B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2006.

Fifth Semester

Civil Engineering

CE 1302 — STRUCTURAL ANALYSIS - CLASSICAL METHODS

(Common to B.E. (PT) Fourth Semester Regulation 2005)

(Regulation 2004)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define virtual work.

2. Define a Statically indeterminate structure.

3. What are the stress resultants released when a cut is introduced on a beam element?

4. State Muller Breslau's principle.

5. Define tied arch.

6. A two hinged parabolic arch is loaded with a uniformly distributed load throughout the span.   Show the variation of BM along the span.

7. What are the primary unknowns in slope deflection method.

8. Differentiate-slope deflection sign convention and designer's sign convention.

9. Define stiffness factor.

10. Over hanging member is not a bonafide member-why?

11. (a) Find by the unit load method the slope θ_A of the simple beam AB shown in fig 11(a).
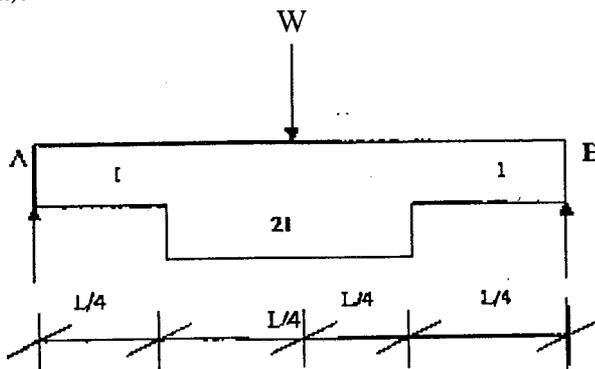

Fig. 11(a)

Or

(b) The truss shown in fig 11(b) carries a horizontal load at B. The tension members are stressed to 10 kN/cm² and compression members to 6 kN/cm². Assume $E = 2 \times 10^4 \, \text{kN/cm}^2$. Determine the vertical deflection of joint F.
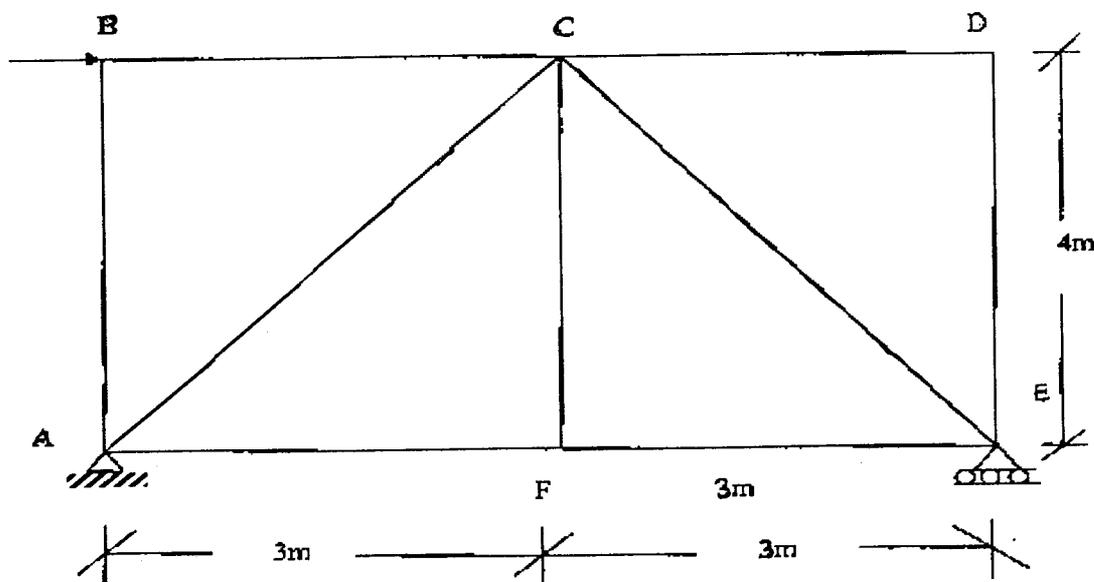

Fig. 11(b)

12. (a) A uniformly distributed load of 40 kN/m, 5 m long rolls over a simply supported beam of 20 m span from left to right. Using influence lines, determine the maximum SF and BM at 8 m from left end. Also calculate the absolute maximum BM anywhere on the span.

Or

A simply supported girder of 15 m span is traversed by a train of loads as shown in fig 12(b). Determine the maximum BM at a section 5 m from left support. Also find the magnitude of absolute max BM anywhere in the girder.
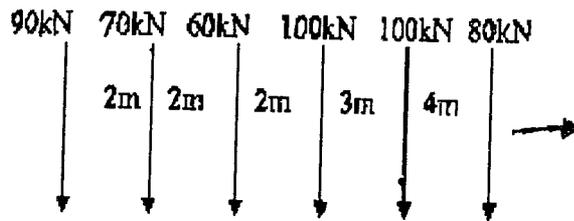
90kN   70kN   60kN   100kN   100kN   80kN

2m | 2m | 2m | 3m | 4m

Fig. 12(b)

(a) A circular arch rib of 24 m span with a central rise of 4.8 m is hinged at the crown and the springings which are at the same level. It carries a point load of 100 kN at 6 m from left end. Calculate (i) the horizontal thrust at the ends (ii) the reactions at the support and (iii) max + ve and – ve BM. Also draw the BMD.

