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M.Tech. (Civil Engg.) (Sem.-1)

ADVANCED STRUCTURAL DESIGN

Subject Code : MTCE-205

M.Code : 74241

Date of Examination : 25-01-2023

Time : 3 Hrs. **Max. Marks : 100**

INSTRUCTIONS TO CANDIDATES :

1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWENTY marks.**

1. a) Design a flat slab for a garage using the following data :

   Loading – 10 KN/m^2

   Column Grid – 8m × 8m

   Materials – M20 grade of concrete and Fe 415 grade HYSD bars

   Design the interior panels of slab with drops. Design the flat slab panel and sketch the reinforcement details.

   b) Write advantages and disadvantages of flat slabs as compared to other slabs.

2. Design the rear counterfort of a counterfort retaining wall of total height 7.5m, used to retain granular material of 6.2m height. Also design and detail curtailment of reinforcement in the counterfort. Top of embankment is horizontal. Weight of earth is 18KN/m^3 and angle of repose is 30°. Thickness of heel slab is 400mm and c/c spacing of counterfort may be taken as 3.25m. Use M20 grade of concrete and mild steel. Sketch the reinforcement details also.

3. a) Design a spherical dome for a hall of 10 m diameter. The rise of the dome is to be 2.2m. The dome carries a lantern load of 12 kN at the crown acting on an area of 1.6 m diameter. Live load including finishes may be taken as 1.2 kN/m^2.

   b) What is difference brackets and corbels?

4. Determine the yield pattern and collapse load of a two way slab of clamped edges along four sides. Assume $M_{PX} = M_{nx} = 50$ KNm/m and $M_{py} = M_{ny} = 70$ KNm/m while Lx = 8m and Ly = 6m.

5. a) Why are deep beams designed for bending moment?

   b) A transfer girder 5.25 m length supports two columns located at 1.75m from each end. Column loads = 3750KN. Total depth of the beam = 4.2m and width of support = 520mm. Grade of concrete = M40, Fe = 415 steel. Design and detail the girder.

6. a) Design substitute frames and loading conditions for maximum moment values of different critical points of a building frame.

   b) What are the conditions under which a frame sways?

7. a) Explain the portal method for analyzing a building frame subjected to horizontal forces.

   b) What are the limitations of yield line theory?

8. a) Write difference between grid floor system and beam and slab floor system.

   b) How slab will analyze with grid system by plate theory? Give your answer with a proper example.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.