

Total No. of printed pages = 7

30712/112

CE 181307

Roll No. of candidate

BINA CHOWDHURY CENTRAL LIBRARY

(GIMT & GIPS)

Azara, Hatkhowapara,

Guwahati -781017

2019

B.Tech. 3rd Semester End term Examination

Civil

STRUCTURAL ANALYSIS – I

New Regulation

(w.e.f. 2017–18) & (New Syllabus)

(w.e.f. 2018–19)

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer Question No.1 and any Four from the rest.

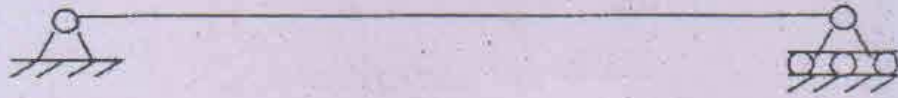
1. Answer all questions : (10 × 1 = 10)
- (i) So that truss members take only axial load with no bending moment or shear force
- (a) Joints of the members need to be pinned with loads anywhere
- (b) The joints of the members need to be welded
- (c) Joints of the members need to be pinned with loads at the joints
- (d) Joints of the members need not be pinned but loads must be at the joints

[Turn over

- (ii) It is necessary that a structure is
- (a) Both stable and statically determinate
 - (b) Both stable and statically indeterminate
 - (c) Stable only irrespective of whether statically determinate or indeterminate
 - (d) Determinate
- (iii) In a truss that is loaded vertically downward load, top chord members are subjected to
- (a) Tension
 - (b) Compression
 - (c) Zero load
 - (d) Bending
- (iv) In a truss that is loaded vertically downward load, bottom chord members are subjected to
- (a) Tension
 - (b) Compression
 - (c) Zero load
 - (d) Bending

- (v) In a truss that is loaded vertically downward load, diagonal members are subjected to
- (a) Tension always
 - (b) Compression always
 - (c) Either tension or compression
 - (d) Bending
- (vi) Example of a geometrically nonlinear structure is
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- (a) Braced arch
 - (b) Simply supported beam of shallow depth
 - (c) Suspension bridge
 - (d) Braced frame
- (vii) Kinematic indeterminacy is based on
- (a) Lack of supports
 - (b) Lack of freedom of movement
 - (c) Static-indeterminacy
 - (d) Inadequacy of equation of static-equilibrium conditions to solve a structure
- (viii) Static-indeterminacy is based on
- (a) Lack of supports
 - (b) Lack of freedom of movement
 - (c) Kinematic-indeterminacy
 - (d) Inadequacy of equation of static-equilibrium conditions to solve a structure

- (ix) The degree of Kinematic indeterminacy of the simply supported beam shown below

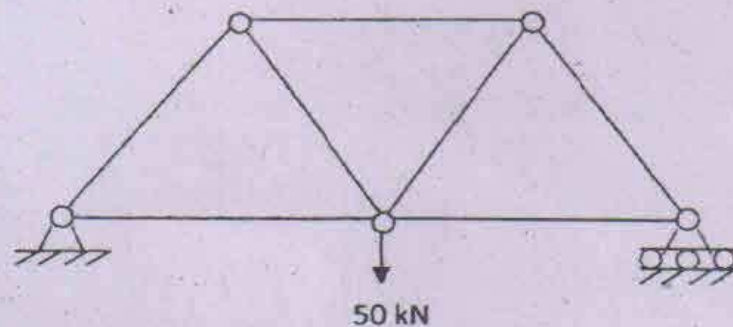


- (a) 0
- (b) 1
- (c) 2
- (d) 3

- (x) The degree of Statical indeterminacy of the simply supported beam shown in 1 (ix)

