CE709 - Elective-II : Advanced RCC Design

P. Pages : 2

Time : Three Hours

13 5 4

Max. Marks : 80

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Notes : 1. All questions carry equal marks.
2. Assume suitable data wherever necessary.
3. Illustrate your answers wherever necessary with the help of neat sketches.
4. I. S. I. Hand Book for I. S. code 8000/1962 or 1964, I. S. 456 (Revised), I. S. 875 may be consulted IS 3370 (Revised), IRC 21 (Revised).

1. Analyse the multistory frame shown in fig. for moments in the ground floor columns IM, JN, KO and LP and the beam IJ, JK and KL. Adopt the following data L = 6.2m and h = 3.1 m, wind load are H_1 = 5.9 kN, H_2 = 12 kN and H_3 = 12 kN. The column having some cross section. **20**
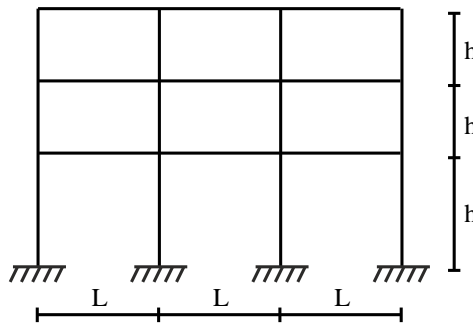

Fig. 1

OR

2. A four bay multistoreyed frame has the following details. Continuous beam ABCDE. With AB = BC= CD = DE = 3.5 m. Height between floors = 4 m. Size of beams = 300mm by 500mm size of columns = 300mm by 400mm. Thickness of floor slabs = 140mm. floor finish = 1 kw/m^2 live load = 2 kN/m^2. Estimate the maximum design moments in the beams and columns. Assume four storeys in the building. **20**

3. Design Top ring beam, cylindrical wall and Bottom ring beam of intze type water tank of capacity 8,50,000 liters supported on symmetrically placed 6 columns. Use m25 and Fe 415 materials. **20**

OR

4. Design a reinforced slab culvert for the following requirement. **20**
Clear span = 6m
Width support = 400mm
Width of carriage way = 7.5m
Width of Kerb = 600mm
Types of loading = IRC, class AA
Grade of concrete = M 20
Grade of steel = Fe 415
Sketch the details of reinforcement by showing longitudinal and cross sectional views.

5. Design the side wall and hopper bottom of a rectangular bunker of capacity 320 kN to store   **20**
where given.
   i)   Unit weight of wheat = 8.5 kN/m^3.
   ii)   Angle of repose = 28
   iii)   Size of bunker = 3m by 3m
   Use M20 grade concrete and Fe 415 steel.

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OR

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6. A Silos with internal diameter 5.5m height of cylindrical portion 18m central opening   **20**
with 0.5m is to be built to store wheat. Design the silos using M25 grade concrete and
Fe415 steel Given
   i)   Unit weight of wheat = 8.5 kN/m^3.
   ii)   Angle of internal friction = 28
   iii)   Angle of wall friction = 0.75 ϕ while filling = 0.60 ϕ while empty

   iv)   Pressure ratio = $\left(\dfrac{P_h}{P_v} \right)$ = 0.5 while filling

   Use Janssen's theory for pressure calculation

7. A multistory building of overall size 12m by 12m has 16 reinforced concrete columns of   **20**
size 300mm by 300mm spaced at interval of 4m on each side forming a square gride
showing in fig (2) Each column transmits a service load of 500 kN at the base. The safe
bearing capacity of the soils at site is 100 kN/m^3 Adopting M20 grade concrete and Fe415
HYSD reinforcement.
     Design a raft foundation comprising the interconnecting beam and column and the
inverted slab and sketch the details of reinforcements in the structural element of the raft.

Fig. 2

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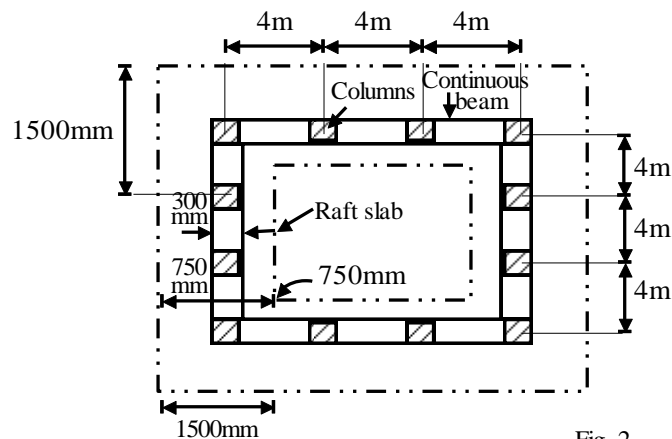
OR

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8. a)   Design R. C. pile to support a load of 600 kN transmitted from reinforced concrete column.   **10**
     The pile is to be driven to a hard stratum available at a depth of 9m. Adopte M20 grade of
     concrete and Fe415 HySD bars. sketch the details of reinforcement in the pile.

    b)   Reinforced concrete column 400mm by 400mm carrying of 700kN is supported on two   **10**
     piles of 400mm by 400mm in section the centre to centre distance between the pile is
     1.5m. Design suitable pile cap. Using M25 grade of concrete and Fe415 HySD steel.

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