53 (CE 702) STAN

2016

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. *(a)* Analyse the building frame using approximate method as shown in *Figure* 1. 10

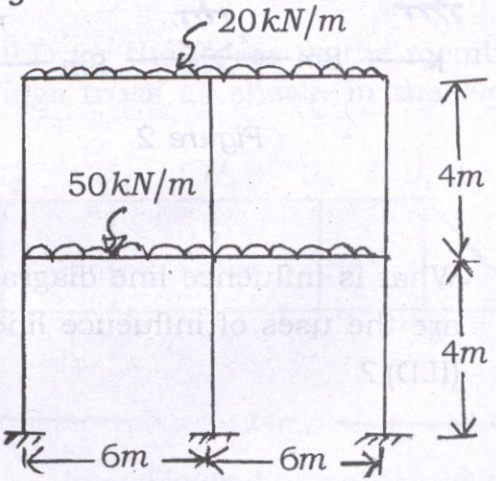

Figure 1

(b) Determine (approximately) the reactions including moment at the base of the column of the frame shown in *Figure* 2. Use portal method of analysis. 10

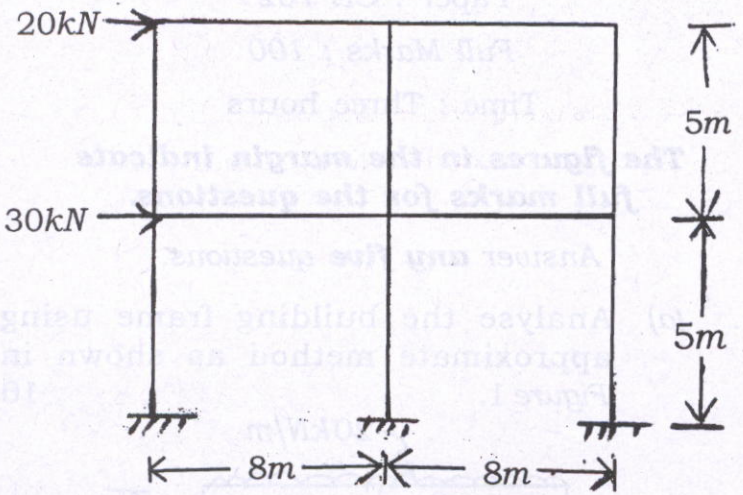

Figure 2

2. (a) What is influence line diagram ? What are the uses of influence line diagram (ILD) ? 5

(b) Find out the absolute maximum bending moment for the loading condition as shown in *Figure* 3. Loads are moving from left to right. 10

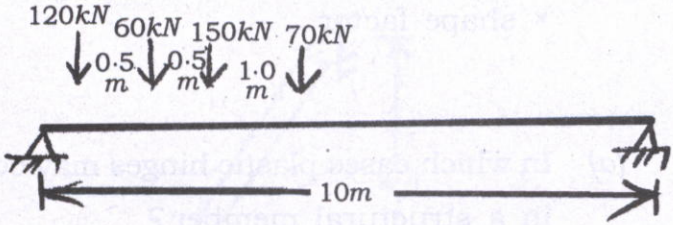

Figure 3

(c) Write down the assumptions for portal method and cantilever method. 5

3. Draw ILD for the forces in the members of the bridge truss as shown in the *Figure* 4. 20

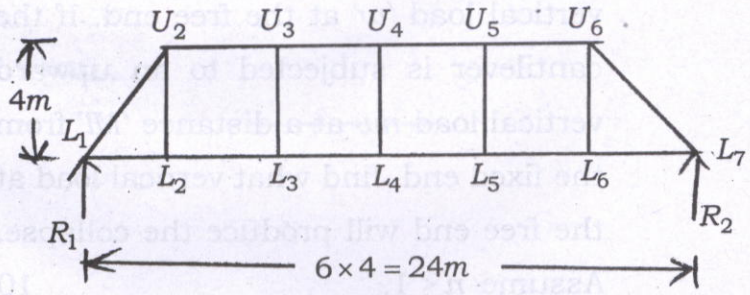

Figure 4

4. *(a)* Derive the expression for shape factor due to section modulus. 10

(b) Show that load factor = factor of safety × shape factor. 10

5. *(a)* In which cases plastic hinges may occur in a structural member? 5

(b) Show that shape factor for a rectangular section of a beam is 1·5. 5

(c) A cantilever of length '*l*' reaches a collapse state when subjected to a vertical load '*w*' at the free end. If the cantilever is subjected to an upward vertical load *nw* at a distance '*Ml*' from the fixed end, find what vertical load at the free end will produce the collapse. Assume $n < 1$. 10

6. Determine the force in each member of the two member truss shown in *Figure* 5 by the stiffness matrix method. Take *AE* is constant. 20

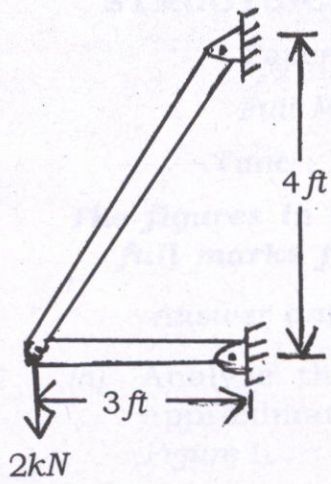

Figure 5