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

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

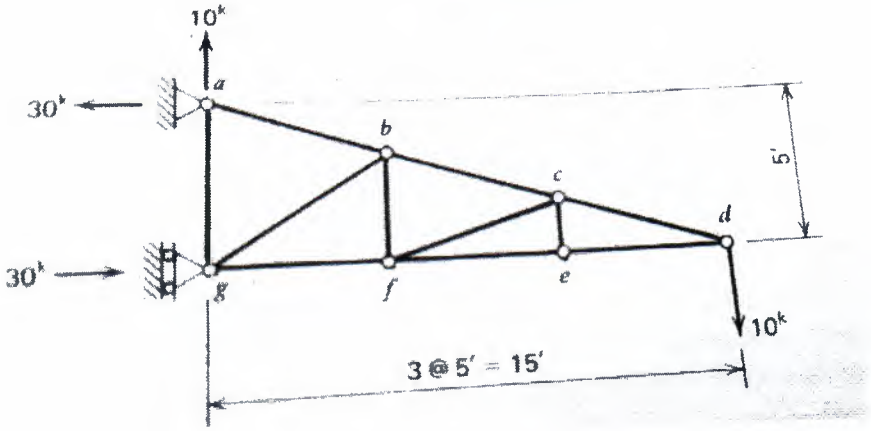
02 JUL 2024

Course : CIEG 331
Semester : I
F.M. : 40

SECTION "B"

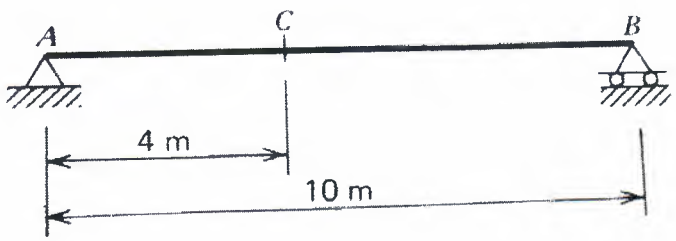
Attempt *ALL* questions. Assume any necessary data.

1. Determine the bar forces for the truss shown below. The structure is statically determinate both externally and internally, and the reactions are given. [5]



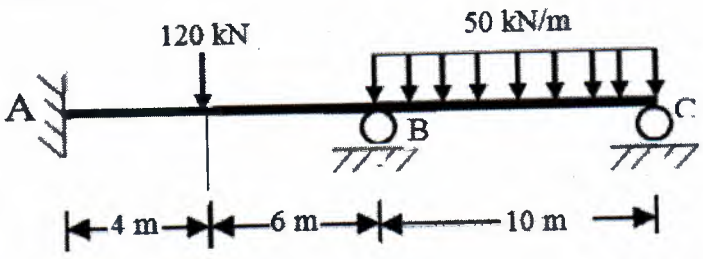
2. Describe Betti's Law with illustration and its application for structural analysis. [4]

3. Describe the advantages and disadvantages of the statically indeterminate structures. Construct the influences lines for the shear and moment at point C for the structure shown below. [3+4=7]



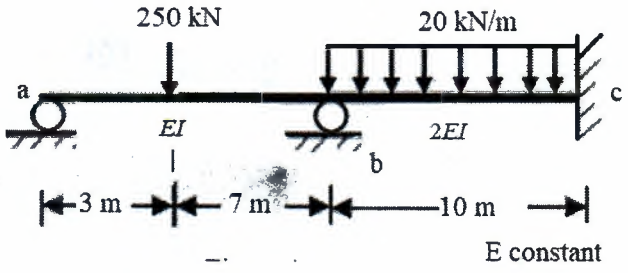
4. Describe the different types of arches. Using Strain energy method, determine the deflection of the free end of a cantilever of length L, subjected to a concentrated load P at the free end. [3+4=7]

5. Determine the end moments for the structure shown below using the Moment Distribution Method. [7]



P.T.O.

