

KATHMANDU UNIVERSITY  
End Semester Examination [C]  
December, 2024

Marks Scored:

Level : B.ARCH

Year : III

Exam Roll No. :

Time: 30 mins.

Registration No.:

Course : CIEG 331

Semester : I

F. M. : 10

Date : 16 DEC 2024

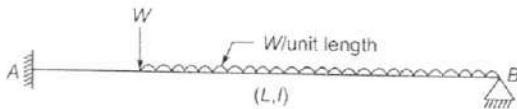
SECTION "A"

[20 Q. × 0.5 = 10 marks]

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

- Which of the following is uniform stress form of structure?  
a. Slab                      b. Beam                      c. Girder                      d. Arch
- The support which doesn't allow any linear and rotational movement is \_\_\_\_\_ support.  
a. Roller                      b. Hinged                      c. Fixed                      d. Free end
- A truss is said to be statically indeterminate if:  
a.  $m + r > 2j$                       b.  $m + r < 2j$                       c.  $m + r = 2j$                       d.  $m + r = 0$
- Which of the following is the moment curvature relationship?  
a.  $\frac{dy}{dx} = \frac{M}{EI}$                       b.  $\frac{dy}{dx} = M \cdot EI$                       c.  $\frac{d^2y}{dx^2} = \frac{M}{EI}$                       d.  $\frac{d^2y}{dx^2} = M \cdot EI$
- In moment area method, the deflection of point  $A$  from a tangent at  $B$  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  $B$
- First moment-area theorem is related to:  
a. Deflection                      b. Slope                      c. Shear force                      d. Bending moment
- Which one of the following is WRONG with respect to strain energy method for finding deflection?  
a. Structure should be subjected to a single concentrated load.  
b. Deflection can be found only at the loaded point.  
c. Deflection can be found only in the direction of load.  
d. Deflection can be found at any point in desired direction.
- In virtual work method, we determine deflection at any point by applying:  
a. Unit force                      b. Unit moment  
c. Unit force and moment                      d. Unit deflection
- Which of the following statement is TRUE?  
a. The shape of ILD for shear force in cantilever beam is triangular.  
b. The maximum value of ordinate in ILD of reaction for simply supported beam is 1.  
c. When an  $udl$  shorter than span travels a beam, maximum bending moment occurs at a section when the c.g. of load lies at the section.  
d. For a train of concentrated loads, the maximum bending moment under any particular load occurs when the resultant of load lies at center of beam.

10. The ordinates of bending moment ILD under 50kN and 10kN loads are 1.75 and 2.15 respectively for simply supported beam, then the bending moment at particular section is:  
 a. 125 kNm      b. 118 kNm      c. 112 kNm      d. 109 kNm
11. The maximum bending moment at 6m from end *A* in a simply supported beam of span 15m due to a moving udl, spanning 5m occurs when the tail of load is at \_\_\_\_\_ distance from *A*.  
 a. 4.5m      b. 4.0m      c. 3.2m      d. 3.0m
12. Five sets of concentrated load 50kN, 80kN, 120kN, 180kN & 90 kN are spaced 1.7m, 2.5m, 3.2m & 2.2m respectively. The resultant of load system from 50kN load is at distance:  
 a. 4.15m      b. 4.8m      c. 5.45m      d. 6.23m
13. A circular arch of span 25m with a central rise 5m is hinged at the crown and springings. It carries a point load of 100 kN at 6m from the left support. In this case, the horizontal thrust is:  
 a. 60 kN      b. 45 kN      c. 90 kN      d. 75 kN
14. Which of the following is the equation of parabolic arch?  
 a.  $y = \frac{4hx}{L^2}(L - 2x)$       b.  $y = \frac{4hx}{L^2}(2L - x)$       c.  $y = \frac{4hx}{L^2}(L - x)$       d.  $y = \frac{4hx}{L^2}(x - L)$
15. An arch resist the external load by:  
 a. Normal thrust and radial shear      b. Normal thrust and B.M.  
 c. Radial shear and B.M.      d. Normal thrust, radial shear and B.M.
16. Fixed end moment  $M_{FAB}$  for a beam *AB* of span  $2L$  with point load *P* applied at mid-span is:  
 a.  $PL/4$       b.  $PL/6$       c.  $PL/8$       d.  $PL/10$
17. In the beam shown in figure below if support *B* yields by  $\Delta$ , the slope deflection equation for  $M_{BA}$  is:



