

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST SEMESTER M. TECH DEGREE EXAMINATION**

Civil Engineering

(Structural Engineering & Construction Management)

04 CE 6407 -ADVANCED DESIGN OF CONCRETE STRUCTURES

Max. Marks : 60

Duration: 3 Hours

Use of relevant codes are permitted

PART A

Answer All Questions

Each question carries 3marks

1. What do you understand by the term limit state of serviceability?
2. Define the following terms: flatslab, panel, column head, drop.
3. Discuss the need for boundary elements in shear wall.
4. Give a brief description about the analysis of a frame subjected to gravity load.
5. What is the purpose of shear reinforcement and why should we provide atleast minimum shear reinforcement in beams.
6. With figure explain stress strain curve for confined concrete.
7. State the assumptions made in baker's method of analysis.
8. Explain the behaviour of beam column joints during seismic loading.

PART B

Each question carries 6marks

9. Design a deep beam 300mm wide and 4m deep simply supported over a clear span of 6m. The beam carries a live load of 160kN/m at the service state and is supported on walls of 600mm thick on each end. Design a corbel for a 450mm square column to support a vertical ultimate load of 700kN, with its line of action 300mm from the face of column.

OR

10. A one way slab of effective span 4.2m is subjected to a total load, inclusive of self weight of 10kN/m^2 and is reinforced with 10mm bars at 125mm c/c in short span with distributors of 8mm diameter at 200mm c/c, if the total depth of slab is 200mm with effective depth 165mm, calculate the maximum short term deflection as per IS 456.

11. Design an interior panel of a flat plate with $6\text{m} \times 6\text{m}$ panels rest on $0.5\text{m} \times 0.5\text{m}$ column has to carry a live load of 6 kN/m^2 and floor finishing load of 1 kN/m^2 . Use M20 concrete and Fe 415 steel.

OR

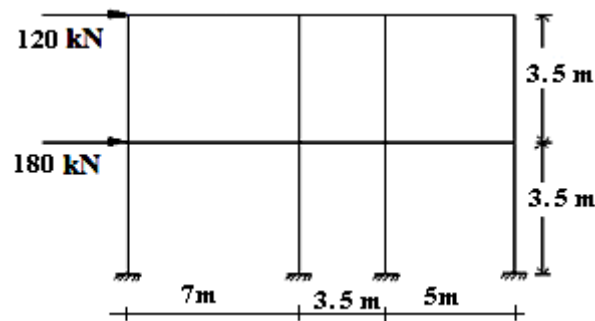
12. A flat slab panel of dimensions $5\text{m} \times 6\text{m}$ supported by columns of size $450\text{mm} \times 450\text{mm}$ has a slab thickness of 150mm and is designed for a working (total) load of 9 kN/m^2 . Check the safety of the slab in punching shear and provide shear reinforcement if required. Assume M20 and Fe 415 steel.

13. Design the RC grid floor to cover a floor area of $12\text{m} \times 18\text{m}$. The spacing of ribs in mutually perpendicular direction is 1.5m c/c . Live Load on floor is 3 kN/m^2 . Assume ends are simply supported. Use IS. 456:2000 method. Use M20 concrete and Fe 415 steel.

OR

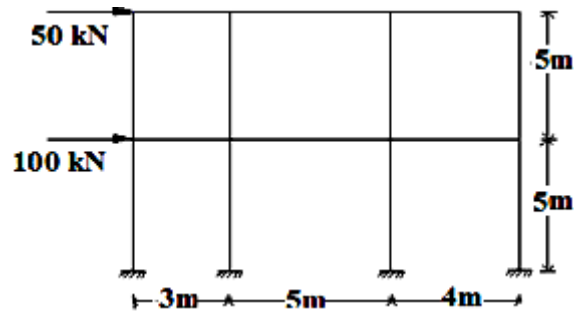
14. A reinforced concrete grid floor is $12\text{m} \times 16\text{m}$ with the centre to centre spacing of ribs at 2m both ways. Determine the bending moment and shears at the salient points. Assume slab thickness is approximately $1/20\text{th}$ span, total load including self-weight is 6.5 kN/m^2 , $f_{ck} = 20\text{ N/mm}^2$, and is simply supported on all the four sides.

15. Analyse the frame shown in figure by portal method and calculate the column moments and beam moments for all columns and beams.



OR

16. Analyse the frame shown in figure by cantilever method assuming all columns have same area of cross section.



17. Obtain the maximum elastic moment diagram for the ultimate stage before redistribution of moments and design moment envelope after 30% redistribution of moments for a two span continuous beam ABC 12 m long and freely supported at ends A and C, continuous over the central support B, 6m from A to carry a DI of 10kN/m and LL of 15kN/m. (consider only maximum negative moment at B)

OR

18. A rectangular beam is 20cm wide and 40cm deep upto the centre of reinforcement. Find the area of reinforcement required if it has to resist a moment of 25kNm. Use M20 concrete mix and Fe 415 steel.

19. Why is ductility considered important in design? How can we achieve desired ductility by design methods?

OR

20. A rectangular column 650 x 500mm in size. Find the diameter and spacing of lateral reinforcement used for confinement assuming that the concrete used is M20 concrete and Fe 415 steel