Or

(b) A UDL of 40kN/m covers left half of the span of a two hinged parabolic arch, Span 20 m and central rise 8 m. Determine the position and magnitude of max BM. Also evaluate the thrust and SF at a section 8 m from left end. Assume M.I varies as secant of slope of the section.

(a) Analyse the continuous beam shown in figure 14(a) by slope deflection method and draw the SFD and BMD, EI is constant.
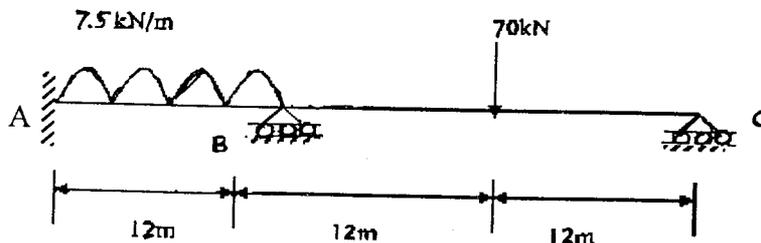
7.5 kN/m   **70kN**

A   B   C

| 12m | 12m | 12m |

Fig. 14(a)

Or

(b) Analyse the frame shown in fig 14 (b) by slope deflection method and draw the BMD.

50kN/m

B   C

4m
I

5m   2I   2J   5m

A   D

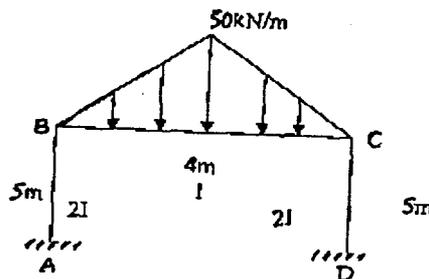Fig. 14(b)

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15. (a) Analyse the continuous beam shown in figure 15(a) by moment distribution method and draw the BMD.
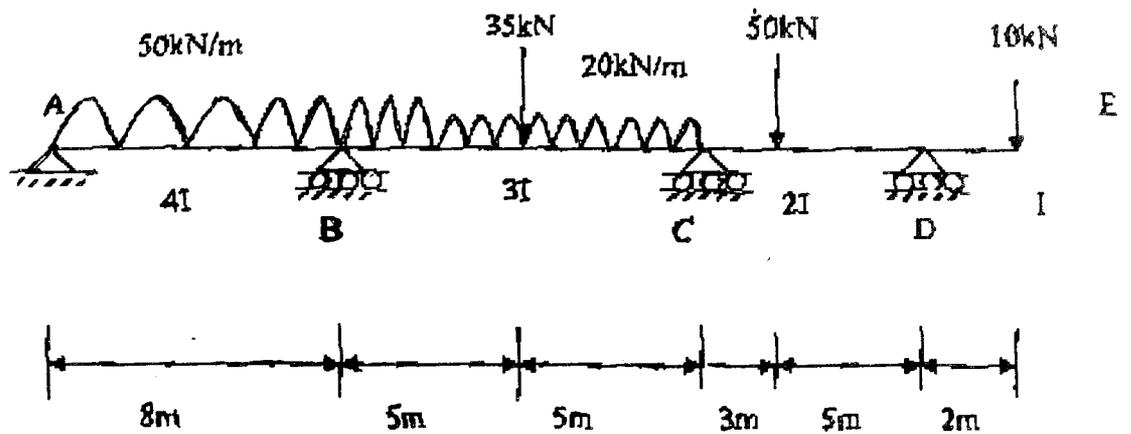

Fig. 15(a)

Or

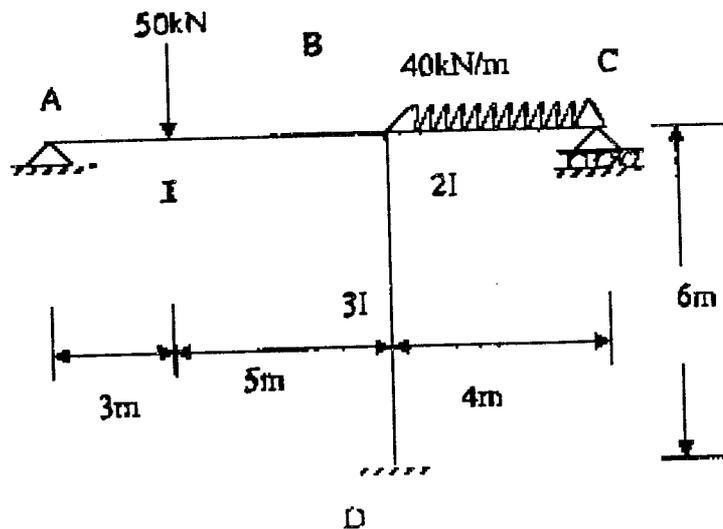(b) Analyse the simple frame shown in fig 15(b) by moment distribution method and draw the BMD.

Fig. 15(b)