Shantilal Shah Engineering College, Bhavnagar

Applied Mechanics Department

(X80602) Structural Design-II

Tutorial

PDDC 8th Semester Civil Engineering

1. The substitute frame shown in Fig. 1 to be analysed for maximum positive and negative moment in the beams AB, BC and CD. Use the following data to estimate the maximum moments in beams and columns. The beams are spaced at 3m intervals.
   Thickness of floor slab =100mm, Live load =2kN/m^2, Floor finissh - 0.6kN/m^2, size of beams =200mm by 400mm deep, Size of column 200mm by 400mm.

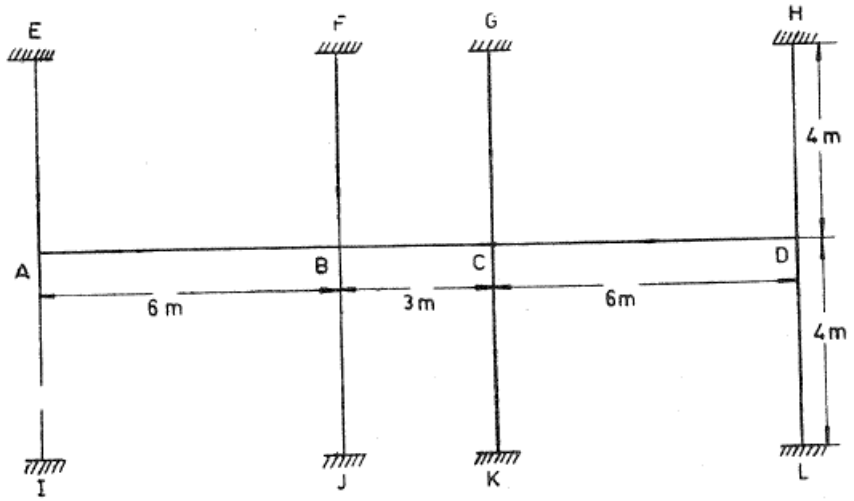

Fig.-1

2. Design a portal frame hinged at base to suit the following data:
   Spacing of portal frames=4m centers
   Height of Column =4m
   Deistance between column centers=20m
   Live load on roof =1.5kN/m^2.
   R.C. C. Slab continuous over portal frames. Safe bearing capacity of soil site=200kN/m^2. Adopt M20 grade concrete and Fe-415 grade for steel.

Design the slab, portal frame and foundations and skethc the details of reinforcements.

3. A rectangular water tank 3m by 3m in plan and of depth 3m is supported on a tower 6m height . Number of columns=4. The columns are braced at mid height. Thewind pressure on the tank may be taken as 1kN/m^2. Assume dead weight of tank 160kN. Wight of water in tank =280kN. Adopt M30 grade concrete and Fe-500 grade steel and designn the columns and brace of the supporting tower. The columns are provided with rigid foundaiton so that fixity conditions may be assumed at the column base.
4. Design rectangular underground RC water tank with the capacity of 3,00,000 liters capacity. The tanks is closed by at the top by RCC slab. Assume SBC of soil is 200kN/m^2, unit weight of soil is 18kN/m^3. Use M30 Grade concrete and Fe500 grade steel.
5. Design circular RC water tank with the capacity of 3,00,000 liters capacity resing on the ground with sliding base. The tanks is open by at the top. Assume SBC of soil is 200kN/m^2, unit weight of soil is 18kN/m^3. Use M30 Grade concrete and Fe500 grade steel.
6. A cantilever-retaining wall is required to retain earth 3.8 m high above the ground level. The backfill surface is inclined at an angle of 15° with the horizontal and the backfilled soil has a unit weight of 18 kN/m^3 and an angle of internal friction of 30°. The exposure condition is moderate. Assume that the SBC of soil is 150 kN/m^2 and that the coefficient of friction between the soil and concrete is 0.5. Design the RC retaining wall. Adopt M25 grade concrete and Fe-415 grade steel.
7. Design a counterfort-type retaining wall to retain a 6.8 m high backfill above the ground level. The unit weight and SBC of the soil at site are 18 kN/m^3 and 170 kN/m^2, respectively. The angle of internal friction of soil and coefficient of friction are 30° and 0.6, respectively. The exposure condition is moderate. Adopt M25 grade concrete and Fe-415 grade steel.