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B020411(020)

B. Tech (Fourth Semester) Examination, April-May 2021

(Civil Engg. Branch)

STRUCTURAL ANALYSIS-I

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : *Part (a) carries 4 marks & compulsory from each unit. Rest other parts (b), (c) and (d) carry equal 8 marks. Answer any two from (b), (c) and (d).*

Unit-I

1. (a) Define Static indeterminacy and Kinematic indeterminacy 4

   (b) Compute Degree of static indeterminacy for the rigid frame shown in figure (i) & (ii) 8

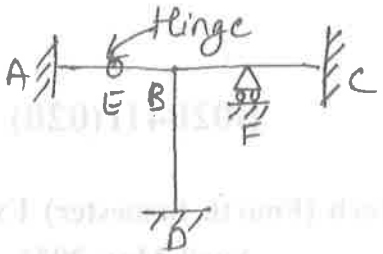


Fig. (i)

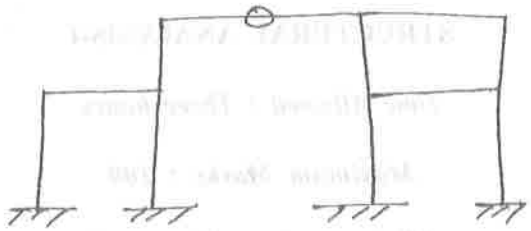
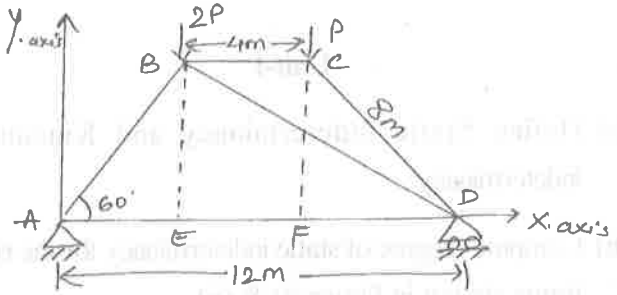


Fig. (ii)

(c) A Truss shown in figure below is loaded with two point loads of 2P and P kN at joints B and C. Determine the forces in all the members 8



(d) The feet of a tripod on a smooth ground are tied by horizontal bars forming a tringle BCD, shown in fig (i) below where E is the mid point of CD and F is the mid point of BE. The Apex A [fig (ii)] of the tripod is 3 m vertical above point (F). Determine the force in all the members due to a load of 100 kN suspendel from Apex A.

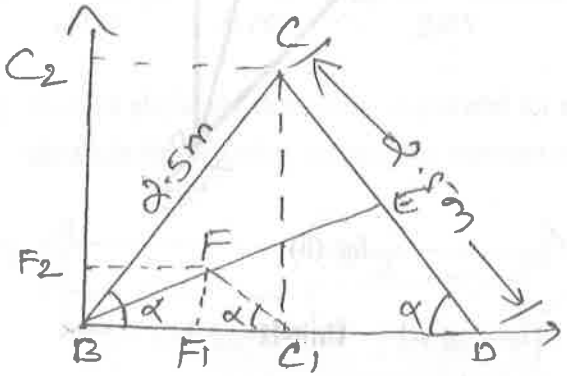


fig (i)

