Total No. of printed pages = 3

CT-401/SA/4th Sem/2013/M

STRUCTURAL ANALYSIS

Full Marks – 70

Pass Marks – 28

Time – Three hours

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

1. (a) Explain the concept of strain energy. 4

   (b) Determine the horizontal displacement of the roller end D of the portal frame shown in figure 1; when P = 8 kN. EI = 6000 kNm^2 throughout. 10

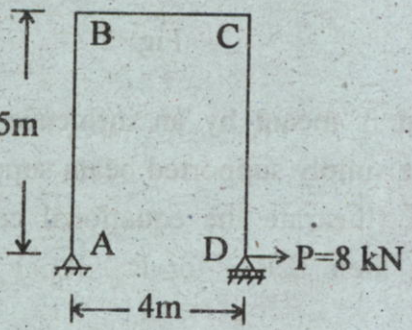

Fig. 1

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2. (i) Define :

(a) Virtual work

(b) Castigliano's theorems. $2\times2=4$

(ii) Describe degree of indeterminacy. 5

(iii) Differentiate between statically determinate and indeterminate structures. 5

3. Determine the deflection and rotation at the free end of the cantilever beam shown in fig 2. Use unit load method. Given $E = 2\times10^5$ N/mm^2 and $I = 12\times10^6$ mm^4. 14

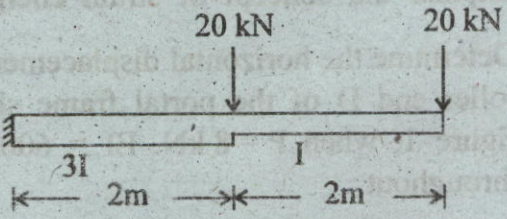

Fig. 2

4. What is meant by an influence line diagram ? For a simply supported beam supplied with a unit load, illustrate the equational conditions (along with their ILP's) for R_A, R_B, F_C and M_C. 14

5. Determine the rotations of A,B,C,E and deflections of C, D and E in the beam shown in fig 3. Use conjugate beam method. 14

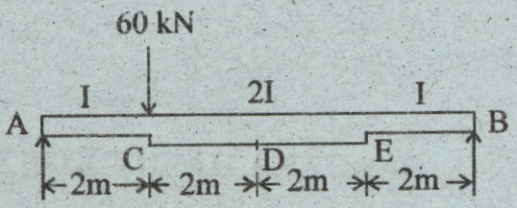

Fig. 3