APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER M. TECH DEGREE EXAMINATION

Civil Engineering

(Structural Engineering and Construction Management)

04CE6407—Advanced Design of Concrete Structures

Max. Marks: 60   Duration: 3 Hours

Use of IS 456 -2000 and Interaction Curves are permitted

PART A
Answer All Questions
Each question carries 3 marks

1. List out the methods of design of slender columns. Explain any one method.
2. Derive the equation for determining the ultimate load on a simply supported square slab using equilibrium method of analysis.
3. Explain the minimum requirements of reinforcements in ordinary walls.
4. Explain the portal method analysis of frames subjected to horizontal forces
5. Explain the stress – strain curve for inelastic analysis of concrete structures.
6. Write short notes on redistribution of moments in continuous beams.
7. List out the assumptions made in bakers method for plastic analysis of frames.
8. How the quality of concrete can be evaluated at construction sites?

PART B
Each question carries 6 marks

9. A simply supported beam of rectangular section 250 mm wide by 450 mm overall depth is used over an effective span of 4 m. The beam is reinforced with 3 bars of 20 mm diameter Fe415 HYSD bars at an effective depth of 400 mm. Two hanger bars of 10 mm diameter are also provided. The self weight of the beam together with the dead load on the beam is 4kN/m. If the service load on the beam is 10 kN/m and the grade of concrete used is M20 compute the short term deflection.

Or

10. A continuous deep beam spanning over three equal spans of 8 m each has an overall depth of 4 m. The width of support is 0.8 m. The beam supports an udl of 150 kN/m. Design suitable reinforcement for the central span of the deep beam. Width of beam is 0. 4 m.

11. A RCC slab 5 m. x 5 m. in plan is simply supported along its four edges, and is reinforced with
10 mm diameter Fe-415 grade bars at 150 mm c/c both ways. Slab is 130 mm. thick; with average effective depth of reinforcement as 100 mm. Slab carries a floor finish weighing 2 kN/m^2. M-20 concrete is used. Compute the service load on slab, from fundamentals of yield line theory. Take load factor = 1.50.

Or

12. A typical flat slab floor has panels of 8 m. x 6 m. in size. It is subjected to LL of 4 kN/m^2 and surface finish of 1 kNlm^2. Thickness of slab is 260 mm. Size of drop is 3 m x 3 m. Thickness of drop is 325 mm. Dimensions of column head is 2 m x 1.5 m. Check the slab and drop for shear.

13. Design a RCC grid floor for a hall measuring 9 m. x 12 m., with ribs spaced at 1.5 m. c/c in both ways. Live-load on floor is 3.0 kN/m^2. Use M-20 concrete and Fe-415 grade steel, Assume the floor slab to be simply supported as all four edges.

Or

14. Why boundary elements are provided in shear wall. Explain how the boundary elements are designed in a shear wall.

15. A reinforced concrete slab 6m X 5m is discontinuous on one of the longer sides and is continuous on all other sides. If it carries a factored load of 9 kN/m^2, find
   a) The loads supported by the beams
   b) The equivalent load for the bending moment, for the continuous long beam.

Or

16. Explain in detail how frames are analysed for lateral loads.

17. A reinforced concrete slab is 105 mm thick with 20 mm effective cover. If the positive steel reinforcement provided is 424 mm^2/m, determine the approximate moment – curvature diagram. Assume M25 grade concrete and mild steel.

Or

18. Explain the factors that influence rotation at a plastic hinge.

19. List out the factors that can enhance ductility in R C members.

Or

20. Explain the various factors to be considered while designing a joint for strength considerations.