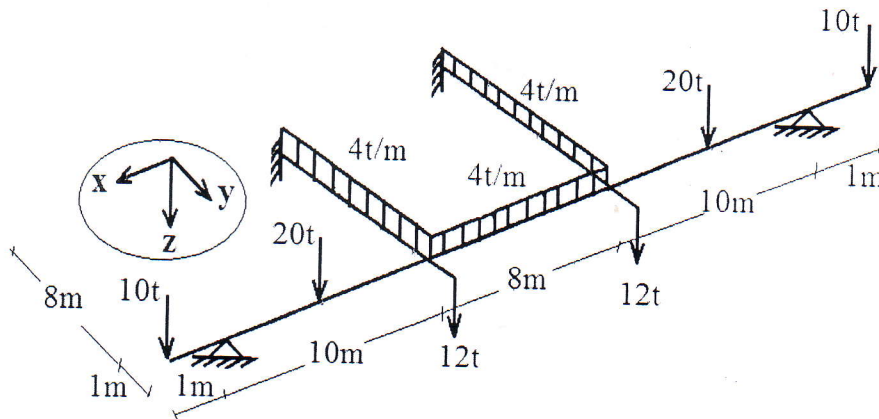**Allowed Tables and Charts:** *(None or e.g. Steam Tables)*

<u>Answer all the following Questions</u> [100 Marks]
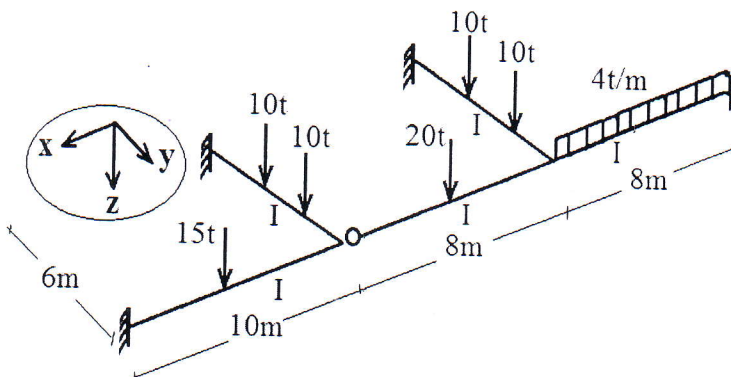
Marks

Question (1)

For the shown structure (Constant I and GJ = EI), draw shear force, bending moment and torsion moment diagram.

[30]

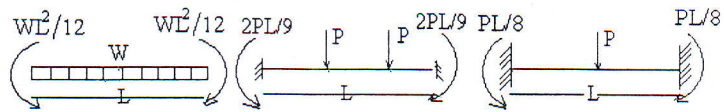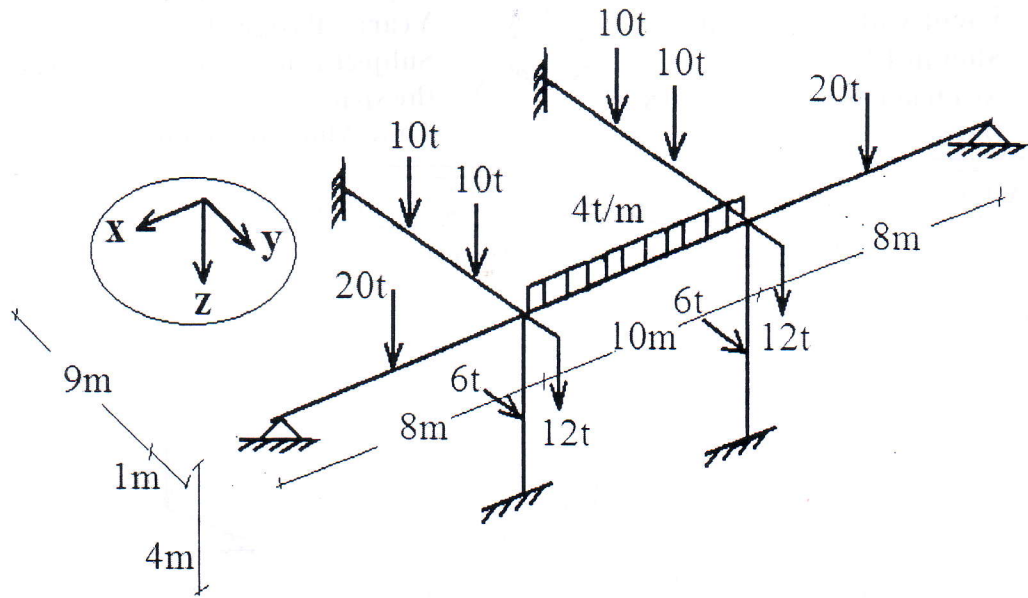

Question (2)

For the shown structure (EI = GJ), conclude the overall stiffness matrix.

[35]

Question (3)

[35]

For the shown structure, draw shear force, bending moment and torsion moment diagram (Constant I and GJ = EI).

x y z

9m
1m
4m

10t
10t
10t
10t
20t
20t
20t
4t/m
6t
6t
12t
12t
10m
8m
8m

$WL^2/12$ $WL^2/12$ $2PL/9$ $2PL/9$ $PL/8$ $PL/8$

W   P   P   P

L   L   L

With my best wishes