

KATHMANDU UNIVERSITY
End Semester Examination
May/June, 2022

Marks scored:

Level : B.E.

Course : CIEG 308

Year : III

Semester: II

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date :

SECTION "A"
[20 Q. × 0.5 = 10 marks]

Encircle the appropriate answers.

1. The load factor is
 - a. The ratio of collapse load to safe working load
 - b. The ratio of safe working load to the collapse load
 - c. Double of the collapse load
 - d. The 1.5 times the collapse load

2. Shape factor is defined as
 - a. The ratio of the elastic section modulus to the plastic modulus of section
 - b. The ratio of the collapse load to the elastic moment of the section
 - c. The ratio of the plastic modulus of section to the elastic modulus of the section
 - d. The ratio of the applied load to the collapse load

3. Independent displacement components at each joint of a rigid-jointed plane frame are
 - a. Three linear movements
 - b. Two linear movements and one rotation
 - c. one linear movement and two rotations
 - d. three rotations

4. The collapse load for simply supported beam having span l , uniformly distributed load with w and plastic moment of M_p is
 - a. Zero
 - b. $8M_p/l^2$
 - c. $8M_p/l^2$
 - d. $M_p/8l^2$

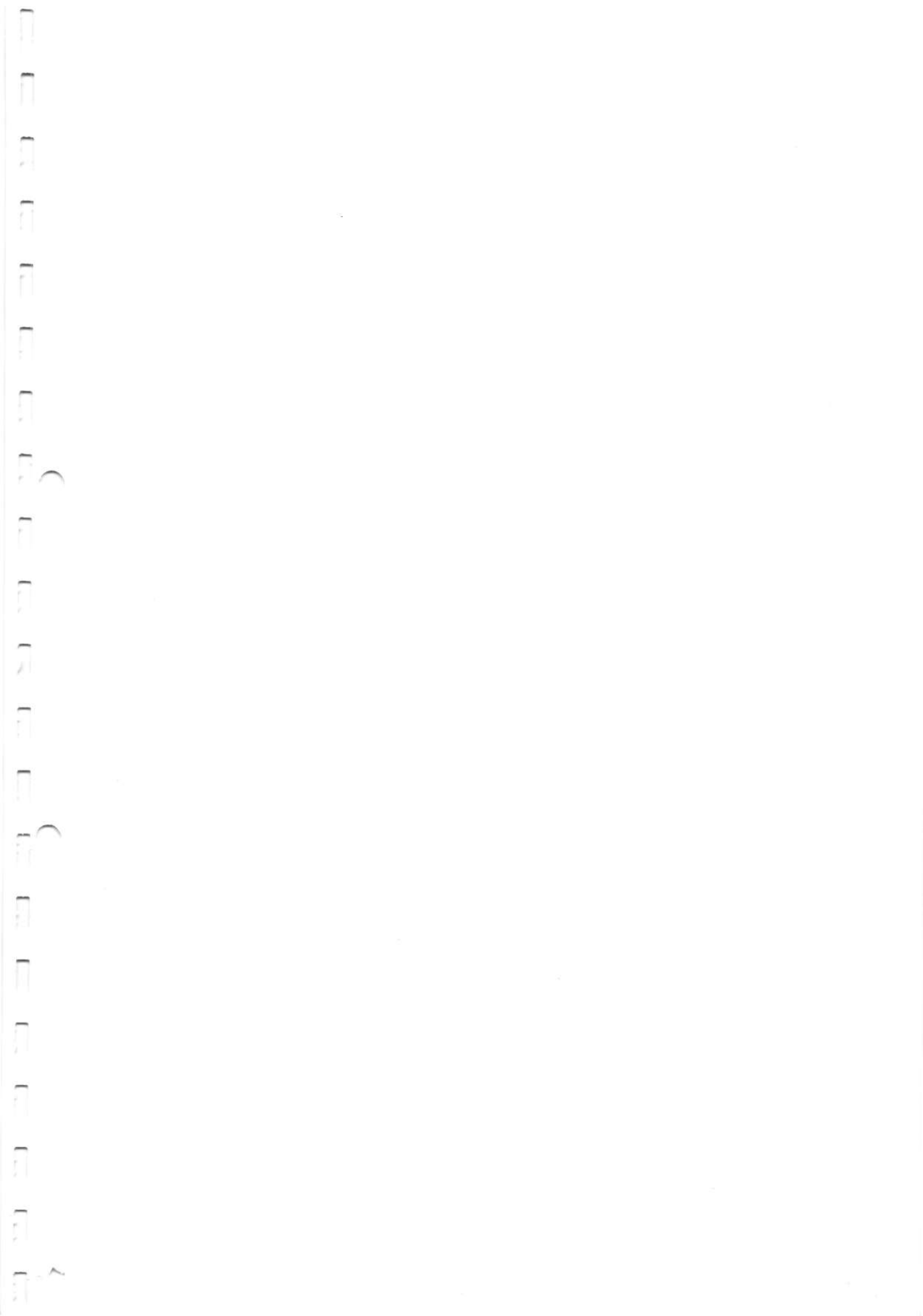
5. The Castigliano's second theorem can be used to compute deflections
 - a. In statically determinate structures only
 - b. For any type of structures
 - c. At the point under the load only
 - d. For beams and frames only

6. In moment distribution method, the distribution factor is
 - a. The ratio of the moment of inertia to the span length between supports
 - b. The ratio of the total length of span to the moment of inertia
 - c. The product to the moment of inertia to the span between the supports
 - d. The product of the stiffness and the fixed end moments

7. If there are more equations than unknowns, the structure is statically
 - a. Indeterminate more than the available equations
 - b. Stable and determinate
 - c. Kinematically determinate
 - d. Unstable

