

B.E DEGREE EXAMINATIONS: MAY/JUNE 2013

Fifth Semester

CIVIL ENGINEERING**CEE113: STRUCTURAL ANALYSIS I****Time: Three Hours****Maximum Marks: 100****Answer all the Questions:-****PART A (10 x 1 = 10 Marks)**

- For a circular column having its ends hinged, the slenderness ratio is 160. The l/d ratio of the column is
 a) 80 b) 57 c) 40 d) 20
- A propped cantilever of span 'l' carries a uniformly distributed load of w per unit run over its entire span. The value of prop reaction to keep the beam horizontal is
 a) $\frac{wl}{3}$ b) $\frac{3}{8}wl$ c) $\frac{wl}{2}$ d) $\frac{5}{8}wl$
- A number of wheel loads 3t, 4t, 5t and 6t spaced 2 m, 3 m and 3 m respectively moved on a simply supported beam AB of span 24 m with 3t load leading from left to right. The maximum bending moment at 18 m from A (the load must be placed at the section), will be
 a) 3t b) 4t c) 5t d) 6t
- The area of the influence line diagram for the fixed end moment of fixed beam of span L is
 a) $\frac{L^2}{8}$ b) $\frac{L^2}{12}$ c) $\frac{L^2}{16}$ d) $\frac{L^2}{24}$
- A two hinged parabolic arch is subjected to uniformly distributed load w/m over entire horizontal beam, the horizontal thrust is
 a) $\frac{wl^2}{3h}$ b) $\frac{wl^2}{4h}$ c) $\frac{wl^2}{6h}$ d) $\frac{wl^2}{8h}$
- In a two hinged parabolic arch an increase in temperature will induce
 a) Decrease the horizontal thrust b) Decrease the bending moment
 c) Increase in the horizontal thrust d) Make no change in the horizontal thrust
- A two span continuous beam ABC is simply supported at A and C and is continuous over supported B. Span AB = 6 m, BC = 6 m. The beam carries a udl of $2t/m$ over both the spans. EI is constant for the entire beam. The fixed end moment at B is span BA or BC would be
 a) 12.5m b) 9 tm c) 8 tm d) 6 tm
- The moment distribution method is best suited for
 a) In determinate pin jointed truss b) Rigid frames
 c) Space frames d) Trussed beam
- The number of unknowns to be determined in the stiffness method is equal to
 a) Static indeterminacy b) Kinematic indeterminacy
 c) Sum of static and kinematic indeterminacy d) None of the above

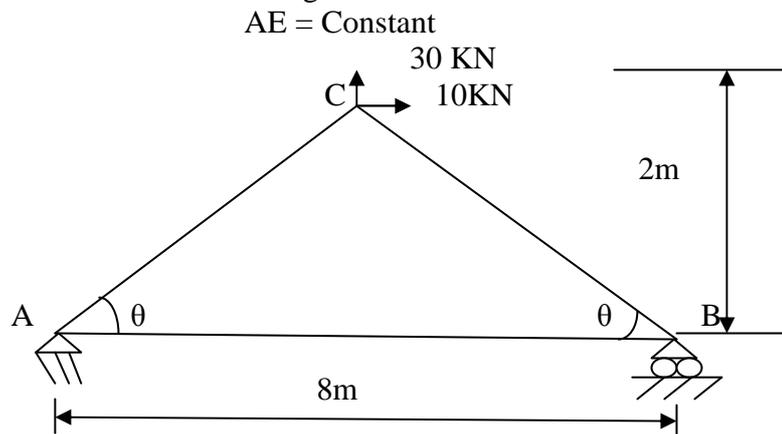
10. Which of the following does not fall under the category of force method?
- a) Method of consistent deformation b) Column analogy method
 c) Equilibrium method d) Three moment theorem

PART B (10 x 2 = 20 Marks)

11. State Castigliano's theorem applicable to virtual strain energy.
 12. Write the virtual strain energy method with examples.
 13. State the advantages of continuous beam over simply supported beam.
 14. Draw the ILD for shear force at a distance 'Z' from the left support of a simply supported beam of span 'L'.
 15. What are the internal forces that act at any section of a three hinged parabolic arch subjected to uniform load on its entire span?
 16. An arch has hinges at supports and at crown. The span is 'l' and central rise is 'r'. A concentrated load W acts at 1/3 from left support. Sketch the line of thrust diagram.
 17. Write the slope deflection equation explaining the meanings of notations used.
 18. Write the sway equation that can be formed for rectilinear portal frame with unequal column members.
 19. What are the advantages of moment distribution method?
 20. Distinguish absolute stiffness and relative stiffness of flexural members.

