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17CV72

Seventh Semester B.E. Degree Examination, July/August 2022  
**Design of RCC and Steel Structures**

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any ONE full question from module – 1 and module - 2.  
2. Use of IS 456, IS-800, SP 6(1); SP-16 and steel tables are permitted.

**Module-1**

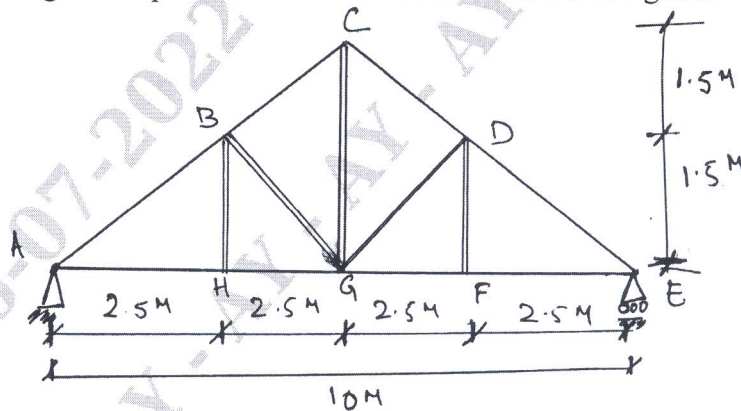
- 1 Design a slab type rectangular combined footing for two columns of size 300 mm × 450 mm and 300 × 600 mm, subjected to axial loads of 650 kN and 900 kN respectively. The columns are spaced at 3.6 m c/c. The width of the footing is restricted to 1.8 m. Use M20 grade concrete and Fe-415 grade steel. Assume SBC of soil = 160 kN/m<sup>2</sup>. (50 Marks)

OR

- 2 Design a RCC portal frame having an effective span of 8m and an effective height of 5m. The portal frames are spaced at 4 m c/c. The live load on slab is 3 kN/m<sup>2</sup>. Assume SBC of soil as 120 kN/m<sup>2</sup>. The base of column are fixed. Use M20 grade concrete and Fe 415 steel. Assume floor finish is 1 kN/m<sup>2</sup>. Draw suitable sketches showing reinforcement details. (50 Marks)

**Module-2**

- 3 Design a steel roof truss with its geometry as shown in Fig.Q3. The analysed forces in the rafter (principal), principal tie and for major sling member. Determine the maximum design forces due to load combinations as per IS800 for the above mentioned members and design the same members with all the necessary checks including for reversal of stresses. Use 16 mm diameter bolt of grade 4.6 for the member end connections. Write a neat sketch of the design describing all the parts. Steel section available is Fe 410 grade.



10m  
Fig.Q3

Member	Length (m)	Dead Load (kN)	Live load (kN)	Wind load (kN)
Rafter (AB)	2.92	-58.0	-52.50	+111.6
Tie (AH)	2.50	+52.0	+47.00	-102.4
Sling (Bg)	2.92	+20.3	+18.40	-63.0

Note: + → Tensile force      - → Compressive force

(50 Marks)

OR

4 Design a simply supported gantry girder to carry an electrically operated travelling crane with the following details:

- (i) Span of the crane bridge = 25 m
- (ii) Span of the gantry girder = 8 m
- (iii) Wheel base = 3.5 m
- (iv) Crane capacity = 200 kN
- (v) Weight of crane bridge = 150 kN
- (vi) Weight of trolley (crab) = 75 kN
- (vii) Minimum hook distance = 1.0 m
- (viii) Weight of rail = 0.30 kN/m
- (ix) Height of rail = 105 mm

Draw neatly cross section of gantry girder showing all details. Also draw side view.

(50 Marks)

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