

KATHMANDU UNIVERSITY  
End Semester Examination  
August, 2018

Marks scored :

Level : B.E.  
Year : III

Course : CIEG 308  
Semester: II

Exam Roll No. :

Time: 30 mins.

F. M. : 10

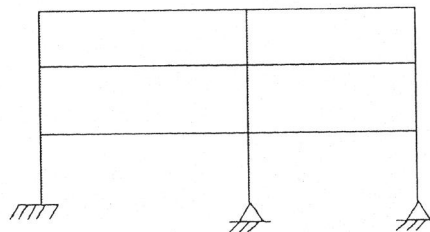
Registration No.:

Date **AUG 08 2018**

SECTION "A"  
[20 Q.  $\times 0.5 = 10$  marks]

Choose the appropriate answers.

- If  $n$  is the number of member required to form an internally statically determinate and  $n_a$  is the actual number of bars in truss, then the truss is statically unstable internally when
  - $2 n_a < n$
  - $3 n_a < n$
  - $n_a < n$
  - $4 n_a < n$
- In a rigid jointed frame, the rotating of various members meeting at the joint will be
  - equal
  - proportional to the length of the members
  - proportional to the stiffness
  - proportional to the respective moment of inertia
- Independent displacement components at each joint of a rigid-jointed plane frame are
  - three linear movements
  - two linear movements and one rotation
  - one linear movements and two rotation
  - three rotations
- In moment distribution method, the sum of the distribution factors of all the members is
  - zero
  - less than 1
  - 1
  - greater than 1
- The Castigliano's second theorem can be used to compute deflections
  - in statically determinate structures only
  - for any type of structures
  - at the point under the load only
  - for beams and frames only
- The total (both internal and external) degree of static indeterminacy of the plane shown in figure is