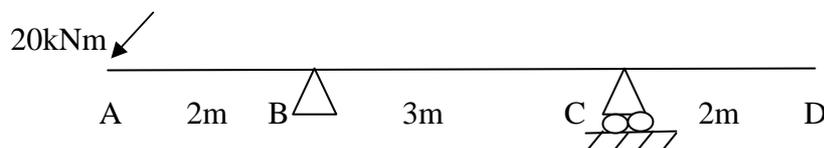
PART C (5 x 14 = 70 Marks)

21. a) Determine the vertical and horizontal displacement of point 'C' of the pin jointed frame shown in the figure.

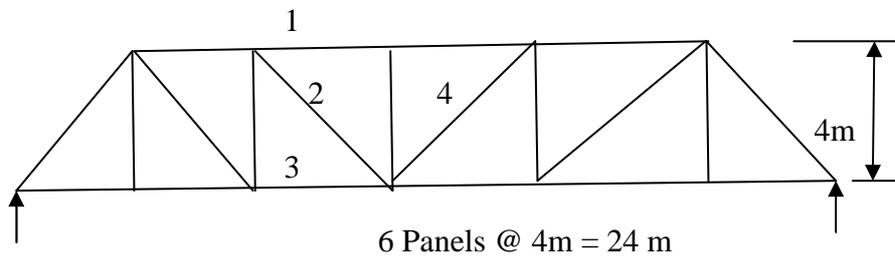


(OR)

- b) Calculate the deflection at A for the beam shown in figure.
 $I = 100 \times 10^6 \text{ mm}^4$, $E = 2 \times 10^5 \text{ N/mm}^2$



22. a) Draw the influence line diagram for the members 1, 2, 3 and 4 of the truss shown in figure.



(OR)

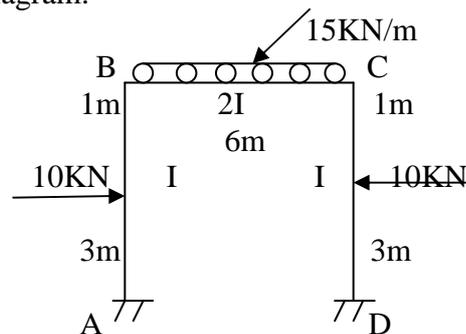
- b) A uniform load of 50 kN/m run, 6 m long crosses a girder of 30 m span. Calculate the maximum shear force at 5 m and 15 m from the left hand support.

23. a) (i) Write a note on fixed arch. (4)
(ii) A parabolic arch hinged at the ends has a span of 60 m and a rise of 12 m. A point load 8 kN acts at 15 m from left hinge. Calculate horizontal thrust and reaction at hinge. (12)

(OR)

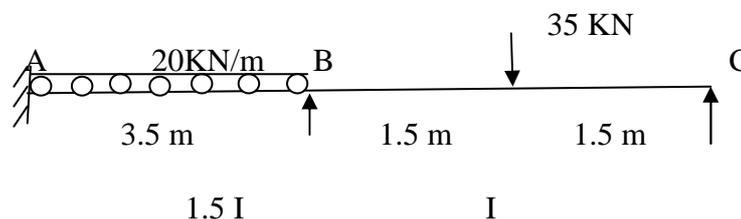
- b) A two hinged parabolic arch of span 24 m and central rise of 6 m is subjected to two concentrated loads 20 kN and 40 kN acting at 6 m and 18 m from left support respectively. $I = I_c = I_c \sec \theta$ where I_c is the moment of inertia of the crown and θ is the slope of arch at any section. Neglecting rib shortening effect, find the reactions of the arch at the supports.

24. a) Analyse the frame in figure by slope deflection method and draw bending moment diagram.

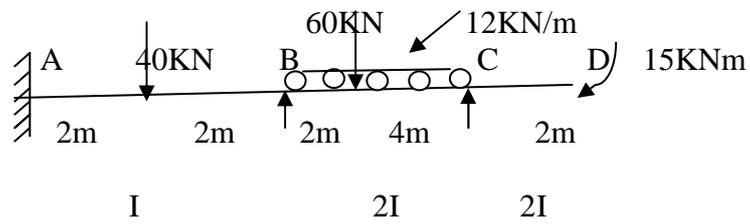


(OR)

- b) Find the moments at the critical points of the beam shown in figure by slope deflection method. The support B settles by 1 cm. $EI = 1500 \text{ kN m}^2$.



25. a) Analyse the continuous beam by moment distribution method as shown in figure.



(OR)

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