BC = 2.5 m

CD = 2.5 m

BD = 2 m

AF = 3 m

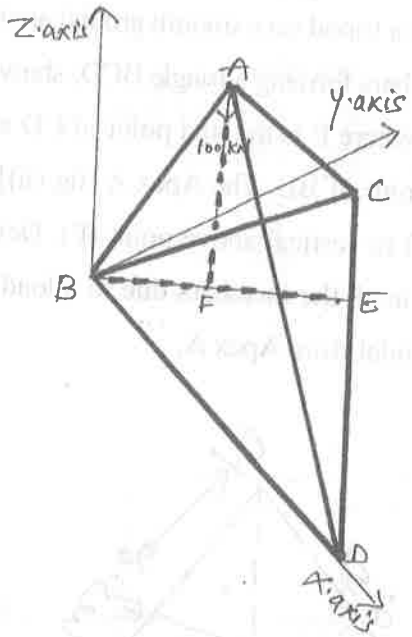


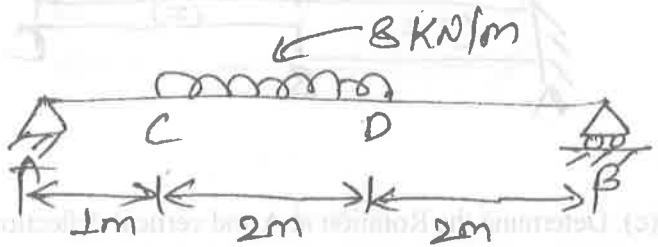
fig. (ii)

Unit-II

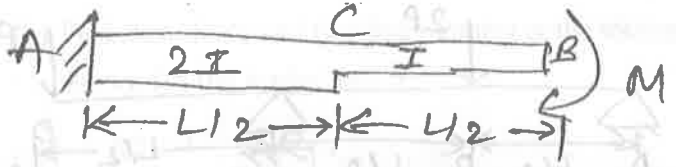
2. (a) State Area Moment Method (Mohr's Method) (Theorem - 1 and Theorem - II) 4

(b) A simply supported beam AB of span 2 m carry a uniformly variable load. The beam is made from 200 mm square cross section. Find the deflection at the centre of the beam. If the loading intensity at support A is zero and support B is 1·5 kNm. E = 2.10×10^5 N/mm^2 using Double Integration Method. 8

(c) A simply supported beam has a flexural rigidity of 24 MN-m^2 and loaded as shown in figure below. Determine deflection at the Mid span. Also find slope at the both ends. Use Macaulay's Method. 8



(d) Find the slope and deflection at free end for a beam shown in figure below using Area moment method. 8



Unit-III

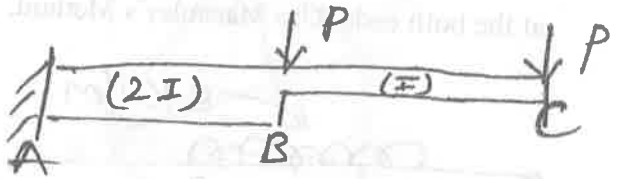
3. (a) Explain : 4

(i) Castiglianos 1st and 2nd theorem

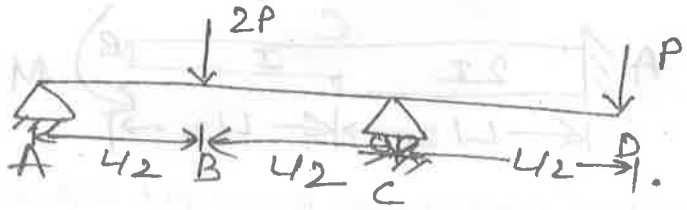
(ii) Relation of strain energy due to axial load and bending.

(b) Determine the deflection and rotation at the free end

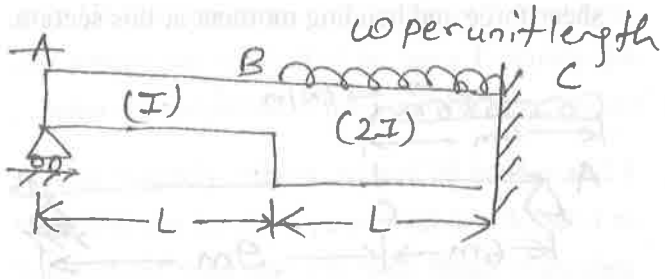
of the cantilever shown in figure. using unit load method. 8



(c) Determine the Rotation at A and vertical deflection at end (d) in the overhanging beam shown in figure below. Using unit load method. 8



(d) A stepped beam ABC, simply supported at A and Fixed at C as shown in the figure below carries a uniformly distribution load of intensity 'W' per unit length over BC. Determine reaction at (A). Using Strain Energy Method. 8



