Total number of printed pages–4

53 (CE 702) STAN-III

2021

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

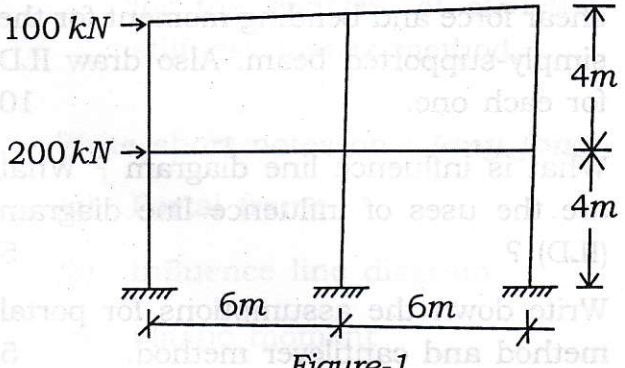

Figure-1

Contd.

2. *(a)* Approximately analyse the building frame subjected to vertical loading as shown in *Figure* 2. 10

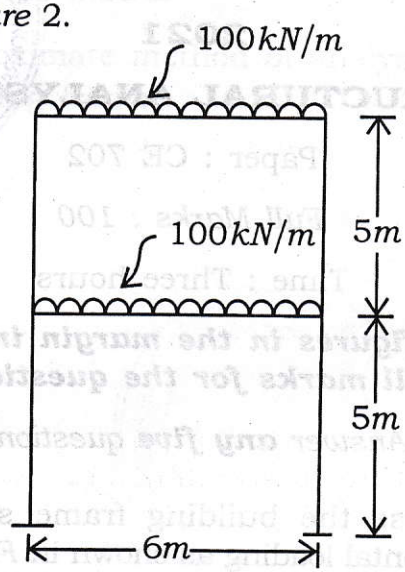

Figure 2

(b) Find the expression of influence lines for shear force and bending moment for the simply-supported beam. Also draw ILD for each one. 10

3. *(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) Two wheel loads $80\,kN$ and $20\,kN$, spaced $2m$ apart, move on a girder of span $16m$. Find the maximum positive and negative shear force at a section $4m$ from the left end. Any wheel load can lead the other. 10

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

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

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

(b) In which cases plastic hinges may occur in a structure member ? 8

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

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

(a) Portal frame

(b) Influence line diagram

(c) Plastic moment

(d) Global and local co-ordinate system

(e) Stiffness matrix

(f) Approximate method of analysis for a building frame.