6. Determine the reactions and draw the shear and bending moment diagrams for the two-span continuous beam as shown the figure below by using the Slope-Deflection Method. [10]



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Marks Scored:

Level : B.Arch.
Year : III
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Exam Roll No. :
Time: 30 mins.
F. M. : 10
Registration No.:
Date 0 2 JUL 2024

SECTION "A"
[20Q. × 0.5 = 10 marks]

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

1. The moments in the arch will be zero, if
   a. Ends are hinged
   b. Ends are fixed
   c. The arch axis coincides with the line of thrust
   d. The arch axis is parallel to the line of thrust

2. The Fixed End Moments are reaction moments developed in a beam member under certain load conditions with
   a. Both end fixed
   b. Both end free
   c. Both ends should have certain settlement
   d. Only uniformly distributed load

3. The slope deflection and moment distribution methods are
   a. Flexibility
   b. Stiffness
   c. both flexibility and stiffness
   d. based on moment reduction

4. If m is the number of member required to form an internally statically determinate and m_a is the actual number of bars in truss, then the truss is statically unstable internally when
   a. $2\ m_a < m$
   b. $3\ m_a < m$
   c. $m_a < m$
   d. $4\ m_a < m$

5. The stiffness factor at the near end of a member with far end fixed is
   a. 4EI/L
   b. EI/4L
   c. EL/4I
   d. EI/L

6. Strain energy is mainly depends on
   a. The material's density
   b. The shape of material
   c. The external load
   d. Modulus of elasticity of the material

7. Strain energy defines as
   a. Stored energy in a material due to deformation
   b. The energy required to cause the deformation in a material
   c. The energy released when a material fractures
   d. The energy dissipated during the plastic deformation

8. The method in which unbalanced moments are distributed as per stiffness is called
   a. Consistent deformation
   b. Betti's law
   c. Maxwell's law
   d. Moment distribution

9. The carry over factor in a prismatic member whose far end is hinged is
   a. 2 b. 1 c. 0.5 d. Zero

10. For a two-hinged arch, if one of the supports settles down vertically, then the horizontal is
   a. Is increased b. Is decreased
   c. Remain unchanged d. becomes zero

11. The external indeterminacy of a two hinged arch is
   a. 2 b. 3 c. 4 d. 1

12. Influence lines are used to determine
   a. The exact values of the internal forces
   b. The exact values of external support reaction
   c. The deformation of structure
   d. The distribution of load along the structure

13. The first moment-area theorem is related to
   a. The slope change between any two points
   b. The deflection at a point of the beam
   c. The end moments of the beam
   d. The distribution of moment through the area of the beam

14. In the virtual-work method we are able to obtain
   a. Only one displacement quantity at a time
   b. Displacement throughout the structure
   c. Support reaction at supports
   d. Bending moments at supports

15. In structural analysis, the virtual work method is used for
   a. to determine the support reactions
   b. to determine the deflection of statically indeterminate structure
   c. to calculate the strain energy
   d. to find the influence ordinate of the beam

16. For the equilibrium of the body
   a. Strain energy is equal to the deformation
   b. External virtual work must be equal to the internal virtual work
   c. Stiffness is equal the deformation of the body
   d. Internal forces is more than the external reactions

17. For the linear elastic structures, the relationship between stress and strain is
   a. Logarithmically relatesd
   b. Exponentially related
   c. Inversely proportional
   d. Directly proportional

18. In the influence line diagram for shear force at a section in a simply supported beam, the sum of the maximum negative and positive ordinate must be
   a. 0 b. 2 c. 1 d. 3

19. The influence line diagram for bending moment at a section of a simply supported beam will be a
    a. Maximum ordinate at the supports and zero at the section
    b. Maximum at the section and zero at the supports
    c. Unit ordinate at the section and rectangular
    d. Unit ordinates at both the supports and at a section

20. A symmetrical two-hinged parabolic arch when subjected to a uniformly distributed load on an entire horizontal span, is subjected to
    a. Radial shear alone
    b. Normal thrust alone
    c. Normal thrust and bending moment
    d. Normal thrust, radial shear and bending moment