Roll No. Total No. of Pages: 02

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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/m²

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 $-8 \text{ m} \times 8 \text{ m}$

Materials -M-20 grade concrete

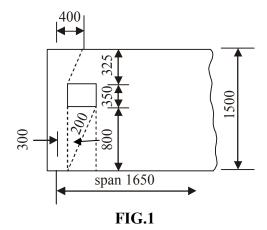
Fe-415 grade HYSD bars

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

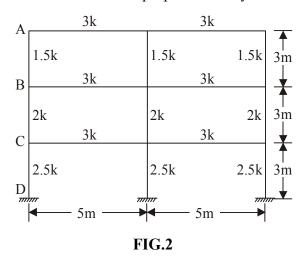
- 3. a) Discuss substitute frames and loading conditions for maximum moment values of different critical points of a building frame.
 - b) What are the conditions under which a frame sways?

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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/mm², grade 25 concrete and effective span 1650 mm.



- 5. A simply supported rectangular slab 4.5 m long and 3 m wide carries an ultimate load of 15 kN/m². 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.



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.

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