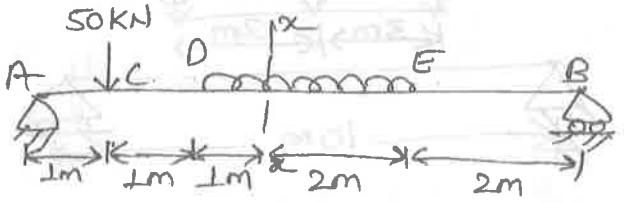
Unit-IV

4. (a) Define : 4

(i) Influence Line Diagram

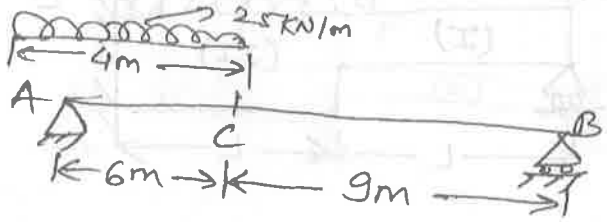
(ii) Muller Breslau's Principle

(b) Find shear force and Bending moment at the section shown for the loaded beam 8

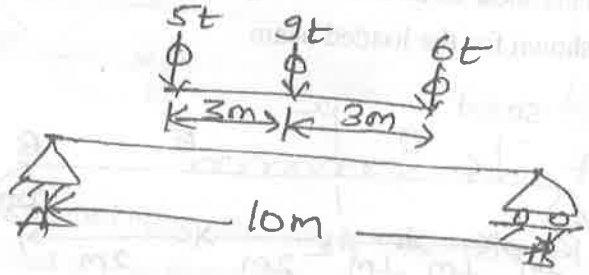


(c) A SSB has a span of 15 m. A uniformly distribution load of 25 kN/m and 4 m long crosses the girder from left to right. Draw the influence line diagram for shear force and bending moment at a section 6

m from the left support. Also calculate maximum shear force and bending moment at this section. 8



(d) The series of three wheel loads 5*t*, 9*t* and 6*t* spaced 3 m from centre to centre cross over simply supported girder of span 10 m. If loads moves from left to right and 6t load leading then the find position and maximum bending moment which may occur anywhere on the girder. 8



Unit-V

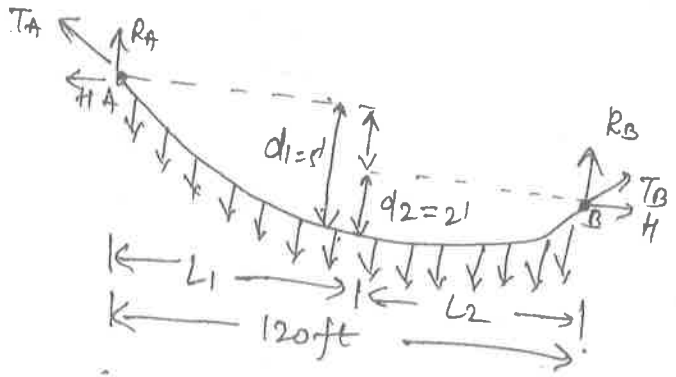
5. (a) (i) Comparison between Arch and cables. 4

(ii) Write advantages and disadvantage of Arch over beams.

(b) A parabolic arch hinged at springings and crown of span (*l*) and central rise (*h*) carries 4dl of (*w*) per unit length over left half of the span. Calculate the position and magnitude of maximum bending moment. 8

(c) A three hinged parabolic arch of 20 m span and 4 m central rise carries a point load of 4 kN at 4 m horizontally from the left hand hinge. Calculate Normal thrust and shear force at the section under the load. Also calculate the maximum B. M positive and negative. 8

(d) A wire of uniform material weighing 0.32 lb per cu in hangs between two points (120 ft) apart horizontally with one end 3ft above the other. The sag of the wire measured from the highest point is 5ft. Calculate the maximum stress in the wire (U.L) 8



Consider $P = \omega x$ of cable, per lit length.