17CV72

USN

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Design of RC and Steel Structures

Time: 3 hrs.   Max. Marks: 100

Note: 1. *Answer any TWO full questions choosing one from each module.*
2. *Use of IS456, IS800, SP(6), Steel tables are permitted.*
3. *Assume any Missing data suitably.*

Module-1

1   Design a slab type rectangular combined footing for two columns of size 300mm × 450mm and 300mm × 600mm, subjected to axial loads of 650kN and 900kN respectively. The columns are spaced at 3.6m C/C. The width of the footing is restricted to 1.8m. Use M_{20} grade concrete and Fe415 grade steel. Assume SBC of soil $\Rightarrow$160 kN/m². **(50 Marks)**

OR

2   An RC portal frame with a hinge base is required to suit the following data :
Spacing of portal frames $\Rightarrow$ 4m C/C   ;   Height of column $\Rightarrow$ 4m
Difference between column centers $\Rightarrow$ 10m   ;   Live load on roof $\Rightarrow$ 1.5 kN/m².
The RC slab is continuous over the portal frame, SBC of soil $\Rightarrow$ 200 kN/m².
Materials : M_{20} and Fe415 steel are used. Design the slab, portal frame and foundation. **(50 Marks)**

Module-2

3   Design a roof truss shown in Fig. Q3, with forces in each member of the truss is given in table 1. The size of RC column supporting the truss is 300mm × 300mm. Use M20 grade concrete for column. Design the truss using bolt of M16, property class 4.6 for connections and also design anchor bolts. **(50 Marks)**

Fig.Q3
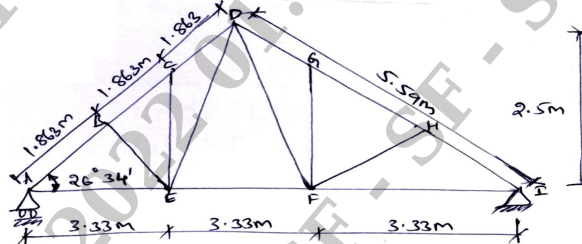
Member	Design force in kN	
	Compression	Tension
Top chord	54.25	-
Bottom chord	-	48.31
Diagonal (DF, DE)	14.35	-
Member (BE, HF)	-	24.50
Member (CE, GF)	12.40	-

Table – 1.

OR

4   Design a simply supported crane gantry girder for the following data :
Span of crane girder $\Rightarrow$ 20m ; Span of gantry girder $\Rightarrow$ 7m ; Capacity of the crane $\Rightarrow$ 220kN
Self weight of crane excluding the crab $\Rightarrow$ 200 kN   ;   Weight of crab $\Rightarrow$ 60kN
Wheel base distance $\Rightarrow$ 3.4m ; Min hook approach $\Rightarrow$ 1.10m ; Self weight of rail $\Rightarrow$ 0.3kM/mm
Height of rail $\Rightarrow$ 70mm. **(50 Marks)**

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