KATHMANDU UNIVERSITY
End Semester Examination
July/August, 2024

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

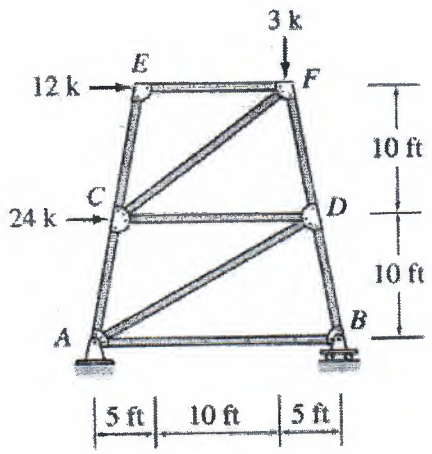
13 AUG 2024

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

SECTION "B"
[5 Q. × 8 = 40 marks]

Attempt ALL question. Assume any necessary data.

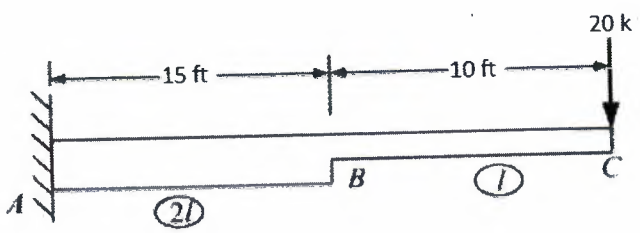
1. Define the plane truss and its applications. Determine the forces in members AC, CD, and DF of the truss given below. State if the members are in tension and compression. Assume all members are pin jointed. [2+6]



2. Describe the moment-area methods to determine the deflection of a beam. A rectangular beam of 20 cm, width, by 40 cm, depth, in cross section is simply supported on a span of 6 m and carries a central load of 200 kg. Calculate the strain energy due to shear and bending. Neglect self-weight of the beam. Take E= $2*10^6$ kg/cm^2 and G= $0.85*10^6$ kg/cm^2. [3+5]

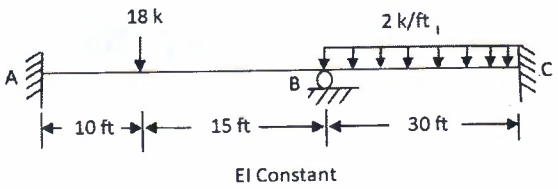
3. Discuss the concept of influence line diagrams to analysis of determinate structures. Describe the Moment Distribution Method to analyze the two span continuous beam loaded with uniformly distributed load. Take EI constant throughout the span. [2+6]

4. Define the different types of arches and its application. Determine the slopes and deflections at point B and C of the cantilever beam shown in Figure below by the moment-area method. *Given, I= 3,000 in.4 and E= 29,000 ksi* [2+6]



P.T.O.

5. 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. Take EI= constant. [8]



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Marks Scored:

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Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date : 13 AUG 2024

SECTION "A"

[20 Q. × 0.5 = 10 marks]

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

1. The force to do work,
   a. The displacement must be along the same line of action as the force
   b. The displacement must be perpendicular to the line of action as the force
   c. The displacement not necessary along the same line of action as the force
   d. The product of displacement and force along the same line of action

2. If a rigid body is in equilibrium under a set of P forces and it is subjected to any virtual displacement, the virtual work done by the P forces is
   a. Depends upon the magnitude of the forces
   b. Unit
   c. Zero
   d. Depends upon the direction of the forces

3. If a deformable body is in equilibrium under a set of P forces and it is subjected to a geometrically compatible virtual distortion, then the external virtual work done by the P forces is
   a. Equal to the internal virtual work done
   b. Less than the internal virtual work done
   c. More than the internal virtual work done
   d. Zero

4. In Moment Distribution Method, the process begins with
   a. All joints fixed against the rotation
   b. All joints are not fixed against rotation
   c. Releasing the moments in each supports
   d. Carrying the moments in the far end directly

5. If the number of is less than the equations of equilibrium, the structure is said to be
   a. Statically unstable externally
   b. Statically stable externally
   c. Statically indeterminate
   d. Statically determinate

6. If the member, having length L and flexural rigidity of EI, is fixed, the slope is
   a. Zero b. EI/4L c. EL/4I d. EI/L

7. The fixed end moments at the ends of a beam due to uniformly distributed load is
   a. Equal and opposite direction
   b. Equal with same direction
   c. Same as for the concentrated load
   d. Zero

8. The energy stored in a prismatic bar due to deformation is known as
   a. Strain energy b. Kinetic energy c. Potential energy d. Work energy

9. In the Moment-Distribution Method, the unbalanced moments are distributed as per
   a. Moment of inertia of the section b. Distribution factor
   c. Carry-over factor d. Support conditions

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

11. The two-hinged arch is
    a. Statically determinate
    b. Statically unstable
    c. Statically indeterminate by two degree
    d. Statically indeterminate by one degree

12. A point load acting at the mid-span of a fixed beam of uniform section produces fixed end moments of 30kN. If the same total load is spread over the entire span as a uniformly distributed load, the magnitude of the fixed end moment will be
    a. 15 kNm b. 10 kNm c. 20 kNm d. 40 kNm

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. 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

15. The ratio of the moment borne by the member to the total moment applied at the joint is called
    a. Distribution factor b. Stiffness factor
    c. Carry-over factor d. Disturbance factor

16. In slope deflection equations, the deformations are considered to be caused by
    a. Bending moment
    b. Shear force
    c. Both bending and shear force
    d. Axial force only

17. In the linearly elastic structure, the equilibrium of the body is governed when
    a. Strain energy is equal to the deformation
    b. External virtual work must be equal to the internal virtual work
    c. Stiffness is equal to the deformation of the body
    d. Internal forces are more than the external reactions

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

19. The ratio of stiffness of a member when far end is hinged to that of the member when far end is fixed is
    a. 1
    b. 2
    c. 0.75
    d. 1.33

20. An arch can be treated as a curved beam
    a. Whose ends are restrained against horizontal movement
    b. Whose ends do not provide any reaction
    c. Whose ends are unsupported
    d. Whose ends are fixed