USN ☐☐☐☐☐☐☐☐☐☐

18CV72

Seventh Semester B.E. Degree Examination, June/July 2024
Design of RCC and Steel Structures

Time: 3 hrs.   Max. Marks:100

Note: *1. Answer any ONE full question each from Module-1 and Module-2.*
2. Use of IS – 456, IS – 800, SP – 16, SP(6) and steel tables is permitted.
3. Missing data, if any, may be suitably assumed and same must be stated clearly.

Module - 1

1 Design a cantilever Retaining wall to retain an earthen embankment 5m height above GL. Given Density of backfill = $18kN/m^3$; Angle of internal friction = 30º : Co-efficient of friction between soil and slab = 0.5 and SBC of soil = $200kN/m^2$. Adopt M_{20} grade concrete and Fe 415 steel. Draw a neat sketch of the designed reinforcement details. **(50 Marks)**

OR

2 Design a rectangular combined footing for supporting two columns 400mm × 400mm in size to carry a load of 1000kN each. Centre to centre distance between the columns is 3.5m. The projection of the footing on either side of the column with respect to centre is 1m. SBC = $190kN/m^2$. Adopt M_{20} grade of concrete and Fe 415 steel. Draw a neat sketch of the designed reinforcement detail. **(50 Marks)**

Module – 2

3 The line diagram of a truss with loads and tabulation of factored member forces are shown in the Fig Q3. Design the various members of the roof truss along with their end connections with gusset plates by bolts. Assuming the thickness of supporting walls as 450mm, design the supports consisting the shoe angle bearing plate, base plate by considering support reaction and anchor bolts for an uplift force of 15kN at each support. The bearing pressure of concrete may be taken as $4N/mm^2$. [Refer Fig. Q3 and Table Q3]
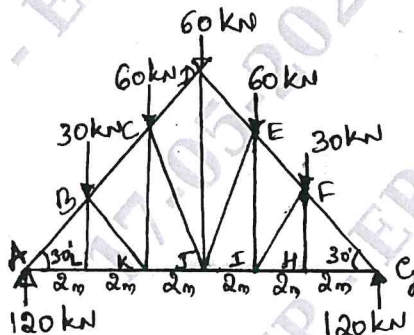

Fig Q3

Members	Length (m)	Force (kN)
AB, GF	2.31	-240
BC, FE	2.31	-210
CD, ED	2.31	-160.04
AL, GH	2	+207.84
LK, HI	2	+207.84
KJ, IJ	2	+181.32
BL, FH	1.154	0
BK, FI	2.31	-30
CK, EI	2.31	+15
CJ, EK	3.05	-66.05
DJ	3.46	-60

Table Q3

(50 Marks)

4. Design a simply supported welded plate girder with thick web without stiffness to carry a UDL of 50kN/m, over a span of 20m. Design the following :
   i)   C/s of the girder @ mid span
   ii) Curtailment of flange plates
   iii) Connection details
   Draw a neat sketch of designed details.

(50 Marks)

* * * * *