

FACULTY OF ENGINEERING

B.E. 3/4 (Civil) II - Semester (Main) Examination, June 2014

Subject : Theory of Structure – II

Time : 3 Hours

Max. Marks: 75

Note: Answer all questions of Part - A and answer any five questions from Part - B.**PART – A (25 Marks)**

- 1 Define Enveloping Parabola.
- 2 State Eddy's theorem
- 3 Define influence line diagram for force in member of a truss. Draw influence line for any bottom chord member of Pratt truss with 6 panels.
- 4 Develop Stiffness matrix for a 2-D truss element.
- 5 Write the properties of Flexibility matrix.
- 6 Writ the conditions for maximum BM at a section and absolute max. BM when several concentrated loads are traversing a simply supported girder.
- 7 Discuss the effect of temperature on two and three hinged arches.
- 8 What is a stiffening girder? Discuss determinacy of 2 and 3-hinged stiffening girders.
- 9 What is counter bracing and when do you provide it?
- 10 Find flexibility matrix given the stiffness matrix for a system of coordinates as $\frac{EI}{3} \begin{pmatrix} 4 & 3 \\ 2 & 7 \end{pmatrix}$

PART – B (5 x 10 = 50 Marks)

- 11 A uniform load of 1 kN/m, 4 m long, crosses a girder of 16 m span. Calculate the maximum SF and BM at 6 m and 8m from the left hand support. Also, draw maximum BM and SF diagrams.
- 12 A uniform three hinged parabolic arch, span 36 m and rise 6 m, is carrying a point load of 48 kN at 9 m from its left hinge. Calculate the horizontal thrust in the arch and calculate BM, radial shear, and normal thrust at 9 m from the left hand support. Also draw the maximum BM diagram. Assume $I = I_c \sec \theta$.
- 13 For the truss shown in Figure 1, draw the influence line diagrams for the forces in the members AB, AC and BC.

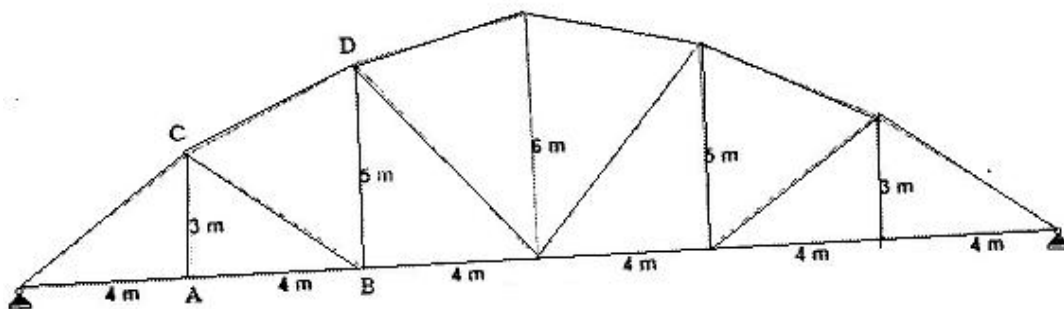


Figure 1

- 14 Analyse the beam shown in figure 2 by Flexibility matrix method and draw BMD. EI is constant.

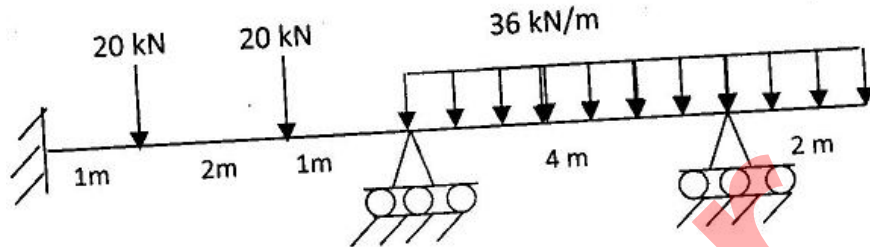


Figure 2

- 15 Analyse the continuous beam shown in figure 3 by stiffness matrix method and draw the BMD.

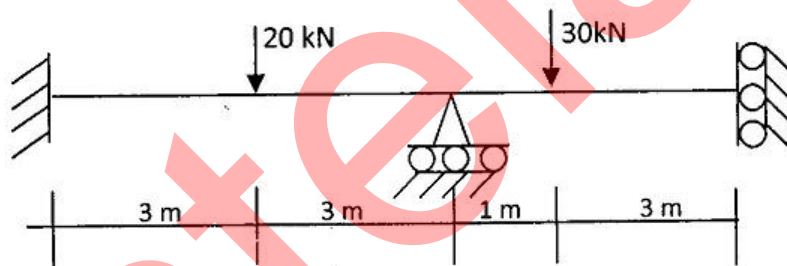


Figure 3

- 16 (a) Discuss the various forces induced in the 3 hinged stiffening girder of a suspension bridge.
 (b) A cable supported at its end 40 m apart at the same level carries loads 200 kN, 100 kN and 150 kN at 10m, 20m, and 30m from the left end, respectively. If the point where 100 kN is acting is 10m below the level of supported, find the length of the cable and the cross sectional area required of the cable if the permissible tensile stress is 150 MPa.
- 17 A system of 5 concentrated loads 100 kN, 100 kN, 200 kN, 200 kN and 160 kN separated by distance 3m, 4m, 4.5m and 3m respectively are traversing a simply supported girder from right to left with 100 kN load as leading load. Determine the maximum SF and BM at the quarter span.
