

**SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION  
JUNE 2009**

CE 04 602—STRUCTURAL MECHANICS—III

(2004 Admissions)

Time : Three Hours

Maximum : 100 Marks

*Answer all questions.*

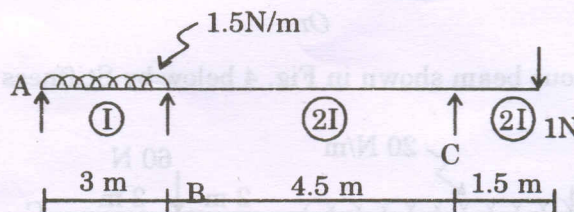
**Part A**

- I. (a) Write a note on comparison between Static indeterminacy and Kinematic indeterminacy.  
 (b) What do you know about Flexibility influence coefficient and Stiffness influence coefficient ? Explain.  
 (c) Explain the equilibrium and compatibility relationship for flexibility approach and stiffness approach.  
 (d) Write down the steps involved in the stiffness method of structural analysis.  
 (e) Write short notes on types of coordinates.  
 (f) Distinguish between flexibility method and stiffness method.  
 (g) Write notes on Consistent mass and Lumped mass.  
 (h) State and explain D'Alembert's principle.

(8 × 5 = 40 marks)

**Part B**

- II. (a) Analyse the continuous beam shown in Fig. 1. by flexibility method.



**Fig. 1**

Or

- (b) Find, by the force method, the bar forces in the truss shown in Fig. 2 below.

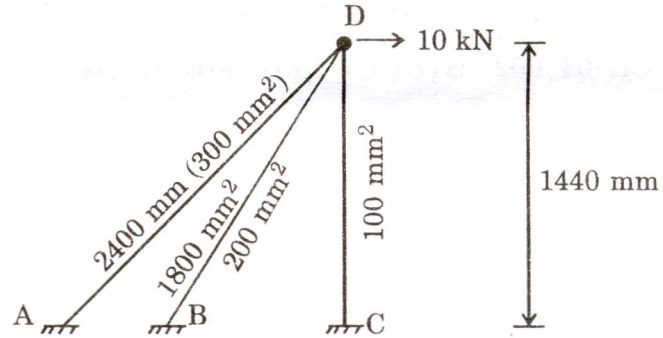


Fig. 2.

(20 marks)

- III. (a) Analyse the frame shown in Fig. 3 below by Stiffness method.

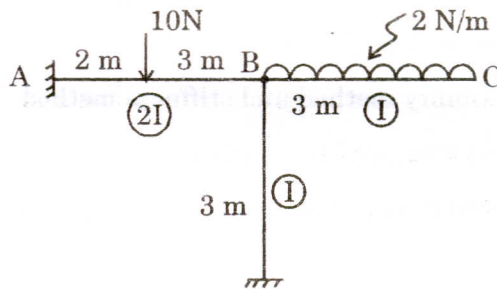


Fig. 3.

Or

- (b) Analyse the continuous beam shown in Fig. 4 below by Stiffness method.

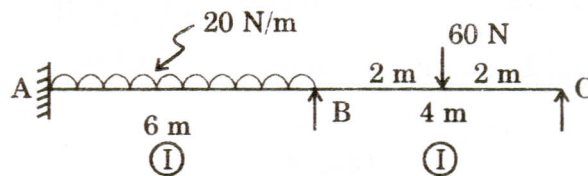


Fig. 4.

(20 marks)

- IV. (a) Fig.5 below shows a beam with ends fixed. A lumped mass with  $M = 4CAL/35$  and a massless elastic spring with constant  $= 12EI/L^3$  are attached at the mid span. Find the approximate values for  $w$  by using two elements to model the whole beam.

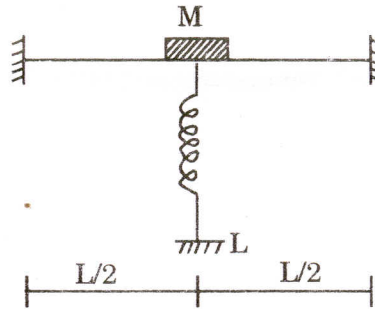


Fig. 5.

Or

- (b) A weightless cantilever of length ' $l$ ' and constant flexural rigidity  $EI$  carries a weight  $W$  at its end. Neglecting the moment of inertia of the mass about its center.
- Find the natural angular frequency and the natural period of vibration of the system.
  - If the motion is initiated by displacing the mass in a direction perpendicular to the cantilever by a distance of  $\frac{Wl^3}{3EI}$  and then leaving the system to vibrate freely, what is the maximum displacement? What is the displacement at any time ' $t$ '?

(20 marks)

(3 × 20 = 60 marks)