53 (CE 702) STAN-III

2014

STRUCTURAL ANALYSIS III

Paper : CE 702

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer ***any five*** *questions.*

1. Analysis the building frame subjected to horizontal loading as shown in *figure 1*. Find out beam axial forces, column axial forces, beam shear, column shear, beam moments, column moments. Draw bending moment diagram. 20

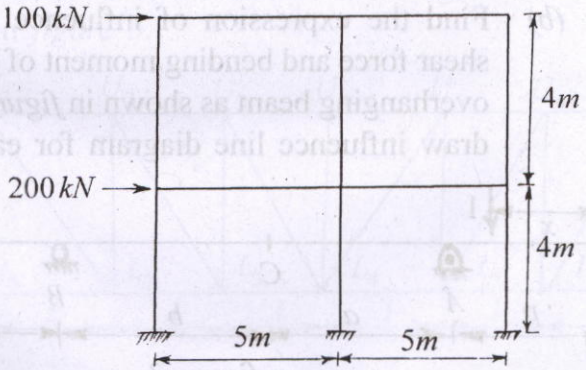

figure 1

2. *(a)* Approximately analyse the building frame subjected to vertical loading as shown in *figure 2*. Draw shear force and bending moment diagrams. 10

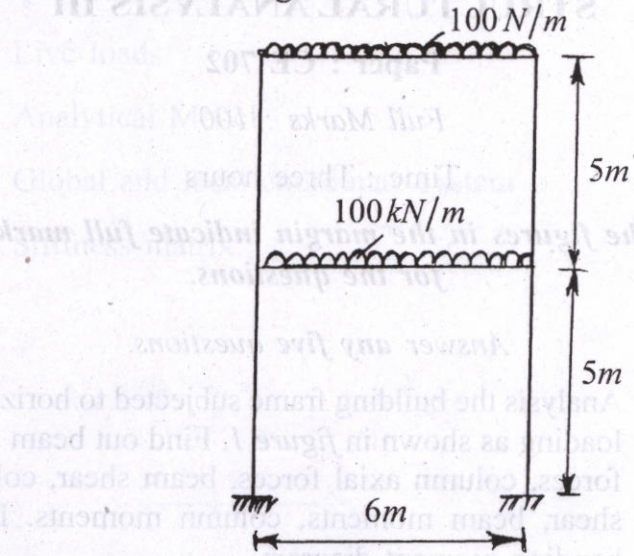

figure 2

(b) Find the expression of influence lines for shear force and bending moment of both side overhanging beam as shown in *figure 3*. Also draw influence line diagram for each one. 10

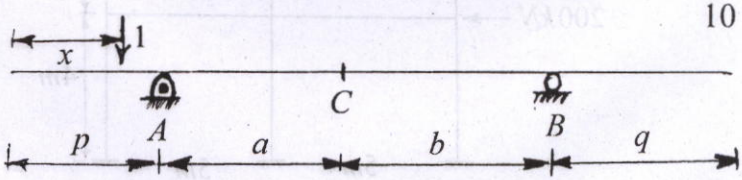

figure 3

3. *(a)* Write down the assumptions for portal method, and cantilever method. Also write step by step procedure for each method. 10

(b) Find out the absolute maximum bending moment for the loading condition as shown in *figure 4*. Loads are moving from left to right. 10