8. Statically indeterminate structures typically result in
 - a. higher stresses and smaller stiffness
 - b. higher stress and greater stiffness
 - c. smaller stresses and greater stiffness
 - d. both stresses and stiffness are smaller
9. Kinematic Indeterminacy refers to the number of
 - a. Reactions which required for equilibrium
 - b. Reaction more than equilibrium
 - c. Displacement quantities including rotations
 - d. Displacement quantities without rotations
10. 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
11. The basic assumption of the Slope Deflection Method is
 - a. Member can flex but the shear and axial deformation are very high
 - b. Member cannot flex but the shear and axial deformation are very high
 - c. Member can flex but the shear and axial deformation are zero
 - d. Member can flex but the shear and axial deformation are negligible
12. In slope deflection method, the end moments for any members are expressed
 - a. In terms of unknowns and rotations
 - b. As zero
 - c. As equal
 - d. In terms of only fixed end moments
13. The carryover moment is the moment induced at a fixed end of a member when the opposite end is
 - a. hinged
 - b. fixed
 - c. is rotated by an end moment
 - d. is rotated by fixed end moment
14. The stiffness factor is defined as
 - a. The end moment required to rotate through unit angle
 - b. Maximum Slope at the far end
 - c. Maximum slope at the near end
 - d. Maximum bending moment at the mid span
15. The carry over factor in a prismatic member whose far end is hinged is
 - a. 2
 - b. 1
 - c. 0.5
 - d. zero
16. The distribution factor is defined as the
 - a. Ratio of the applied moment to the total moment
 - b. Ratio of the end moment to the fixed end moment
 - c. Ratio of the effective stiffness to the total stiffness
 - d. Ratio of the induced shear force to the total support reaction
17. In the analysis of structurally indeterminate structures, primary structure refers
 - a. As acted upon by only actual loading
 - b. Deformation of structure
 - c. As the structure acted upon only by the redundant
 - d. Internal shear forces of structure

18. Consistent deformation method also known as
- a. Flexibility method
 - b. Stiffness method
 - c. Distribution method
 - d. Slope area
19. Degree of static indeterminacy of a rigid-jointed plane frame having 15 members, 3 reaction components and 14 joints is
- a. 2
 - b. 3
 - c. 6
 - d. 8
20. The shape factor of the rectangular section is
- a. 2
 - b. 3
 - c. 1.5
 - d. 4



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SECTION "B"

Attempt ALL the questions.

1. Compute the change in slope of the cross section at support A due to the loads acting on a statically determinate beam. (Hint: use the Castigliano's Theorem) [6]

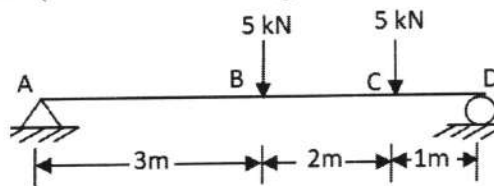
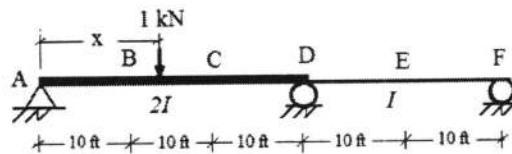


Figure 1

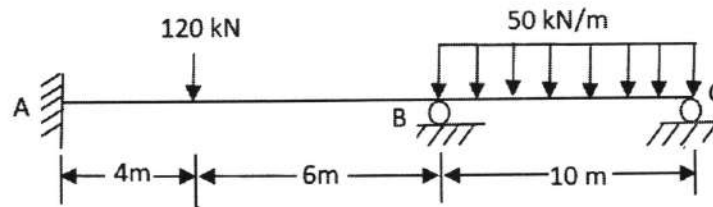
2. Draw the influence lines for the vertical reactions at support D and the shear force at point C of the two-span continuous beam as shown in Figure 2. [6]



$E = \text{constant}$

Figure 2

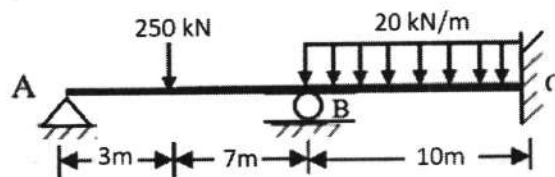
3. Construct the final shear and moment diagram for the structure and loading given. The quantity EI is the same for each span. Use the Consistent deformation method. [8]



$EI \text{ Constant}$

Figure 3

4. Determine the end moment and construct the shear and moment diagram for the structure shown below by slope deflection method. [8]



$EI \text{ Constant}$

Figure 4

5. Determine the end moments for each member and the support reactions for the frame given below in Figure 5. Use Moment distribution method. [12]

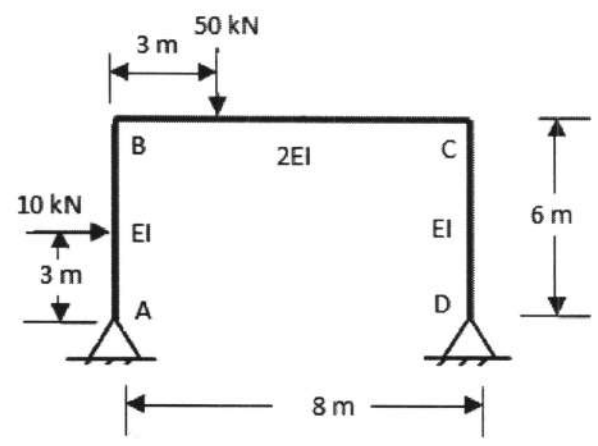


Figure 5