6E 6031

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B.Tech.VI Semester (Main/Back) Examination, May 2015

Civil Engineering

6CE1A Theory of Structures-II

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

Instructions to Candidates:

*Attempt any **five** questions, selecting **one** question from **each unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Unit - I

1. a) Write Muller-Breslau principle. Using Muller-Breslau principle. Draw the influence line for moment at A for the propped contilever shown in fig.1 compute the ordinates at every 2m interval. **(10)**

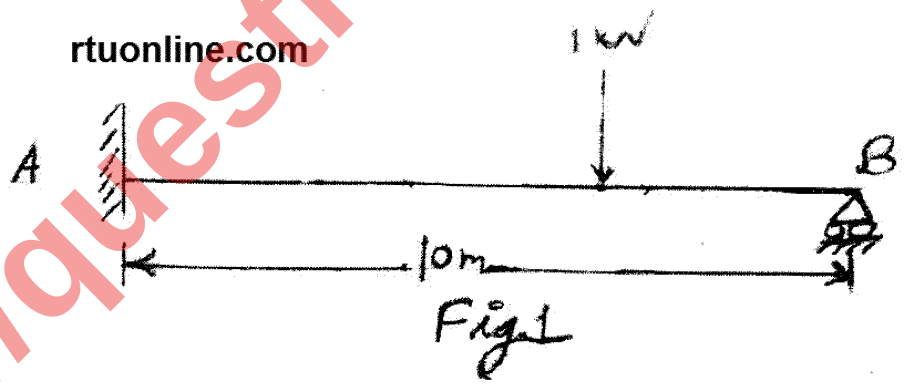

Fig.1

b) A uniformly distributed load of 1KN/m run, 6m long crosses a girder of 16m span. Calculate maximum shear force values at 5m from left hand support of girder **(6)**

OR

1. a) Draw the influence line for force in member U_1L_2 of the truss shown in fig2. Find the exact point where a single concentrated load should be placed in order that no force is produced in the member. Determine the maximum

compressive and tensile force in the member when a u.d.l of 60 KN/m, longer than the span, moves across the truss. **(8)**

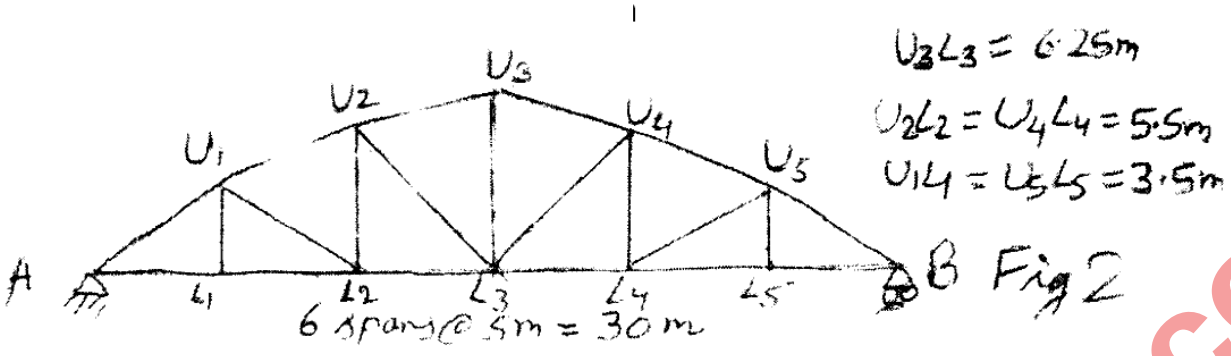

Fig 2

b) Calculate the absolute maximum bending moment in a 25m span beam caused by a series of concentrated loads moving across the span as shown in fig.3 **(8)**

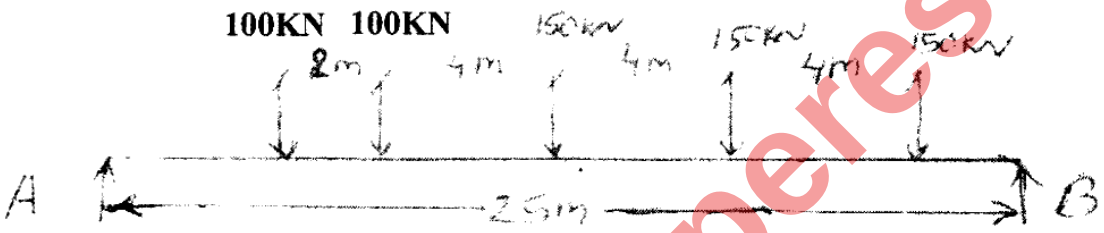

Fig 3

Unit - II

2. a) A parabolic two hinged arch has a span of 32m and a rise of 8m. A uniformly distributed load of 1kN/m carers 8m horizontal length of the left side of the arch. If $I=I_0 \sec\theta$, where θ is the inclination of the arch of the section to the horizontal, and I_0 is the moment of inertia of the section at the crown, find out the horizontal thrust at hinges and bending moment at 8m from the left hinge also find out normal thrust and radial shear at this section **(12)**

b) Draw the influence line diagram for 'radial shear' and normal thrust at a section in a two hinged arch of span 'L' and rise 'r'. Explain the shape of influence line diagram obtained **(4)**

