Code : 011616

B.Tech 6th Semester Exam., 2018

STRUCTURAL ANALYSIS—II

Time : 3 hours *Full Marks* : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

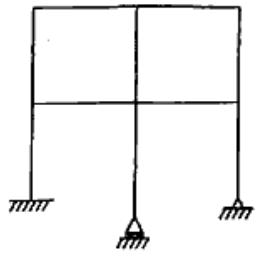
*(ii) There are **NINE** questions in this paper.*

*(iii) Attempt **FIVE** questions in all.*

*(iv) Question No. **1** is compulsory.*

1. Choose and write the correct option (any *seven*) : 2×7=14

(a) What is the kinematic indeterminacy for the frame shown in the figure below? (Member inextensible)



(i) 6 *(ii)* 11

(iii) 12 *(iv)* 21

(b) What is the variation of influence line for stress function in a statically determinate structure?

(i) Parabolic

(ii) Bilinear

(iii) Linear

(iv) Uniformly rectangular

(c) The maximum bending moment under a particular point load among a train of point loads crossing a simply supported girder occurs when that load is

(i) at mid-span

(ii) at 1/3rd span

(iii) at one-quarter span

(iv) so placed that the point load and the point of CG of the train of loads are equidistant from the mid-span

(d) The area of influence diagram for the reaction at the hinged end of a uniform propped cantilever beam of span L is

(i) $3L/8$

(ii) $L/2$

(iii) $L/4$

(iv) $L/8$

(e) What is the horizontal thrust in a symmetric parabolic two-hinged arch of span L and central rise (y) subjected to a uniformly distributed load of intensity (w) per unit length over its entire span?

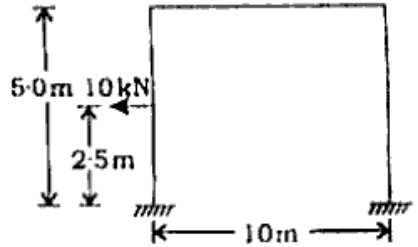
(i) $wL^2/(4y)$

(ii) $wL^2/(8y)$

(iii) $wL^2/(12y)$

(iv) $wL^2/(16y)$

(f) For the portal frame shown in the diagram below, the final end moments are $M_{AB} = 15$ kN-m; $M_{BA} = 10$ kN-m; $M_{CD} = 20$ kN-m. The end moment at M_{DC} will be



(i) 10 kN-m

(ii) 20 kN-m

(iii) 30 kN-m

(iv) 40 kN-m

(g) A beam is hinged at end A and fixed at B. A moment M is applied at end A. What is the moment developed at end B?

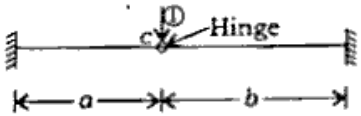
(i) $-M$

(ii) M

(iii) $M/2$

(iv) $-M/2$

(h) The stiffness coefficient k_{11} for the beam as shown below



is

(i) $EI\left(\frac{1}{a^3}+\frac{1}{b^3}\right)$ (ii) $2EI\left(\frac{1}{a^3}+\frac{1}{b^3}\right)$

(iii) $3EI\left(\frac{1}{a^3}+\frac{1}{b^3}\right)$ (iv) $4EI\left(\frac{1}{a^3}+\frac{1}{b^3}\right)$

(i) The moment distribution method in the structural analysis falls in the category of

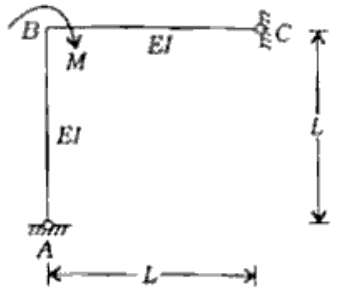
(i) displacement method

(ii) force method

(iii) flexibility method

(iv) first-order approximate method

(j) What is the rotation of the member at C for a frame as shown in figure below?



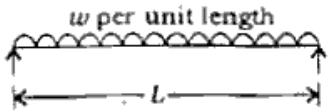
(i) $ML/(3EI)$ (ii) $ML/(4EI)$

(iii) $ML/(6EI)$ (iv) $ML/(12EI)$

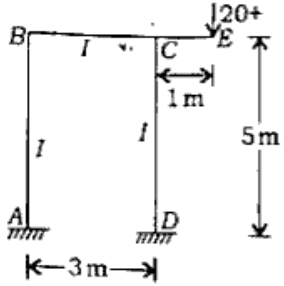
2. Using generalized coordinate approach, find shape functions for two nodded bar/truss element. 14

3. Find flexibility and stiffness matrix for a cantilever beam element having length L and constant flexural stiffness. 14

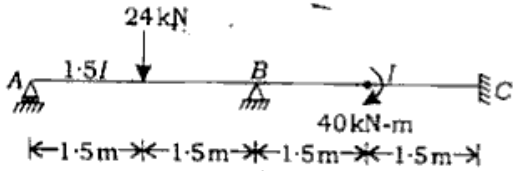
4. Using three-moment method, obtain central deflection having constant EI. 14



5. Analyze the beam shown in the figure below by slope deflection method. Draw BMD and SFD : 14



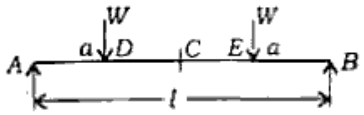
6. Analyze the rigid jointed frame by moment distribution method. Draw SFD and BMD. 14



7. A simply supported beam of 10 m span, a 7 m long UDL of 10 kN/m intensity crosses the beam from left to right. When the head of load is 1 m from the right support, find the support reactions, BM and SF at the mid-span using the influence line diagram. 14

8. A two-hinged semicircular arch of radius R carries a distributed load uniformly varying from zero at left end to w per unit run at the right end. Determine the horizontal thrust at each support. 14

9. A beam of length l is simply supported at ends and carries a concentrated load W at a distance a from each end. Find the slope at each end and under load. Also find the deflection under each load and central deflection by conjugate beam method. 14



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