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M.Tech. (Civil Engg.) (2016 Batch) (Sem.-1)
ADVANCED STRUCTURAL DESIGN
Subject Code : MTCE-205
M.Code : 74241

Time : 3 Hrs.   Max. Marks : 100

INSTRUCTION TO CANDIDATES :
1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.

1. Design the stem of a cantilever retaining wall for the following requirements:

    Height of wall above ground level   -5 m

    Superimposed load due to road traffic   -18 kN/m^2

    Unit weight of fill   -18 kN/m^2

    Angle of internal friction for fill material -28°

    Allowable bearing pressure on ground   -150 kN/m^2

    Coefficient of friction between concrete and ground   -0.4

    Height of parapet wall on top of stem   -1 m

    Use M-20 concrete and Fe-415 grade steel.

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

    Loading   -10kN/m^2

    Column grid   -8 m × 8 m

    Materials   -M-20 grade concrete

                  Fe-415 grade HYSD bars

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

3. a) Discuss 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?

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4. Design a symmetrical deep beam one half of which is shown in figure 1. It supports two loads kN at 400 mm from supports on each side. Assume fy = 415 N/mm^2, grade 25 concrete and effective span 1650 mm.
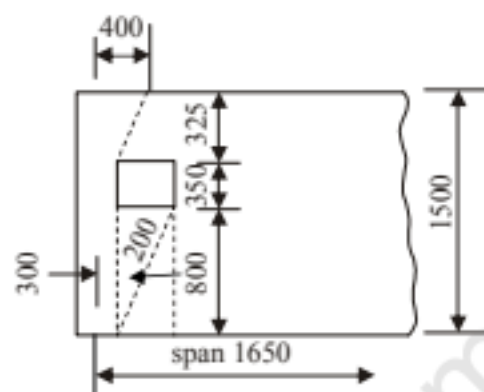

FIG.1

5. A simply supported rectangular slab 4.5 m long and 3 m wide carries an ultimate load of 15 kN/m^2. Determine the design moments for case when the moment of resistance of the short span is 30% greater than that in the direction of long span.

6. Explain the portal method for analysing a building frame subjected to horizontal forces.

7. A two span intermediate frame of a multi-storeyed building is shown in figure 2. The frames are spaced at 5 m intervals. The dead load and live load per meter run of the beam may be taken as 15kN/m and 20 kN/m respectively. Analyse the frame using two cycle method of moment distribution. If wind loads of 15 kN and 30 kN are acting at joint A, B and C respectively. Analyse the frame by portal method. Assume that all the columns have equal area of cross section for the purpose of analysis.

FIG.2

8. A square slab is simply supported on three sides and is free on the fourth side. If the moment capacities are equal in both directions, calculate the collapse load.

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.