

KATHMANDU UNIVERSITY
End Semester Examination [C]
December, 2024

Marks Scored:

Level : B.E.

Course : CIEG 305

Year : III

Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date :

SECTION "A"

[20 Q. × 0.5 = 10 marks]

Choose and encircle in the most appropriate option from each set of choices

1. According to moment area theorem, the change in slope of the tangents to the elastic curve between two points A & B is equal to:
 - a. Area of M/EI diagram between A & B
 - b. Moment of M/EI diagram between A and B about A
 - c. Moment of M/EI diagram between A and B about B
 - d. Half area of M/EI diagram between A and B
2. An overhanging beam ABC has fixed support at A , roller at B and free end at C . It's conjugate beam is:
 - a. Fixed at A , roller at B , fixed at C
 - b. Free end at A , roller at B , fixed at C
 - c. Free end at A , internal hinge at B , fixed at C
 - d. Fixed at A , internal hinge at B , fixed at C
3. Maximum deflection for a simply supported beam of length 6m with u.d.l. of 10 kN/m over entire span is 15mm. The value of flexural rigidity for beam is:
 - a. 1,875 kNm²
 - b. 3,000 kNm²
 - c. 11,250 kNm²
 - d. 15,385 kNm²
4. A rectangular bar of size 10mm × 20mm has a length of 2m and subjected to axial pull of 8 kN at its bottom. What will be the strain energy stored in the bar?
 - a. 80,000/E
 - b. 640,000/E
 - c. 580,000/E
 - d. 320,000/E
5. Strain energy stored in a beam of length L with moment of inertia $2I$ subjected to bending moment $M/2$ is given as:
 - a. $\int_0^L \frac{M^2}{32EI} dx$
 - b. $\int_0^L \frac{M^2}{16EI} dx$
 - c. $\int_0^L \frac{M^2}{8EI} dx$
 - d. $\int_0^L \frac{M^2}{4EI} dx$
6. By using unit load method, the horizontal deflection at any point in the truss is determined by:
 - a. Applying unit moment at that point
 - b. Applying unit vertical load at that point
 - c. Applying unit horizontal load at that point
 - d. Applying unit deflection at that point
7. A three hinged parabolic arch ACB with crown at C is of span 50m and rise 10m. It is loaded with a u.d.l. of 10 kN/m over the portion AC and a point load of 70 kN acts at distance 15m from end B . Then, the horizontal thrust for the arch is:
 - a. 208.75 kN
 - b. 215.75 kN
 - c. 232.75 kN
 - d. 258.75 kN
8. Internal forces acting on a arch section are:
 - a. Normal thrust and radial shear
 - b. Radial shear and B.M.
 - c. Normal thrust and B.M.
 - d. Normal thrust, radial shear and B.M.

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Level : B.E.
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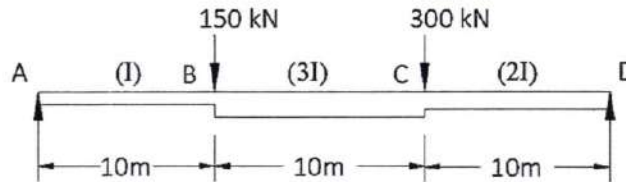
19 DEC 2024

Course : CIEG 305
Semester : I
F. M. : 40

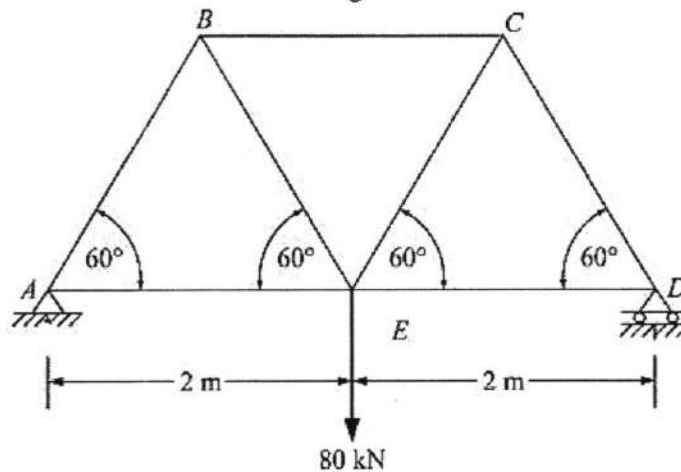
SECTION "B"

Attempt ALL questions. Assume suitable data if necessary.

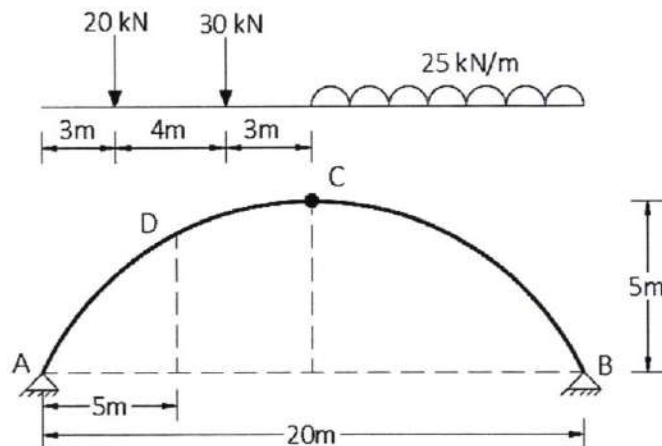
1. For a simply supported beam $ABCD$ shown in figure below, calculate the slopes at A and C and deflections at B and C using Moment Area method. Take $E= 200 \text{ kN/mm}^2$ and $I=2 \times 10^{10} \text{ mm}^4$. [6]



2. Determine the vertical displacement of joint E of the truss shown in Figure due to given loading and due to member BE and CE being 10mm too long. Given, for all members cross-sectional area = 1000 mm^2 and Young's modulus = 200 kN/mm^2 . [8]

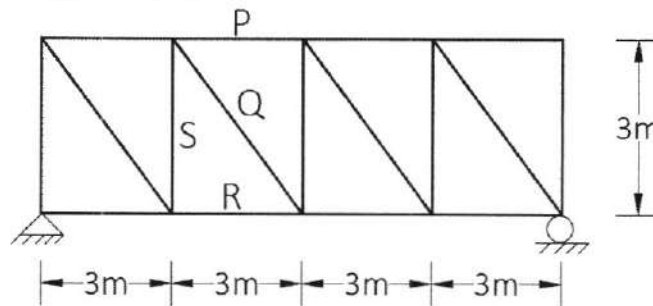


3. A three-hinged parabolic arch carries load as shown in figure. Determine the reactions at supports. Find the bending moment, normal thrust and radial shear at D , 5m from A . What is the maximum bending moment in the arch? [6]



P.T.O.

4. A suspension bridge of 250m span has a three hinged stiffening girder supported by cable with a central dip of 25m. If four point loads of 150 kN each acts at 20, 30, 40 and 50m from the left hand hinge, find the shear force and bending moment in the girder at 62.5m from each end. Calculate also the maximum tension in the cable. [7]
5. Draw the Influence Line Diagrams (ILD) for the forces in the members *P*, *Q*, *R* and *S* of the truss shown in figure below. [8]



6. A rod 12.5mm in diameter is stretched 3.2mm under a steady load of 10kN. What stress would be produced in the bar by a weight of 700N, falling through 75mm before commencing to stretch, the rod being initially unstressed? Take $E = 2.1 \times 10^5 \text{ N/mm}^2$. [5]