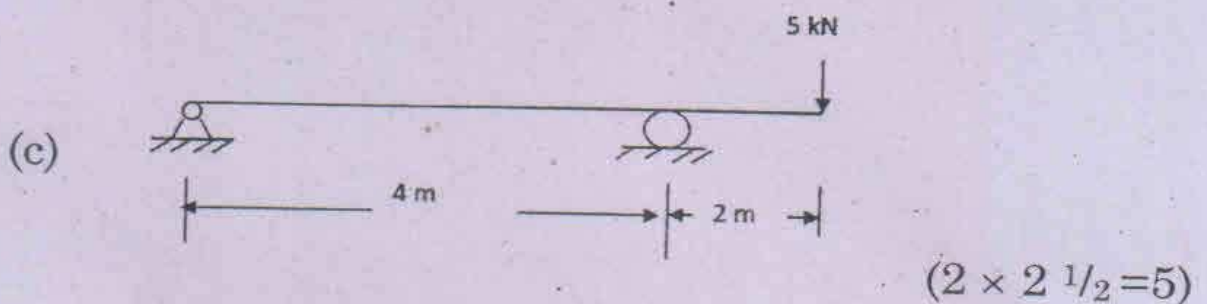
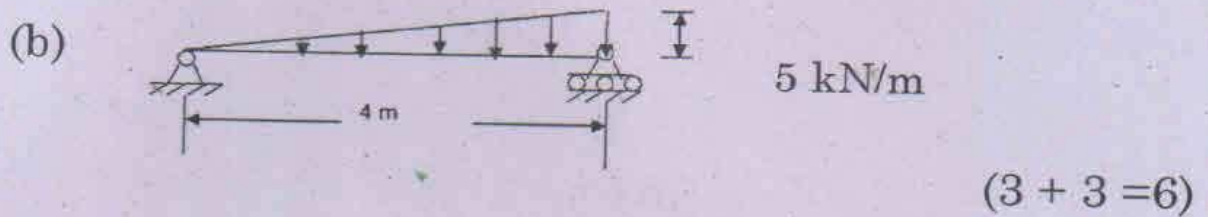
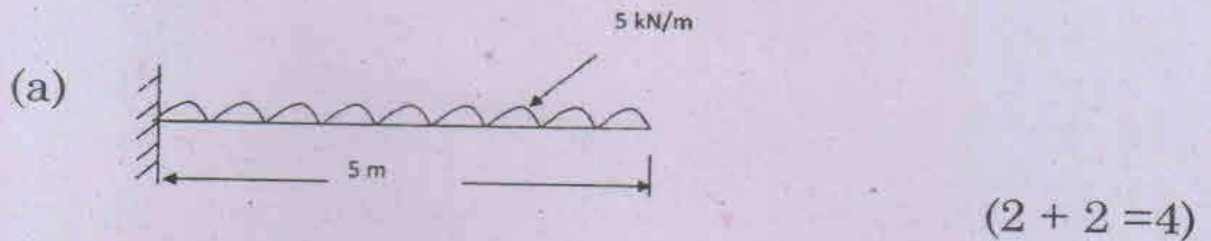
- (a) 0
- (b) 1
- (c) 2
- (d) 3

2. (a) Determine the forces in the truss by method of joints. The truss members are of length 5 in each. (8)

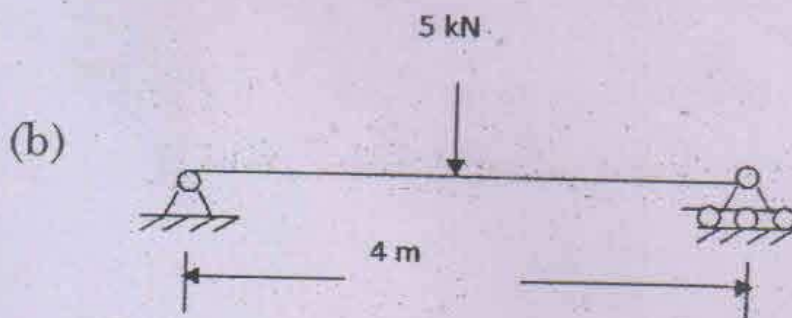


- (b) Validate the results using method of section. (7)

3. Draw the Shear Force Diagram and Bending Moment Diagram for the beams shown below



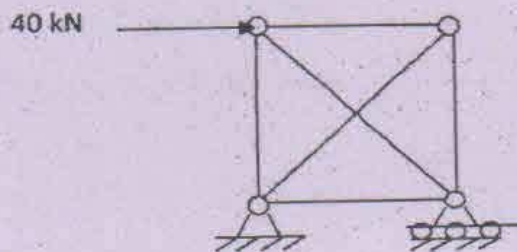
4. (a) Solve the beam in Prob 3(a) for slope and deflection at free end using moment area method. (3 + 3)



Solve the above mentioned beam for slope and deflection under the midspan load using double integration method. (3 + 3)

- (c) Draw the conjugate beam for simply supported beam in problem 4(b). (3)

5. (a) State Betti's theorem. Show how Maxwell's reciprocal theorem is a special case of Betti's theorem. (2 + 3)
- (b) Using unit load method, determine the deflection at free end of the structure shown in Prob 3(a) (5)
- (c) Solve for force in the redundant truss member for the truss shown below (5)



The peripheral members of truss are of length 3 mts each.

6. (a) Illustrate three types of arches with schematic diagrams: Three-hinged arch, Two-hinged arch and Fixed arch. (2×3=6)
- (b) Derive the expression for Horizontal thrust for a two-hinged parabolic arch. (5)
- (c) A three-hinged parabolic arch of span L and central rise h have udl of intensity w /unit length all over the span. Prove that bending moment at any section of the arch is zero. (4)

7. (a) Illustrate with schematic diagram: A three-hinged stiffening girder. (3)
- (b) A cable supports a udl of intensity w /unit length all over the span. Prove that the deflected shape of the cable is parabolic. (5)
- (c) A three hinged stiffening girder has a span 100 mts. The central dip of the cable is 7 mts. The girder supports a point load of 50 kN at left quarter span. Draw the bending moment of the stiffening girder. (7)
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