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Sub Code: RCE-403
Roll No.

B. TECH
(SEMESTER-IV) THEORY EXAMINATION 2017-18
STRUCTURE ANALYSIS I

Time: 3 Hours *Total Marks: 70*

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

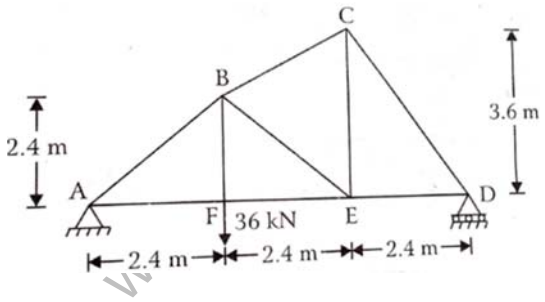
1. Attempt *all* questions in brief. 2 x 7 = 14

a) What do you mean by static and kinematic indeterminacy of a structure?
b) Define space truss with suitable example.
c) Draw the influence line diagram of bending moment for a simply supported beam at a section D.
d) State the Eddy's theorem.
e) Three hinged arch is a determinate structure. Why?
f) Write statement of Castigliano's first and second theorem.
g) What do you mean by principal axes?

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

a) The loading and support condition of a plane truss is shown in fig. find the forces in member AB and AF.

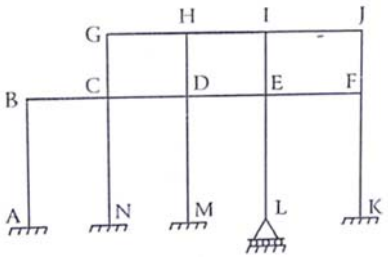


b) A uniformly distributed load of 50 KN/m longer than the span rolls over a girder of 30 m span. Determine the maximum S.F. and B.M. at a section 12 m from left hand support.
c) A three hinged parabolic arch of span 40 m and rise 10 m carries concentrated loads of 20 KN and 70 KN at a distance 8 m and 16 m from the left and a uniformly distributed load of 50 KN/m on the right half of the span. Find the horizontal thrust.
d) Determine the slop and deflection at free end of cantilever beam of span L, and uniformly loaded with load ' ω' . EI = constant
e) A channel section has overall depth of 250 mm, flange width of 125mm, and flange thickness of 20 mm and also web thickness of 20 mm. find the location of shear centre.

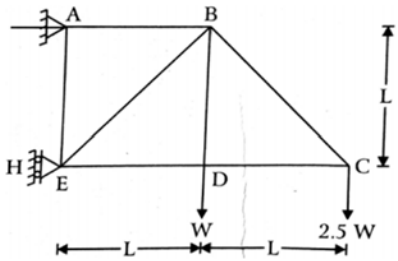
SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

a) Determine the static indeterminacy (D_s) and Kinematic indeterminacy (D_k) for a given frame.



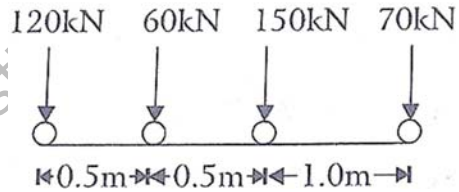
b) A braced cantilever is loaded as shown in figure. All the members are of same cross sectional area. Find the force in BE.



4. Attempt any *one* part of the following: 7 x 1 = 7

a) Two wheel loads 160 KN and 100 KN, spaced 4 m apart, are moving over a simply supported beam of 12m span. Determine the maximum shear force and maximum bending moment that may be developed anywhere on the beam.

b) The load system shown in fig. moves from left to right on a girder of span 10 m. Find the absolute maximum bending moment for the girder.



5. Attempt any *one* part of the following: 7 x 1 = 7

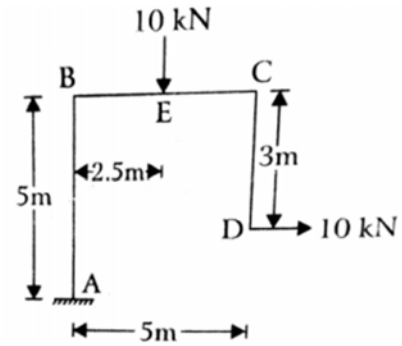
a) Draw the influence line diagram for normal thrust of a three hinged parabolic arch at a section D.

b) Proof that bending moment at any section of a three hinged parabolic arch having a UDL over its whole span will be zero

6. Attempt any *one* part of the following: 7 x 1 = 7

a) A simply supported beam of uniform cross section subjected to concentrated load W at mid span. If span of the beam is 10 m, calculate slop at its end and also calculate the deflection at mid span. Use conjugate beam method.

b) Determine the horizontal deflection at a free end of the frame as shown in figure, by using unit load method.



7. Attempt any *one* part of the following: 7 x 1 = 7

a) A of beam of rectangular section 80 mm wide and 120 mm deep is subjected to a bending moment of 12 KN-m. the trace of the plane loading is inclined at 45^0 to the YY- axis of the section. Calculate the maximum bending stress induced in the beam.

b) A cast iron beam of T-section as shown in figure. The beam is simply supported on a span of 8 m. the beam carries a UDL of 1.5KN/m length on the entire span. Determine the maximum tensile and compressive stresses.