53 (CE 702) STAN–III

2017

STRUCTURAL ANALYSIS–III

Paper : CE 702

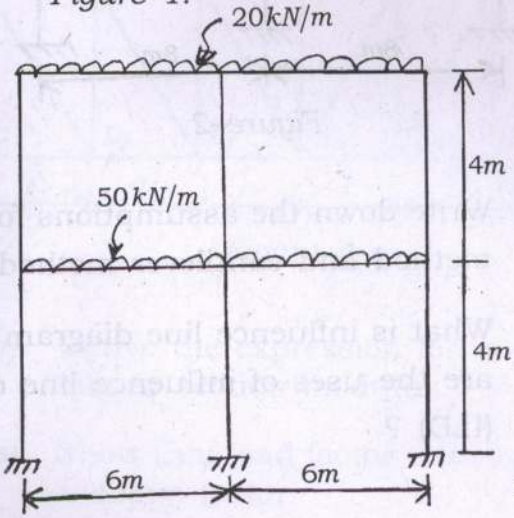
Full Marks : 100

Time : Three hours

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

*Answer **any five** questions.*

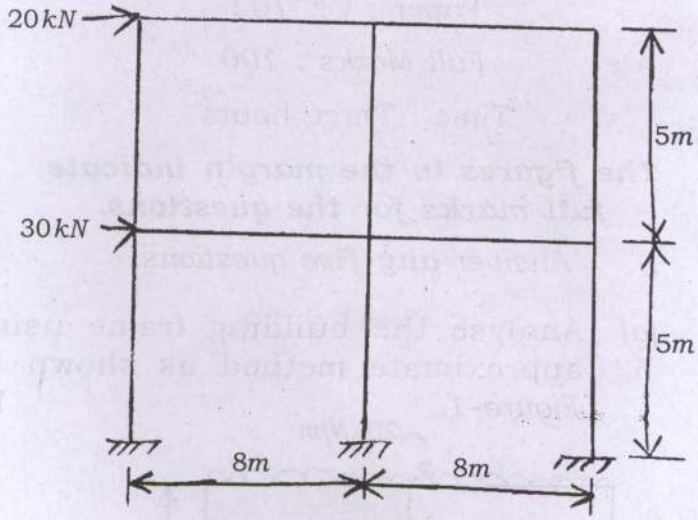
1. *(a)* Analyse the building frame using approximate method as shown in *Figure–1.* 10



Figure–1

Contd.

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

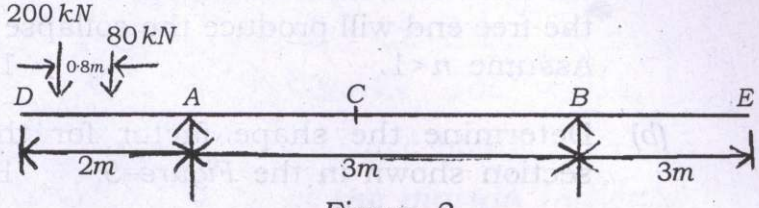


Figure–2

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

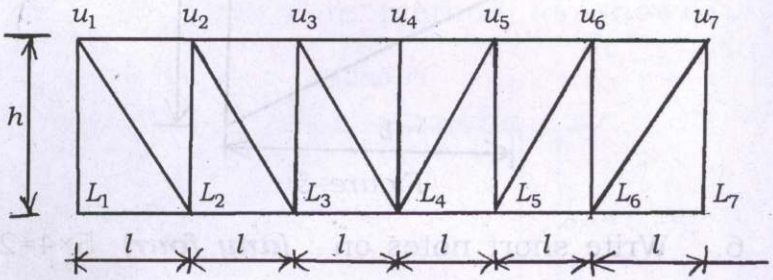
(b) What is influence line diagram ? What are the uses of influence line diagram (ILD) ? 5

(c) Two wheel loads $200kN$ and $80kN$ spaced $0{\cdot}8m$ apart roll on the girder shown in *Figure–3*. Find the maximum positive and negative shear force at the section *C*. Any wheel load can lead each other. 10



Figure–3

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



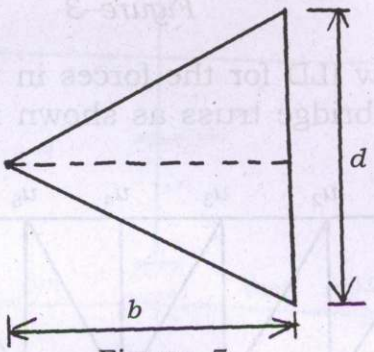
Figure–4

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)* 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

(b) Determine the shape factor for the section shown in the *Figure–5*. 10



Figure–5

6. Write short notes on : ***(any four)*** 5×4=20

(a) Portal frame

(b) Qualitative Influence lines

(c) Live loads

(d) Global and local co-ordinate system

(e) Stiffness matrix

(f) Plastic moment.
