

Total number of printed pages-5

53 (CE 402) STAN

2015

**STRUCTURAL ANALYSIS-I**

Paper : CE 402

Full Marks : 100

Time : Three hours

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

Answer **any five** questions out of seven.

1. (a) The members of the warren girder shown in fig. 01 are so proportioned that all the members are stressed to  $100\text{N/mm}^2$  when a vertical load of  $60\text{kN}$  is applied at  $L_1$ .

Contd.

If  $E = 2 \times 10^5 \text{ N/mm}^2$  find the vertical displacement of  $L_2$ . 15

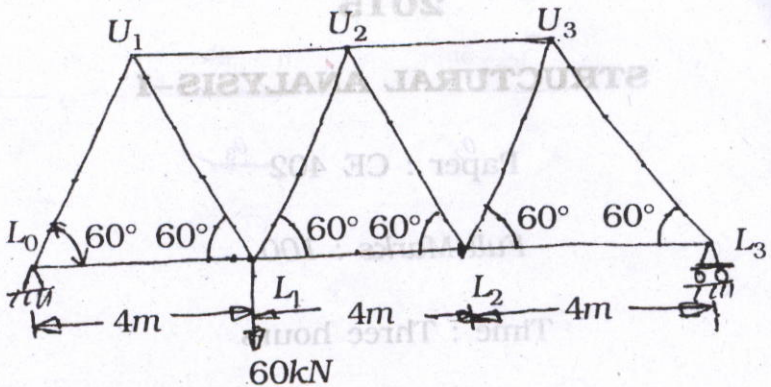


fig. 01

(b) What is meant by Indeterminate structures? Differentiate between static & kinetic indeterminacy. 1+4

2. A light cable is supported at two points  $20 \text{ m}$  apart which are at the same level. The cable supports three concentrated load as shown in fig. 02. The deflection at first point is found to be  $0.8 \text{ m}$ . Determine the tension in

the different segments and total length of the cable. 20

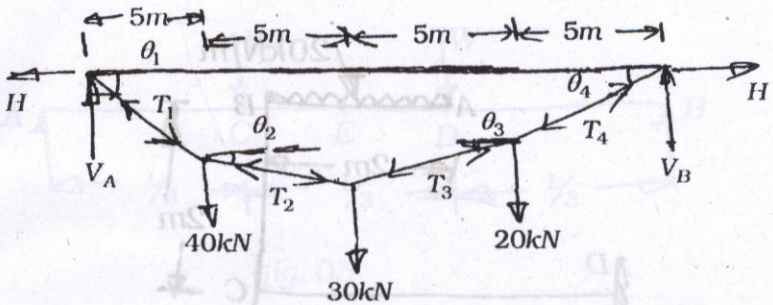


fig. 02

3. Determine the vertical and horizontal displacement at the free end D in the frame shown in fig. 03. Take  $EI = 12 \times 10^{13} \text{ Nmm}^2$ . Use Castigliano's theorem. 20

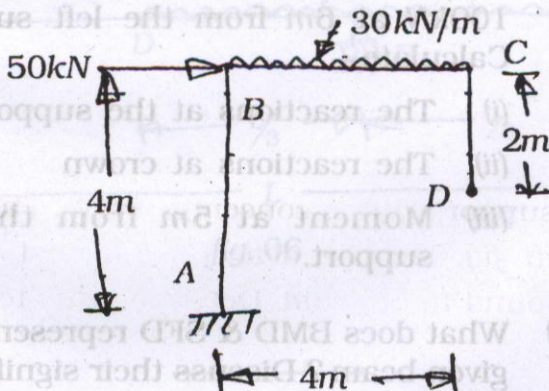
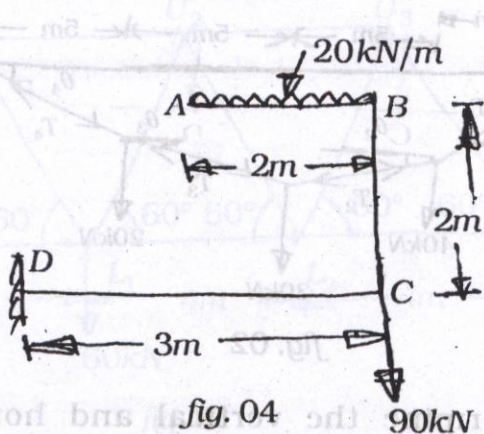


fig. 03

14. Determine the vertical deflections at A and C in the frame shown in *fig. 04*. Take  $E = 200\text{GPa}$ ,  $I = 150 \times 10^4 \text{mm}^4$ . 20



*fig. 04*

5. (a) A circular arch of span  $25\text{m}$  with a central rise  $5\text{m}$  is hinged at the crown and springing. It carries a point load of  $100\text{kN}$  at  $6\text{m}$  from the left support. Calculate

- (i) The reactions at the supports
- (ii) The reactions at crown
- (iii) Moment at  $5\text{m}$  from the left support. 15

- (b) What does BMD & SFD represent for a given beam? Discuss their significance in reference to a structural member. 5

6. Determine the rotation at supports and deflection at mid-span and under the loads in the simply supported beam as shown in fig. 05. 20

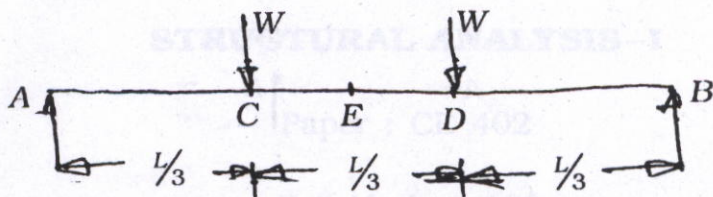


fig. 05

7. Determine the rotation and deflection at the free end in the overhanging beam as shown in fig. 06. 20

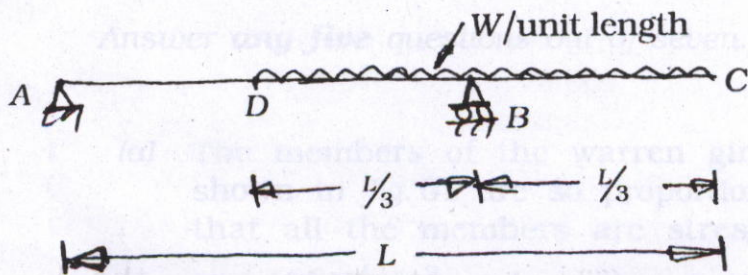


fig. 06