- a.  $M_{BA} = M_{FBA} - \frac{2EI}{L^2} \left( \theta_A + 2\theta_B - \frac{3\Delta}{L} \right)$   
 b.  $M_{BA} = M_{FBA} - \frac{2EI}{L^2} \left( 2\theta_A + \theta_B - \frac{3\Delta}{L} \right)$   
 c.  $M_{BA} = M_{FBA} + \frac{2EI}{L^2} \left( \theta_A + 2\theta_B - \frac{3\Delta}{L} \right)$   
 d.  $M_{BA} = M_{FBA} + \frac{2EI}{L^2} \left( 2\theta_A + \theta_B - \frac{3\Delta}{L} \right)$
18. When a structural member of the uniform section is subjected to a moment at one end only, then the moment required so as to rotate that end to produce a unit slope, is called:  
 a. Carryover moment      b. Bending moment  
 c. Stiffness      d. Distribution factor
19. Which of the following statement is INCORRECT?  
 a. Stiffness for a beam with far end hinged is  $3EI/L$ .  
 b. Distribution factor is the ratio of moment shared by member to applied moment at joint.  
 c. Sum of stiffness of members meeting at a joint is called as joint stiffness.  
 d. Sum of distribution factors for members meeting at joint is greater than 1.
20. The bending moment at any distance 'x' from free end of cantilever beam is given by  $M=15x$ . If the span of beam is 3m &  $EI= 10,000 \text{ kNm}^2$ , the strain energy due to bending is:  
 a. 0.20 kNm      b. 0.10 kNm      c. 0.32 kNm      d. 0.08 kNm

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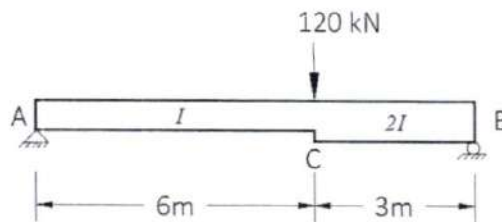
Level : B.ARCH  
Year : III  
Time : 2 hrs. 30mins.

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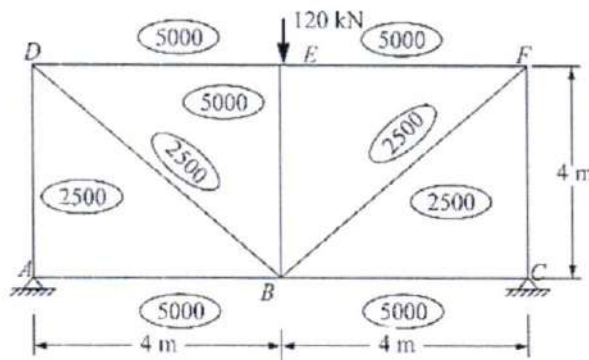
SECTION "B"  
[40 marks]

Attempt ALL question.

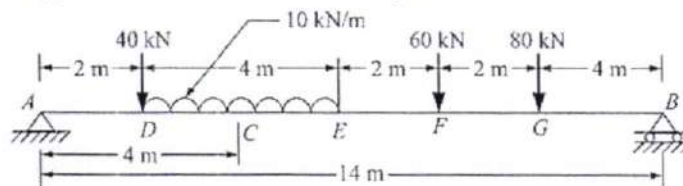
1. Determine the slope at  $A$  and  $B$  and deflection under concentrated load for the beam shown in figure below by Moment Area Method. Take  $E = 200 \text{ kN/mm}^2$  and  $I = 1.25 \times 10^9 \text{ mm}^4$ . [6]



2. Find the vertical deflection of joint  $B$  of truss shown in figure using unit load method. The cross-sectional area of members in  $\text{mm}^2$  are shown in circles as shown in figure. Take  $E = 200 \text{ kN/mm}^2$ . [7]

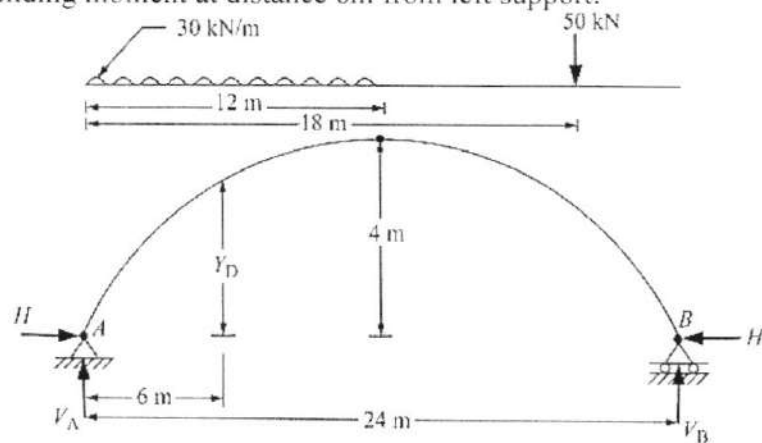


3. Using Influence Line Diagram, determine the shear force and bending moment at section  $C$  in the simply supported beam as shown in figure. [5]

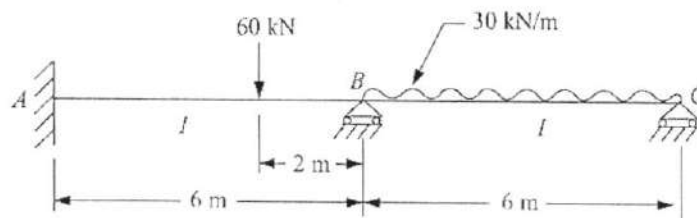


P.T.O.

4. For a three hinged parabolic arch shown in figure below, determine normal thrust, radial shear and bending moment at distance 6m from left support. [6]



5. Determine the reactions and draw the shear and bending moment diagrams for the continuous beam shown in figure by the slope-deflection method. [8]



6. Analyze the continuous beam shown in figure and draw the bending moment diagram for the beam shown in figure below. [8]