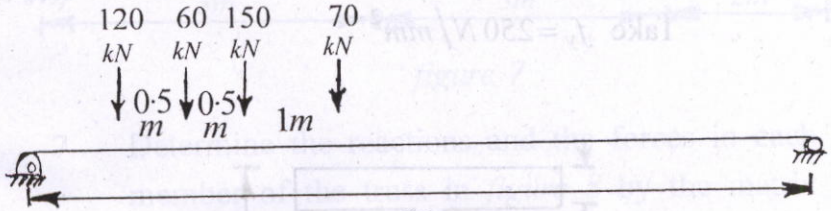

figure 4

4. Draw influence line diagram for all top and bottom chord members for bridge truss as shown in *figure* 5. 20

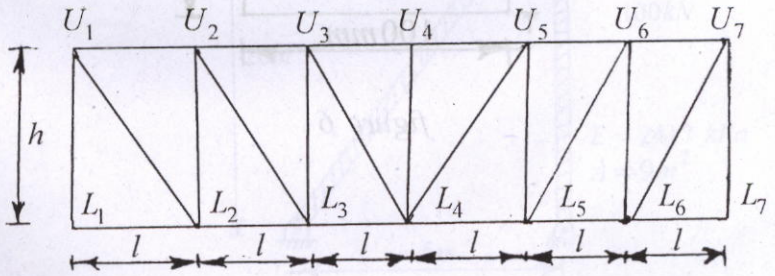

figure 5

5. *(a)* Write down the step-by-step procedure for the analysis of structure by the matrix stiffness method. 10

(b) Derive the expression for shape factor due to section modules. 10

6. *(a)* Determine the shape factor for the beam section shown in *figure 6*. Find also the fully plastic moment of the beam section. 10

Take $f_y = 250\, N/mm^2$

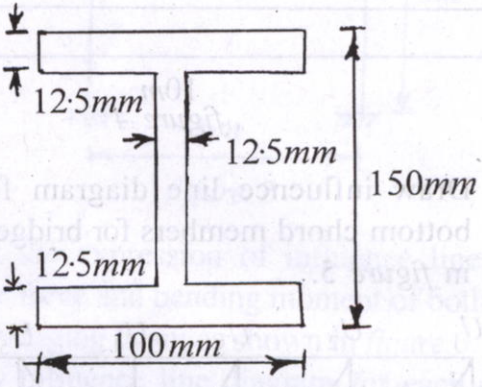

figure 6

(b) A simply supported beam of span $8m$ carries the load system as shown in *figure 7*. Design the beam by plastic theory. Allow a load factor of 1·75. Take $f_y = 250\,N/mm^2$. 10

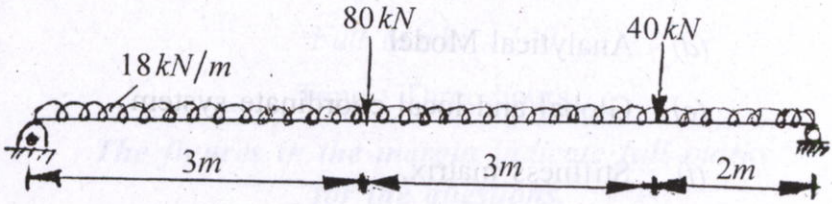

figure 7

7. Determine the reactions and the forces in each member of the truss in *figure 8* by the matrix stiffness method. Take $E = 2417\,kPa$, $A = 9m^2$. 20

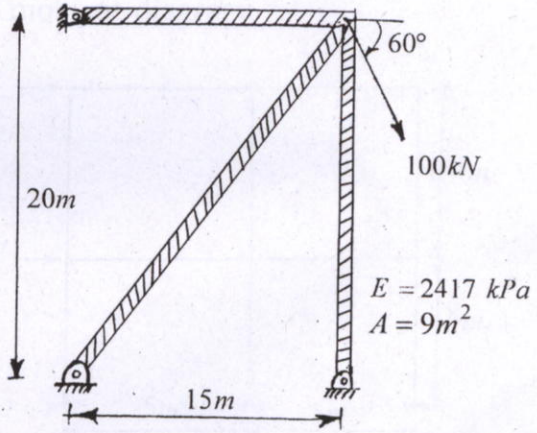

figure 8

8. Write Short Notes on : ***(any four)*** 20

(a) Portal Frame

(b) Qualitative Influence lines

(c) Live loads

(d) Analytical Model

(e) Global and local coordinate system

(f) Stiffness matrix.
