

**B.Tech. CIVIL ENGINEERING (BTCLEVI)**

**Term-End Examination**

00028

June, 2017

**BICE-011(S) : STRUCTURAL ANALYSIS – II**

*Time : 3 hours*

*Maximum Marks : 70*

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*Note : Attempt any five questions. All questions carry equal marks. Use of scientific calculator is allowed.*

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1. Determine the forces in all members of the truss shown in Figure 1. Length of each member is 3 m.

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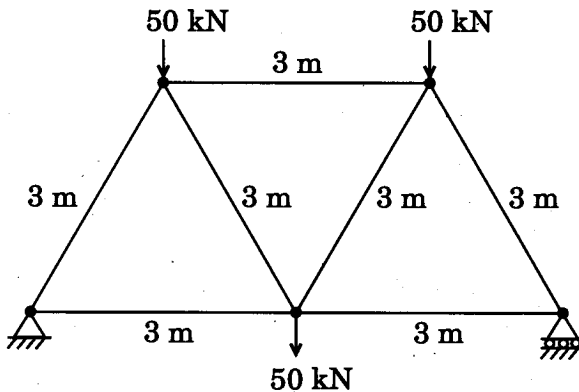


Figure 1

2. A single rolling load of 10 kN rolls along a simply supported girder of 20 m span. Draw the diagrams of maximum bending moment and maximum shear force (positive and negative) at a section 4 m from the left support. What will be the absolute maximum shear force and bending moment ?

14

3. A three-hinged parabolic arch hinged at the springings and crown has a span of 20 m. The central rise of the arch is 4 m. It is loaded with a uniformly distributed load of intensity 2 kN/m on the left 3 m length. Calculate :

(a) the direction and magnitude of reaction at the hinges.

(b) the maximum positive and negative bending moment in the arch.

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4. A suspension cable, 160 m span and 16 m central dip, carries a load of 0.5 kN per lineal horizontal metre. Calculate the maximum and minimum tension in the cable. Find the horizontal and vertical forces in each pair under the following alternative conditions :

(a) If the cable passes over frictionless rollers on the top of the piers.

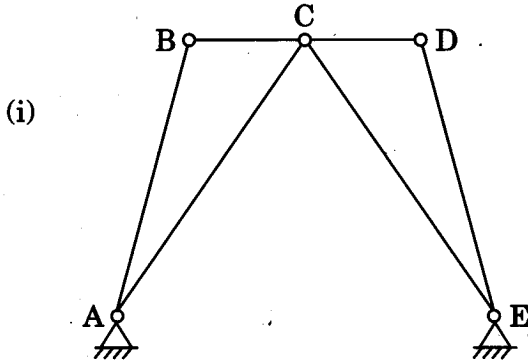
(b) If the cable is firmly clamped to saddles carried on frictionless rollers on top of the piers.

In each case, back stay is inclined at  $30^\circ$  to the horizontal.

14

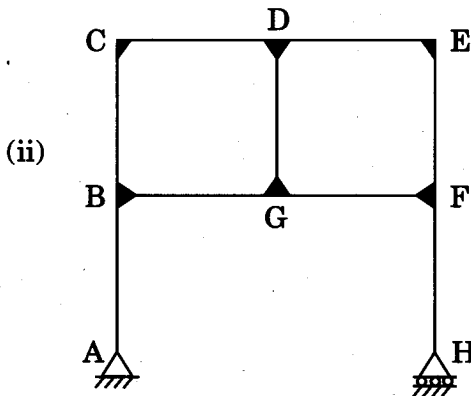
5. (a) Find the external and internal indeterminacy of the following structures :

2×4=8



Articulated structure

Figure 2(a)



Stiff jointed frame

Figure 2(b)

- (b) A cantilever of uniform flexural stiffness is propped at the remote end. Find the load on the prop when a load of  $W$  is applied at the centre of the cantilever.

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6. A continuous beam ABC is supported on an elastic column BD and is loaded as shown in Figure 3. Treating joint B as rigid, analyse the frame, plot the B.M.D. and sketch the deflected shape of the structure.

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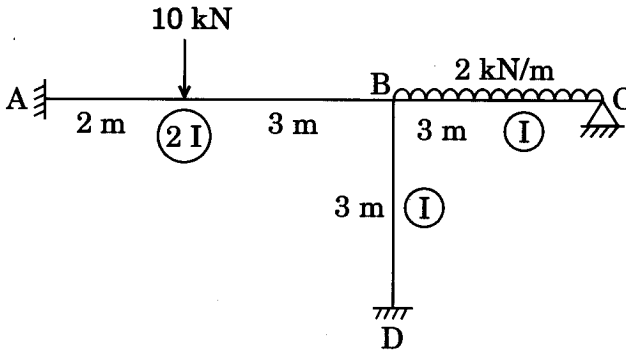


Figure 3

7. Write short notes on any **two** of the following: 2×7=14
- (a) Principle of Virtual Work
  - (b) Eddy's Theorem
  - (c) Rib Shortening and Temperature Effects in Arches