C 14717 (Pages 3) Name.....

Reg. No.....

SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2010

CE 04 602—STRUCTURAL MECHANICS—III

Time : Three Hours Maximum : 100 Marks

Missing data, if any, may be suitably assumed.
Answer **all** *questions.*

I. (a) Differentiate between degree of static indeterminacy and degree of Kinematic indeterminacy. Explain with example.

(b) Prove that $[K] = [B]^T [-K] [B]$. Symbols have their usual meanings.

(c) Derive the flexibility and stiffness matrices for the following beam :

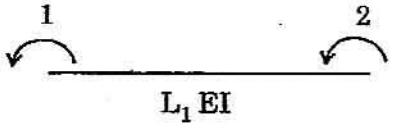

Fig. 1.

(d) Derive the stiffness matrix for a 2D bar element in terms of 1 D bar element.

(e) What is meant by logarithmic decrement ? Discuss.

(f) Explain the principle of vibration isolation.

(g) Derive the force transformation matrix for the following continuous beam.

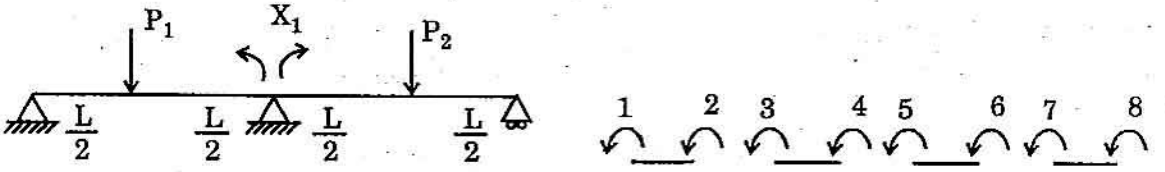

Fig. 2.

(h) Derive the displacement transformation matrix for the following frame.

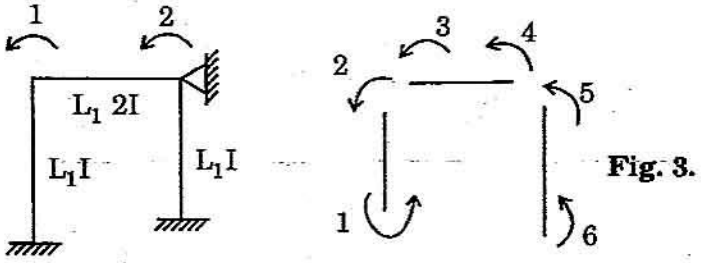

Fig. 3.

(8 × 5 = 40 marks)

Turn over

II. (a) Considering only axial deformations for the truss shown, determine the flexibility matrix [*f*] associated with the applied forces P_1 and P_2.

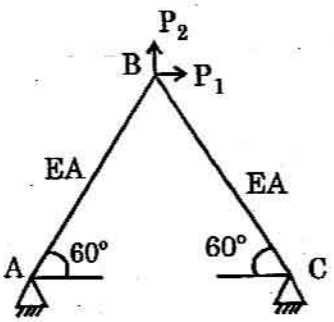

Fig.4.

Or

(b) Solve the following beam using flexibility method. Draw the BMD and SFD.

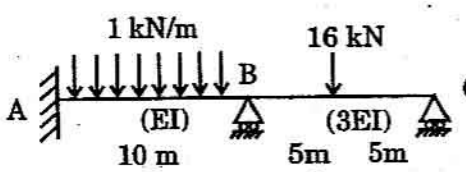

Fig. 5.

III. (a) Generate the stiffness matrix for the following beam with coordinates as shown.

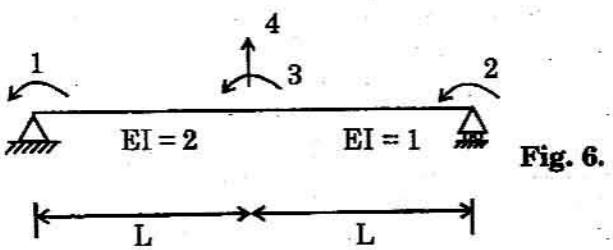

Fig. 6.

Or

(b) Analyse the plane truss shown in the figure. Use stiffness method.

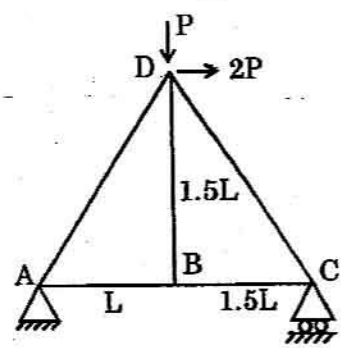

Fig.7.

Axial rigidity of all members = AE

IV. (a) A single degree of freedom system (underdamped) is subjected to a sinusoidal base displacement. Find the expression for displacement transmissibility.

Or

(b) A single degree of freedom system is subjected to a rectangular pulse loading of magnitude P from $t = 0$ to $t = t_0$. If the system is underdamped, derive the expression for response.

(3 × 20 = 60 marks)