

KATHMANDU UNIVERSITY
End Semester Examination [C]
June/July 2024

Marks Scored:

Level : B.E.

Year : III

Exam Roll No. :

Time: 30 mins.

Course : CIEG 305

Semester : I

F. M. : 10

Registration No.:

Date

02 JUL 2024

SECTION "A"

[20Q. × 0.5 = 10 marks]

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

- The moment at any point on the conjugate beam is equal to the _____ at the corresponding point on the real beam.
a. Slope b. Deflection c. Shear force d. Bending moment
- Moment curvature relationship is given as:
a. $M = EI \frac{d^2y}{dx^2}$ b. $M = \frac{1}{EI} \frac{d^2y}{dx^2}$ c. $M = EI \frac{dy}{dx}$ d. $M = \frac{1}{EI} \frac{dy}{dx}$
- A load of 100 kN is suddenly applied in a bar of length 2m, diameter 50mm and modulus of elasticity 200 GPa, then the strain energy stored in bar is:
a. 25.6 Nm b. 42.3 Nm c. 72.4 Nm d. 102.3 Nm
- Using Castigliano's second theorem, the deflection of any joint of truss is given as:
a. $\sum \left(\frac{\partial F}{\partial P} \right) \frac{FL}{2AE}$ b. $\sum \left(\frac{\partial F}{\partial P} \right) \frac{FL}{AE}$ c. $\sum \left(\frac{\partial F}{\partial P} \right) \frac{2FL}{AE}$ d. $\sum \left(\frac{\partial F}{\partial P} \right) \frac{L}{AE}$
- A cantilever beam of length 5m carries a u.d.l. of 10 kN/m over entire span. If the maximum deflection for beam is 10mm, the value of flexural rigidity for beam is:
a. 41,667 kNm² b. 20,833 kNm² c. 78,125 kNm² d. 104,167 kNm²
- A fixed support of real beam changes to _____ for a conjugate beam.
a. Roller b. Hinge c. Interior hinge d. Free end
- The maximum bending moment at 10m from end A in a simply supported beam of span 25m due to a moving udl, spanning 8m occurs when the tail of load is at _____ distance from A.
a. 6.8m b. 3.2m c. 10.2m d. 6.0m
- Three point loads 20, 10 and 30 kN have centre-to-centre spacing of 1 m between consecutive loads and they traverse a girder of 10 m span from left to right with 30 kN load leading. The absolute maximum positive shear force for the beam will be?
a. 63 kN b. 53 kN c. 45 kN d. 72 kN
- Maximum bending moment under a wheel load occurs when:
a. The wheel load is at center of span.
b. The wheel load and the resultant lies on same side from the center of beam.
c. The wheel load and the resultant is equidistant from the center of beam.
d. The resultant of load lies at center of beam.
- For a 3-hinged arch with span 35m and rise 10m, the maximum ordinate of ILD for horizontal thrust is:
a. 1.167 b. 0.703 c. 0.437 d. 0.875
- A parabolic 3-hinged arch has a span of 20m and rise of 4m. If a point is located at the arch 6m from left springing, then the rise at this point is:
a. 1.92m b. 3.36m c. 2.25m d. 3.02m

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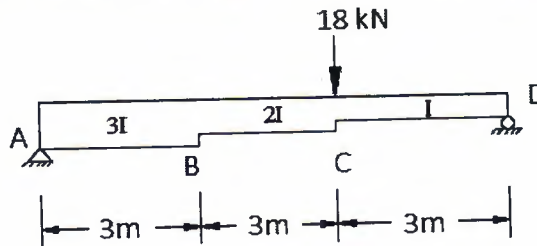
Course : CIEG 305
Semester : I
F.M. : 40

02 JUL 2024

SECTION "B"

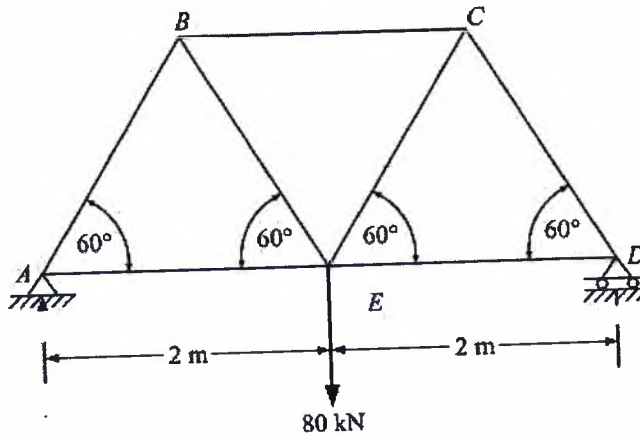
Attempt *ALL* questions. Assume suitable data if necessary.

1. A simply supported beam AD is shown below. Determine slopes and deflections at B & C using Conjugate beam method. Take $E = 200 \text{ kN/mm}^2$ and $I = 4.15 \times 10^7 \text{ mm}^4$. [6]



2. A load of 100 N falls through a height of 2cm on to a collar rigidly attached to the lower end of a vertical bar 1.5m long and of 1.5 cm^2 cross-sectional area. The upper end of the vertical bar is fixed. Determine the maximum instantaneous elongation and strain energy stored in the vertical rod. Take $E = 2 \times 10^5 \text{ N/mm}^2$. [5]

3. Determine the vertical displacement of joint E of 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 , Young's modulus of elasticity 200 kN/mm^2 . [8]



4. A three-hinged parabolic arch has a span of 36m and a rise of 6m. Determine the bending moment, normal thrust and radial shear at 9m from the left support, if the arch is subjected to a uniformly distributed load of intensity 30 kN/m over left half portion and a concentrated load of 60 kN at 27m from the left springing. [6]
5. The three-hinged stiffening girder of a suspension bridge of span 120m is subjected to two point loads of 240 kN and 300 kN at distances 25m and 80m from the left end. Find the shear force and bending moment for the girder at a distance of 40m from the left end. The supporting cable has a central dip of 12m. Find also the maximum tension in the cable. [6]

6. For a Pratt truss shown in figure below, draw the influence lines for force in members U_2U_3 , U_2L_4 and L_3L_4 . Also calculate the maximum value of forces in these members when a uniformly distributed load of intensity 60 kN/m longer than span crosses the structure. [9]

