

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2012.

Fifth Semester

Civil Engineering

CE 2302/CE 51 — STRUCTURAL ANALYSIS — I

(Regulation 2008)

(Common to PTCE 2302 – Structural Analysis – I for B.E. (Part-Time)
Third Semester – Civil Engineering – Regulation 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Differentiate perfect and imperfect frame.
2. Explain the principle of least work.
3. What are influence lines?
4. State Muller Breslaus Principle.
5. Write the difference between circular arch and parabolic arch.
6. Give the equation for temperature effect in arches.
7. Mention the causes for sway in portal frames.
8. Explain the use of slope deflection method.
9. Write the equation for final moments in moment distribution method.
10. Define flexural rigidity.

PART B — ($5 \times 16 = 80$ marks)

11. (a) Determine the vertical and horizontal displacements of the point C of the pin jointed frame shown in figure 1. The cross sectional area of AB is 125 Square mm and of AC and BC 175 square mm each. $E = 2 \times 10^5$ N per square mm.

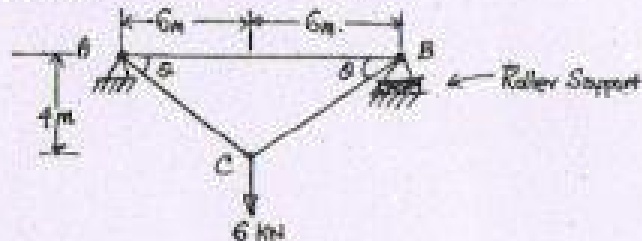


Figure 1

Or

- (b) The steel truss shown in figure – 2 is anchored at A and supported on rollers at B. If the truss is so designed that, under the given loading, all tension members are stressed to 110 N per square mm and all compression members to 85 N per square mm, find the vertical deflection of the point C. Take $E = 2 \times 10^5$ N per square mm.

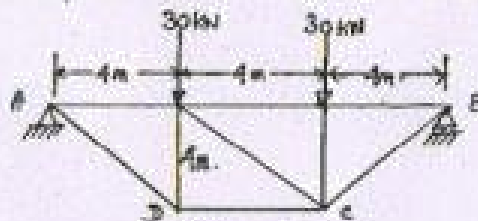


Figure 2

12. (a) A two span beam ABC has internal hinges at D and E as shown in figure 3. Using Muller Breslau influence theorem, sketch influence lines for
- Reaction at A
 - Reaction at B
 - Reaction at C and
 - Moment at C.

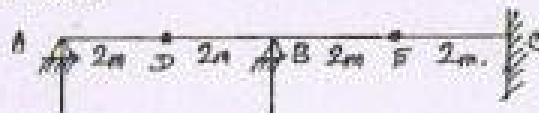


Figure 3

Or

- (b) A live load of 15 kN/m, 5 m long moves on a girder simply supported on a span of 13 m. Find the maximum bending moment that can occur at a section 6m from the left end.

13. (a) A symmetrical three hinged circular arch has a span of 13 m and a rise to the central hinge of 3m. It carries a vertical load of 15 kN at 3m from the left hand end. Find
- the reactions at the supports,
 - magnitude of the thrust at the springings,
 - bending moment at 5 m from the left hand hinge and
 - the maximum positive and negative bending moment.

Or

- (b) A two hinged parabolic arch of span 25 meters and rise 5 meters carries a uniformly distributed load of 38 kN/meter covering a distance of 10 meters from left end. Find the horizontal thrust, the reactions at the hinges and the maximum negative moment.
14. (a) A continuous beam ABC consists of spans AB and BC of 5 m length in each. Both ends of the beam are fixed. The span AB carries a point load of 15 kN at its middle point. The span BC carries a point load of 25 kN at its middle point. Find the moments and reactions at the supports. Assume the beam is of uniform section. Use slope deflection method.

Or

- (b) Analyse the portal frame shown in figure 4 by slope deflection method.

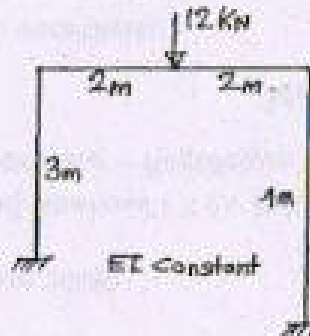


Fig. 4

15. (a) A beam ABC, 16m long, fixed at A and C and continuous over support B, carries an UDL of 3 kN/m over the span AB and a point load of 10 kN at mid span of BC. Span AB = 8 meters and span BC = 8 meters. EI is constant throughout. Analyse the beam using moment distribution method.

Or

- (b) Analyse the portal frame shown in figure-4 by moment distribution method.