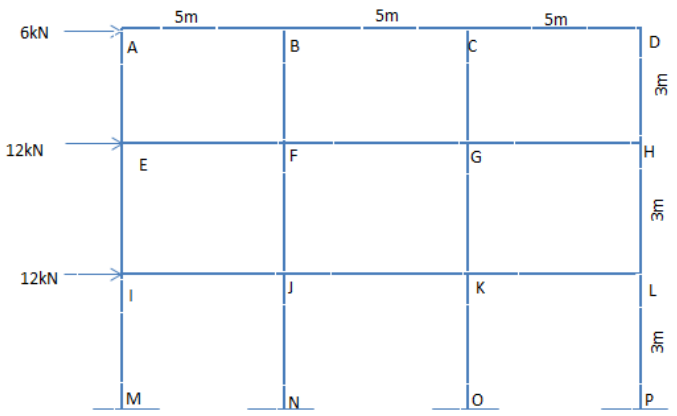
13. An RC grid floor is to be designed to cover a floor area of 12mx9m. The spacing of ribs in mutually perpendicular direction is 1.5m c/c. Live load on floor is 2kN/m^2. Analyze the grid floor by IS-456 method. Design the suitable reinforcements (only for flexure).

OR

14. The end wall of a high single storied building is 15.2mx25.15mx7m in size. Under seismic loading, the horizontal shear transmitted by the roof of the structure to the top of the wall is 1200kN. Lateral forces due to self -weight may be taken as 0.8W. The vertical load on the wall from the roof may be taken as 14kN/m. the wall is 150mm thick. Transverse restraint is provided by cross walls at 5m intervals and wall may be taken as braced. Design the concrete wall. Use M 20 concrete and Fe 415 steel. Use IS 456:2000 provisions.

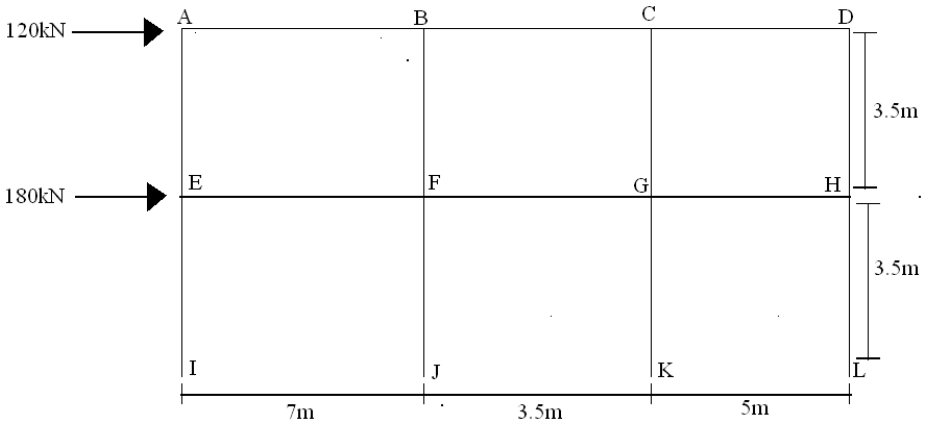


15. Analyze the frame shown in figure by cantilever method.



OR

16. Analyze the frame shown in figure using portal method. Calculate beam moments, column moments and axial loads in columns at a floor level EFGH.



17. 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=1700mm2. Use M30 and Fe 415.

OR

18. A beam AB of span 4m, fixed at the ends, carries a uniformly distributed load of 30kN/m at collapse. Draw the maximum bending moment as per recommendations of IS 456:2000.

19. Design an exterior type (1) joint. An exterior joint has the following members framing into it. Column: 600x600mm with 2.5 % steel with maximum load on the column 2500kN. Bar dia: 30mm.Main beam: 500x600mm, ultimate moment capacity Mu=430kNm, tension steel: 5 nos of 25mm diameter (2454mm^2).Spandrel beam: 450x750mm.Assume fck=30N/mm^2, fy=415N/mm^2, storey height- 3m. If the joint may experience slow reversal of moments due to wind loads, design the joint. Check for column moment capacity, stability conditions of column with capacity of beam and check for confinement by transverse steel.

OR

20. How will you ensure quality in concrete structures.

(6x6marks=36)