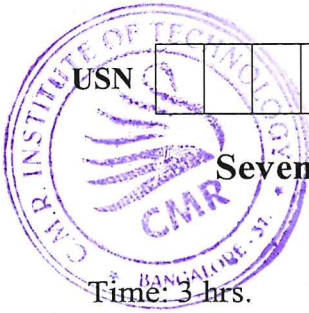


# CBCS SCHEME



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17CV72

## Seventh Semester B.E. Degree Examination, Jan./Feb. 2021 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 may be permitted.

### Module-1

- 1 Design a cantilever retaining wall to retain earth embankment 4.0 m high above the average ground level. The density of soil is  $18 \text{ kN/m}^3$  and its angle of repose is  $30^\circ$ . The safe bearing capacity of the foundation soil may be taken as  $200 \text{ kN/m}^2$ . Coefficient of friction between soil and concrete may be taken as 0.5. Use M20 grade concrete and Fe-415 steel. Design all the components of the retaining wall with necessary checks and write a neat sketch of the cross section of the components showing reinforcement details. (50 Marks)

OR

- 2 Design a combined rectangular footing slab type for two columns A and B, carrying loads of 500 kN and 700 kN respectively. The cross section dimension of column 'A' is  $300 \text{ mm} \times 300 \text{ mm}$  and column 'B' is  $400 \text{ mm} \times 400 \text{ mm}$ . The width of the footing is restricted to 1.80 m. the centre to centre spacing of columns is 3.40 m. The safe bearing capacity of the foundation soil is  $150 \text{ kN/m}^2$ . Use M20 grade concrete and Fe-415 steel. The design must include all the necessary safety checks and write a neat sketch of the cross section of the components showing the reinforcement details. (50 Marks)

### Module-2

- 3 Design a simply supported welded plate girder for an effective span of 24.0 m. The plate girder is laterally supported for its entire length and it is subjected to an imposed service load of  $75 \text{ kN/m}$  which is inclusive of its self weight. The steel plates available is of Fe-410 grade. The design includes proportioning the dimensions of web and flange plate, section classification, check for bending and shear capacity of the section, design of welded connections and necessary stiffness along with check for deflection. Write a neat sketch of design details describing all the parts. (50 Marks)

OR

- 4 Design a steel roof truss with its geometry as shown in Fig.Q4. The analysed forces in the members due to dead load, live load and wind load are given in Table.Q4 for principal rafter, principal tie and for major sling member. Determine the maximum design forces due to load combinations as per IS-800 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 details describing all the parts. Steel section available is Fe-410 grade.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

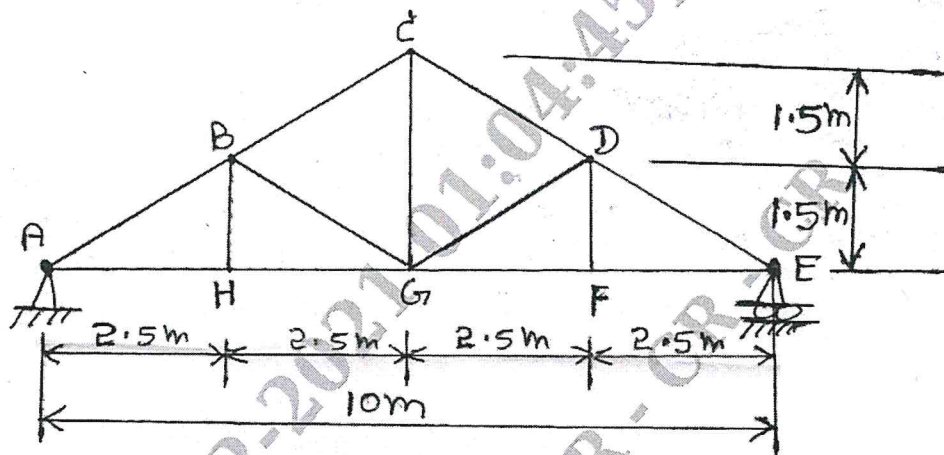


Fig.Q4

Member	Length (m)	Dead Load (kN)	Live Load (kN)	Wind Load (kN)
Rafter (AB)	2.92	-58.0	-52.5	+111.6
Tie (AH)	2.50	+52.0	+47.0	-102.4
Sling (BG)	2.92	+20.3	+18.4	-63.0

Note: + → Tensile force  
 - → compressive force

Table.Q4

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(50 Marks)