Reg. No. : | | | | | | | | | | | | |

Question Paper Code : X 60253

B.E./B.Tech. DEGREE EXAMINATIONS, NOV./DEC. 2020
Fifth Semester
Civil Engineering
CE 2302/10111CE 502/CE51 – STRUCTURAL ANALYSIS – I

(Regulations 2008/2010)
(Common to PTCE 2302/10111CE502 – Structural Analysis – I for B.E. (Part-Time) Third Semester – Civil Engineering – Regulations 2009/2010)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions.

PART – A **(10×2=20 Marks)**

1. Define the Principle of virtual work.
2. What are the difference between determinate and indeterminate structures ?
3. Define the principle of virtual work.
4. What is the use of Williot diagram ?
5. Mention the types of arches.
6. Give the applications of two hinged arches.
7. Write the basic slope deflection equations for a prismatic beam element.
8. Distinguish between 'Sway' type and 'Non-Sway' type problems. What difficulties arise while dealing with the former, compared to the later ?
9. What are fixed end moments ?
10. Define distribution factor.

PART – B **(5×16=80 Marks)**

11. a) A simply supported beam of 15 m span is subjected to an u.d.l of 5 kN/m (self weight) and an u.d.l. of 12 kN/m (live load) acting for 6 m length travelling from right to left. Draw the ILD for shear force and bending moment at a section 10 m from the right end. Use these diagrams to determine the maximum shear force and bending moment at this section. **(16)**

(OR)

b) The Warren girder of 25 m span is made of 5 panels of 5 m each. The diagonals are inclined at 60° to the horizontal. Draw the influence line diagram for force in upper cord member in the second panel from left. Hence evaluate the forces in it when there is a load of 60 kN at each lower joint. **(16)**

12. a) Explain the procedure and applications of Beggs deformeter. **(16)**

(OR)

b) A live load of 30 kN/m, 7m long moves on a girder simply supported on a span of 12 m. Find the maximum bending moment that can occur at a section 6m from the left end. **(16)**

13. a) A parabolic arch hinged at the springing and crown has a span of 20 m. The central rise of the arch is 4 m. It is loaded with uniformly distributed load of intensity 4 kN/m on the left 4 m length. Calculate :

i) The direction and magnitude of reaction at the hinges, **(4)**

ii) The bending moment, normal thrust and shear at 4 m and 12 m from the left end, **(6)**

iii) Maximum positive and negative bending moments. **(6)**

(OR)

b) A two hinged parabolic arch has a span of 30 m and a central rise of 5 m. Calculate the maximum positive and negative bending moments at a section 10 m from the left support, due to a single point load 10 kN rolling from left to right. **(16)**

14. a) A continuous beam ABCD 12 m long is fixed at A and D, and IS loaded as shown Fig Q-14.a. Analyse the beam completely if the following movements take simultaneously :

i) The end A yields turning through 1/250 radians in a clockwise direction. **(6)**

ii) End B Sinks 30 mm in downward direction. **(4)**

iii) End C Sinks 20 mm in downward direction. **(6)**

The beam has constant I = 38.2 × 105 mm^4 and E = 2 × 10^5 N/mm^2.

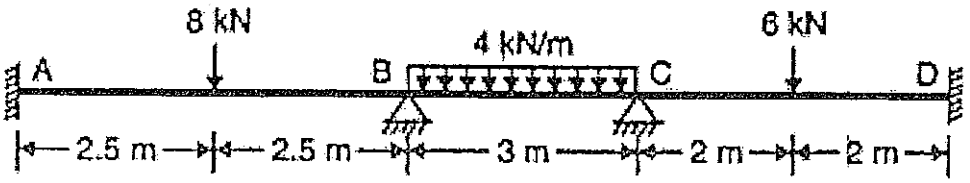

Fig Q. 14 a

(OR)

b) A portal frame ABCD is fixed at A and D and has rigid joints and at B and C. The column AB is 3 m long and column CD is 2 m long. The beam BC is 2m long and loaded with UDL of intensity 6 kN/m. The moment of inertia for AB is 2 I and that of BC and CD is I I (Fig. Q-14b) Plot BMD and sketch the deflected shape of the frame.

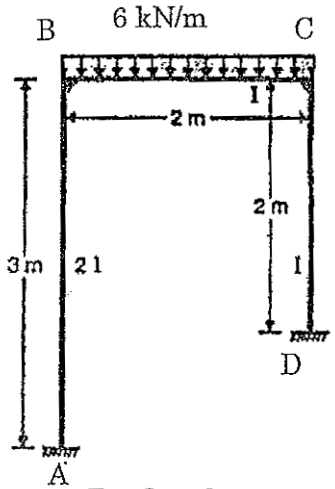

Fig Q 14 b

15. a) Analyse the continuous beam given in Fig. Q. 15 (a) by moment distribution method.

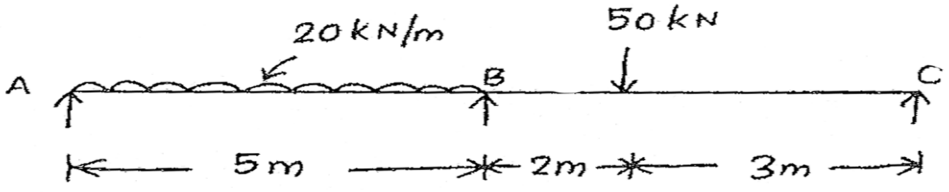

Fig. Q. 15 (a)

(OR)

b) Analyse the portal frame shown in Fig. Q. 15 (b) by moment distribution method and sketch the bending moment and shear force diagram.

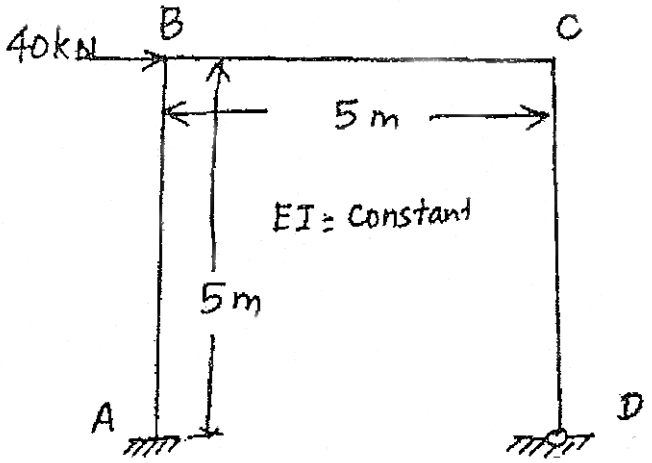

Fig. Q. 15 (b)