Seventh Semester B.E. Degree Examination, July/August 2021
Design of RCC and Steel Structures

Time: 3 hrs.   Max. Marks: 80

Note: 1. Answer any TWO full questions.
2. Use of IS456:2000, SP(16), IS800:2007, Steel tables are permitted.

1   Design a portal frame for an effective span of 8 m and effective height of 4m. The portal frames are spaced at 3.5m c/c. The live load on the roof is 2 kN/m². SBC of soil is 150 kN/m². Take M20 grade of concrete and Fe-415 steel. Assume the frame is fixed. Sketch the reinforcement details. Design the beam, column and footing only.   **(40 Marks)**

2   Design a Cantilever Retaining Wall for a height of 4m above ground level. Density of earth is 18 kN/m³. Angle of internal friction/repose is 30°. Take SBC as 200 kN/m². Coefficient of friction between soil and concrete is 0.5. Use M20 grade concrete and Fe-415 steel. Sketch the reinforcement details.   **(40 Marks)**

3   Design a simply supported gantry girder manually operated with following data:
i)   Span of crane = 20m
ii)   Span of gantry = 7m
iii) Weight of crane excluding crab = 220 kN
iv)   Capacity of crane = 250 kN
v)   Weight of crab = 60 kN
vi)   Wheel base distance = 3.5m
vii) Minimum hook approach = 1.1m
viii) Height of Rail = 60mm
Draw the C/S and L/S of the gantry.   **(40 Marks)**

4   Design a Roof truss, for the forces given in the table. Design the Anchor bolt for an uplift force of 15 kN and bearing plate for reaction of 50 kN. Design all the critical components of truss. [Refer Fig.Q4]
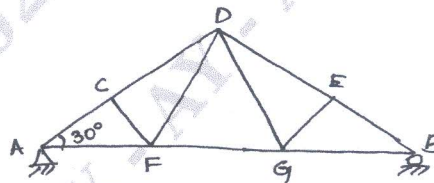

Fig.Q4

Sl.No.	Member	Force (kN) in member	Nature of Force	Length of member 'm'
1	AC, BE	80	Compression	3.46
2	CD, DE	70	Compression	3.46
3	AF, BG	70	Tension	4
4	FG	50	Tension	4
5	DF, DG	24	Tension	4
6	CF, EF	24	Compression	2

Draw the Elevation of Roof truss showing detail of Angles and connection.   **(40 Marks)**

* * * * *