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)* Determine (approximately) the reactions including moment at the base of the columns of the frame shown in *Figure-1*. Use portal method of analysis. 10

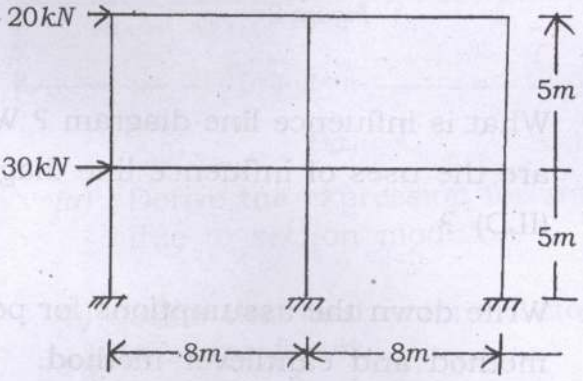

Figure-1

(b) Approximately analyse the building frame subjected to horizontal loading as shown in *Figure-2*. The columns are assumed to have equal cross-sectional areas. Use the cantilever method of analysis. 10

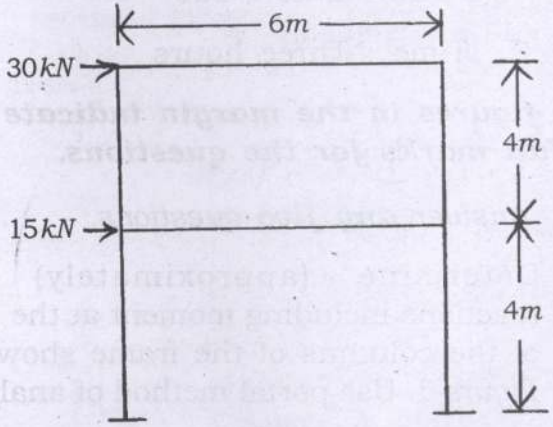

Figure-2

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

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

(c) Find the expression of influence lines for shear force and bending moment for the simply supported beam as shown in *Figure-3*. Also draw ILD for each one. 10

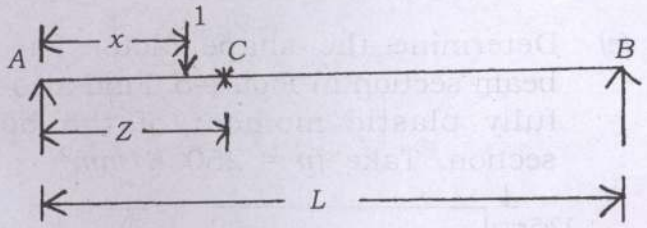

Figure-3

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

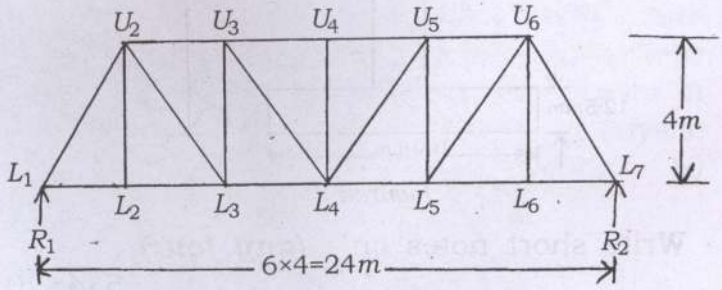

Figure-4

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

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

(c) Determine the shape factor for the beam section in *Figure-5*. Find also the fully plastic moment of the beam section. Take $fy = 250\ N/mm^2$ 10

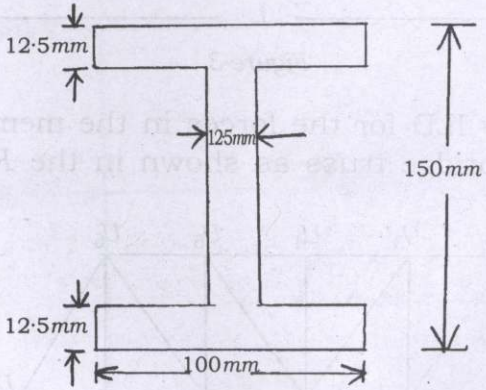

Figure-5

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.