Roll No. ..... Total Pages : 3

002502

December 2023

B.Tech. (Civil) - V SEMESTER

Structural Analysis

(PCC–CED–302)

Time : 3 Hours] [Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART–A

1. (a) Elaborate on different kinds of loads that acts on a structure. (1.5)

(b) Define shape factor. (1.5)

(c) Differentiate between trusses and frames. (1.5)

(d) Define static indeterminacy. (1.5)

(e) What are determinate structures. (1.5)

(f) What are continuous beams? Elaborate. (1.5)

(g) Differentiate between flexibility & stiffness. (1.5)

(h) What are influence lines? Elaborate. (1.5)

(i) What are boundary conditions? Discuss. (1.5)

(j) What are rolling loads? Discuss with example. (1.5)

PART–B

2. (a) Differentiate between slope deflection method and moment distribution method with suitable examples. Also elaborate on sway analysis. (10)

(b) Differentiate between determinate and indeterminate trusses. (5)

3. (a) Discuss the Muller Breslau principle and its application. (8)

(b) What are flanged sections and portal frames? Discuss with examples and diagrams. (7)

4. Analyse the continuous beam ABC using slope deflection method if support B sinks by 10 mm. Span AB is 5 m long and span BC is 6 m long. The concentrated load of 3 kN is acting at mid span of both AB and BC. Support A is fixed and B and C are roller supports. Take $E = 2 \times 10^5$ N/mm^2 and $I = 4 \times 10^7$ mm^4. (15)

5. A Beam ABC, 10 m long, fixed at ends A and C is continuous over pin support joint B with both span AB and BC of 5 m each. A concentrated load of 5 kN and 8 kN acts at a distance of 3 m from point A and at a distance of 2.5 m from point B. Using slope deflection method, compute the end moments and plot the bending moment diagram. Also, sketch the deflected shape of the beam. The beam has constant EI for both the spans. (15)

6. Two, wheel loads of 16 kN and 8 kN, at a fixed distance apart of 2 m, cross a beam of 10 m span. Draw the influence line for bending moment and shear force for a point of 4 m from the left abutment, and find the maximum bending moment and shear force at that point. (15)

7. Explain the following :

(a) Elastic moment of resistance.

(b) Plastic moment of resistance.

(c) Collapse Load.

(d) Degree of freedom.

(e) Compatibility equation. (15)