OR

2. a) A three ringed parabolic arch, hinged at the crown and springings has a horizontal span of 15m with a central rise of 3m. It carries a uniformly distributed load of 40 kN/m on horizontal span of arch over the left hand half. calculate normal thrust, radial shear and bending moment at 5m for left hand hinge. **(8)**

b) Draw the influence line diagram for benditng moment at any section in a three hinged arch. For this arch also obtain the expression for maximum positive and maximum negative bending moment due to a single point load W. Take span of arch as 'L' and rise as 'r' **(8)**

Unit - III

3. A suspension bridge of 250m span has two three hinged stiffening griders supported by two cables having a central dip of 25m, The width of roadway is 8m. The roadway carries a dead load of 0.5 kN/m^2 intending extending over the whole span, and a live load of 1kN/m2 intending over the left hand half of the bridge. Find the B.M and shear force at section 200m from left hinge. Also calculate the maximum tension in the cable **(16)**

OR

3. (a) Draw influence line diagram for horizontal thrust 'H', cable load intensity'P' bending moment and shear force in a cable suspension bridge with a three hinged stiffening girder **(8)**

b) A suspension cable 160m span and 16m central dip carries a load of 1/2 KN per horizontal meter. Calculate the maximum and minimum tensions in the cable. Find horizontal and vertical forces in each pier under the following conditions

i) If the cable posses over frictionless coller on the top of pier

ii) If the cable is firmly damped to saddles carried on frictionless roller on the top of pier **(8)**

Unit - IV

4. Define the following terms:-

a) i) Principal centroidal axis of inertia

ii) Unsymmetrical bending **(4)**

b) Prove that the sum of moments of inertia about any set of rectangular axes is constant. **(6)**

c) Derive the expression to obtain the bending stress at any point when it issubjected to bending (M) inclined at an angle θ with one of the principal planes **(6)**

OR

4. Determine the principal moments of inertia for an unequal angle section 200mm×150mm×10mm. Use analytical expression on Mohr's circle method **(16)**

Unit - V

5. a) List the advantages of stiffness method. Describe the methodology of stiffness method of analysis **(8)**

b) Through force displacement relationship. Define the flexibility coefficient **(4)**

c) What do you understand by transformation matrix **(4)**

OR

5. Construct the global structure stiffness matrix for the truss shown in Fig.4 take AE constant **(16)**

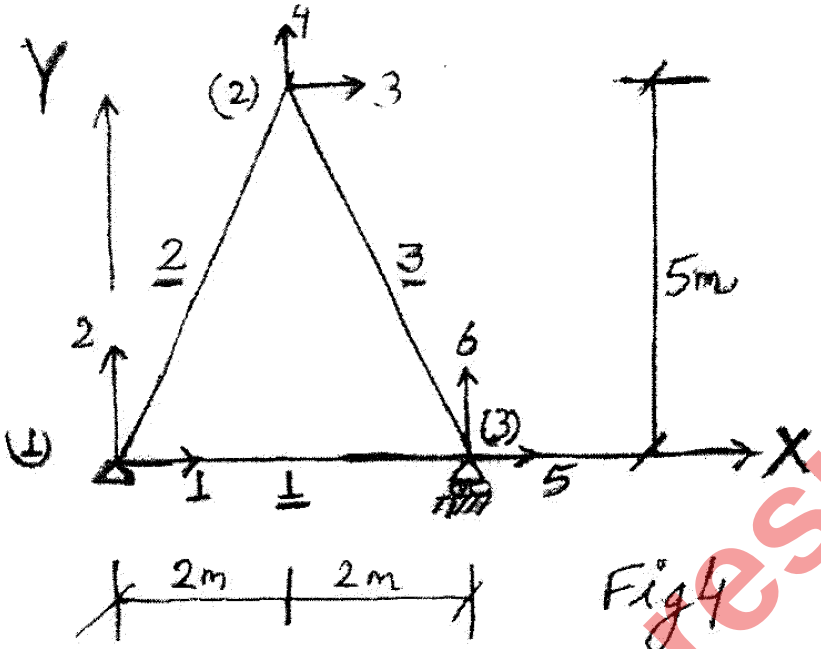

Fig 4

Nodes are marked in bracket as (1),(2)&(3) member number are marked by underline as 1,2&3 and degrees of freedom are marked with arrows for 1 to 6.