a) 18

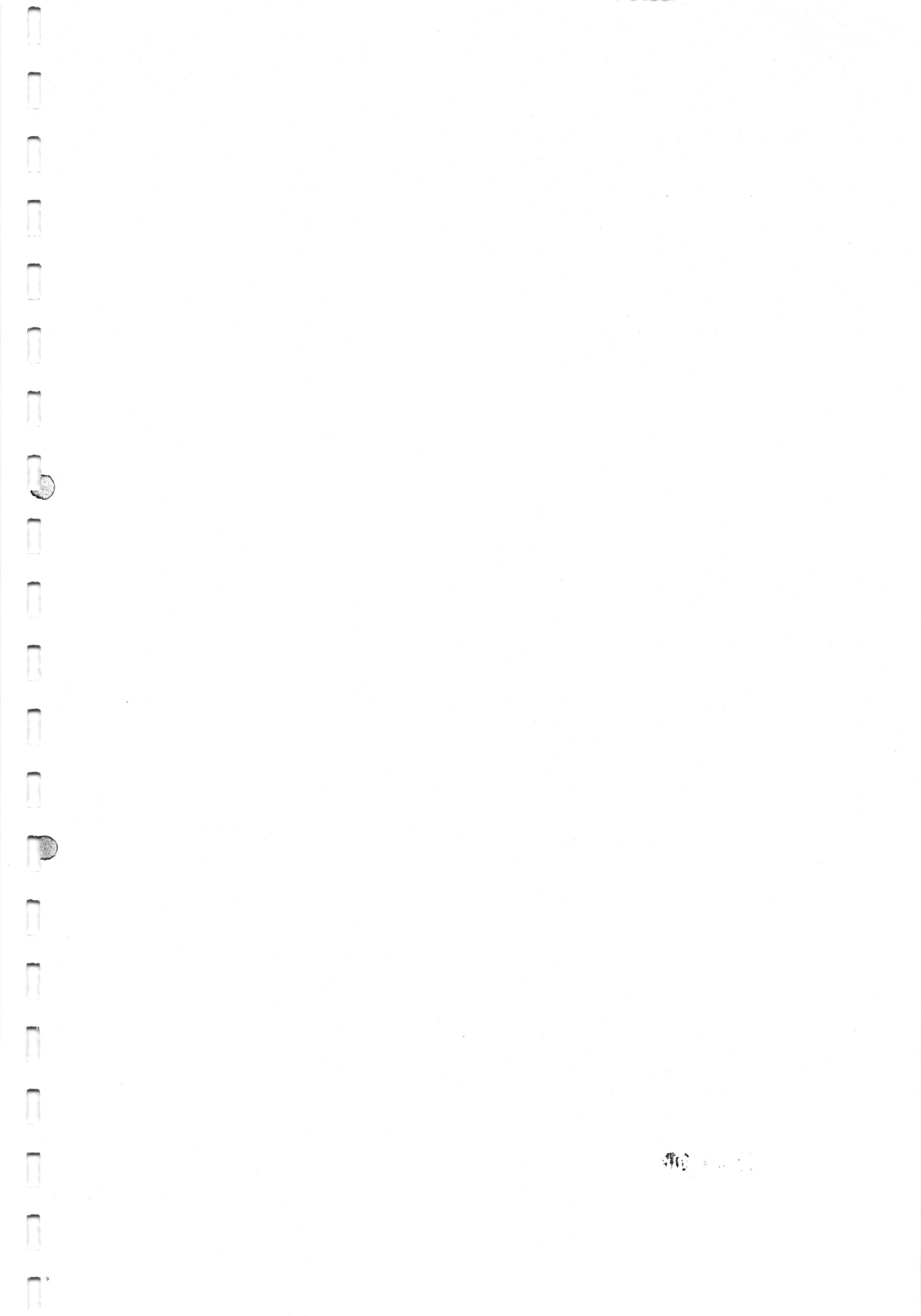
b) 16

c) 14

d) 13

7. The force method is more useful when the degree of static indeterminacy is
- less than the degree of kinematic indeterminacy
  - greater than the degree of kinematic indeterminacy
  - equal to the degree of kinematic indeterminacy
  - no relation with the degree of kinematic indeterminacy
8. The slope deflection and moment distribution methods are
- flexibility
  - stiffness
  - both flexibility and stiffness
  - based on moment reduction
9. 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 uniformly distributed load, the magnitude of the fixed end moment will be
- 15 kNm
  - 10 kNm
  - 20 kNm
  - 40 kNm
10. A symmetrical two-hinged parabolic arch when subjected to a uniformly distributed load on an entire horizontal span, is subjected to
- radial shear alone
  - normal thrust alone
  - normal thrust and bending moment
  - normal thrust, radial shear and bending moment
11. The method of consistent deformation is also called as
- Force method
  - Slope deflection method
  - Moment distribution method
  - Stiffness method
12. The method in which unbalanced moments are distributed as per stiffness is called
- Consistent deformation
  - Betti's law
  - Maxwell's law
  - Moment distribution
13. An arch can be treated as a curved beam
- Whose ends are restrained against horizontal movement
  - Whose ends do not provide any reaction
  - Whose ends are unsupported
  - Whose ends are fixed
14. The moments in the arch will be zero, if
- ends are hinged
  - ends are fixed
  - the arch axis coincides with the line of thrust
  - the arch axis is parallel to the line of thrust
15. The carry over factor in a prismatic member whose far end is hinged is
- 2
  - 1
  - 0.5
  - zero

16. In the displacement method of structural analysis, the basic unknown are  
a) Forces                      b) Displacements              c) Moments                      d) Shear forces
17. In the analysis of structurally indeterminate structures, compatibility equations are based on  
a) Forces of structures                      b) Deformation of structure  
c) External moments of structures              d) Internal shear forces of structure
18. A structure without any degrees of freedom is termed as  
a) Kinematically determinate                      b) Kinematically indeterminate  
c) Statically indeterminate                      d) Statically determinate
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. For a two-hinged arch, if one of the supports settles down vertically, then the horizontal thrust  
a) is increased                      b) is decreased  
c) remain unchanged                      d) becomes zero



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SECTION "B"

Attempt *ALL* the questions.

1. A uniformly distributed load of 40 kN/m covers left hand of the span of a parabolic arch, span 36 m and central rise 8 m as shown in Figure 1. Determine the position and magnitude of maximum bending moment. Also find the shear force and normal thrust at the section. Assume that moment of inertia at a section varies as secant of slope at the section. Neglect effect of rib shortening. [6]

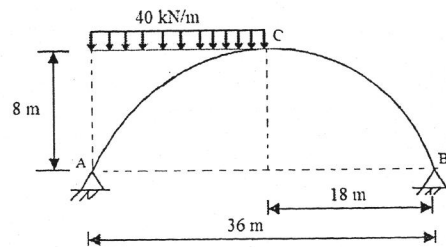


Figure 1

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]

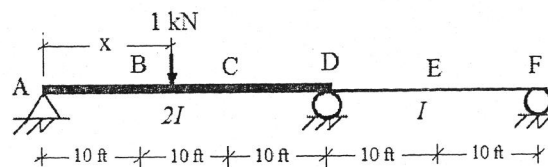


Figure 2  $E = \text{constant}$

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]

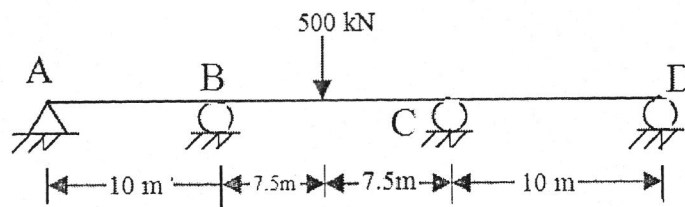


Figure 3

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

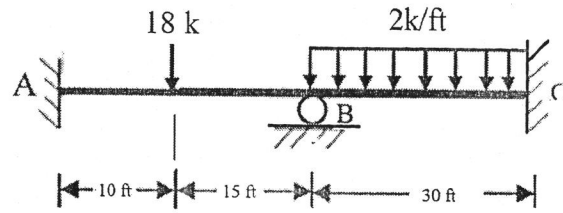


Figure 4

EI Constant

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

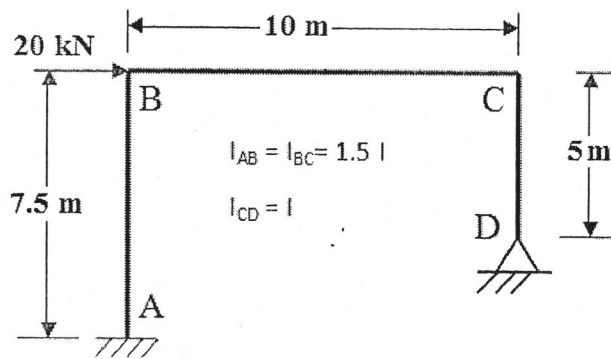


Figure 5