FACULTY OF ENGINEERING

B.E. 3/4 (Civil) II – Semester (New) (Main) Examination, April / May 2013

Subject : Theory of Structures - II

Time : 3 hours   **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. Define Influence line diagram and focal length.   2

2. State the condition for max. B.M. under any load of a train of wheel loads.   2

3. A suspension cable of horizontal span 40m, central dip 4m is subjected to a load of 10 kN/m over the entire span find the maximum tension in the cable.   2

4. A three span continuous beam is fixed at both ends. The order of stiffness matrix for the beam is   2
   a) 1 x 1   b) 2 x 2   c) 3 x 3   d) 4 x 4

5. State the properties of flexibility matrix.   2

6. A u.d.ℓ. of intensity 20 kN/m and of length 4m is rolling on a simply supported girder of 8m span from left to right. Determine max B.F. at left quarter span.   3

7. Explain straining actions in arches.   3

8. A deck type warren girder truss of 30m span has 5 panels. Draw the I.L.D. for force in the interior diagnol member.   3

9. Flexibility matrix for a given system of coordinates is $\begin{bmatrix} \dfrac{4EI}{3} & \dfrac{2EI}{3} \\ \dfrac{2EI}{3} & \dfrac{7EI}{3} \end{bmatrix}$. Find stiffness matrix.   3

10. Find the flexibility matrix w.r.t. given set of coordinates for the beam shown below.   3
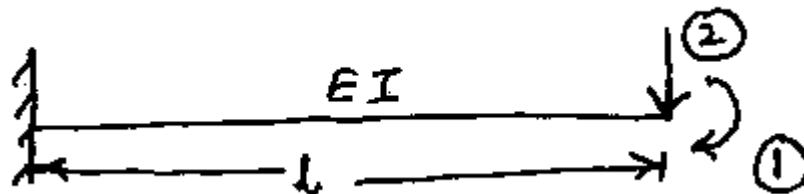
PART – B (50 Marks)

11. A u.d.ℓ. of 30 kN/m and 6m length is moving on a simply supported girder of 20 m span. Draw max S.F.D. and max B.M.D.   10

12. The following system of wheel loads are rolling on a simply supported girder of 36m span with 160 kN load leading. Determine the max. S.F. and max. B.M. at the quarter span.   10

    100 kN   100 kN   200 kN   200 kN   160 kN

       3m   4m   4.5m   3m

13. A cable supported at its ends 40m apart at the same level carries loads 200 kN, 100 kN and 150 kN at 10m, 20 m and 30 m from the left end respectively. If the point where 100 kN is acting is 10m below the level of supports, find   10

    a) the length of the cable and
    b) the cross sectional area required for the cable if the allowable tensile stress is 150 MPa.

14. A three hinged parabolic arch of 20m span has its crown 9m high from the left hand support and 4m high from the right hand support. The crown is 12m from the left hand support. It is subjected to a u.d.ℓ. of 20 kN/m over the left half of the span and a point load of 60 kN at 4m from the right hand support. Find   10

    a) B.M. at 15m from left hand support and
    b) Normal thrust and radial shear at 8m from left hand support.

15. A two hinged parabolic arch of span 30m, central rise 5m is subjected to a u.d.ℓ. 10 kN/m over the left half of the span. Determine   10

    a) Normal thrust and radial shear at 10 m from L.H.S. and
    b) Maximum B.M.

16. Analyse the truss shown in fig. using stiffness matrix method. Assume AE as constant.   10

17. Analyse the beam shown in fig. using flexibility matrix method and draw S.F.D. and B.M.D.   10

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