Printed Pages: 03 **Sub Code: ECE-401**

Paper Id: | 1 | 0 | 0 | 4 | 0 | 1 | **Roll No.** | | | | | | | | | | |

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

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections.

SECTION A

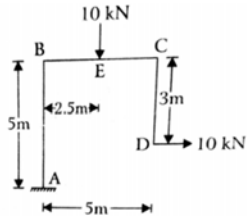
1. Attempt *all* questions in brief. 2 x 10 = 20

a) What is perfect truss? Give example.
b) What do you mean by degree of freedom?
c) Write the statement of Muller Breslau principle. Draw the influence line diagram of bending moment for a simply supported beam at a section D.
d) Draw the influence line diagram of bending moment for a simply supported beam at a section D.
e) Three hinged arch is a determinate structure. Why?
f) Write the Maxwell's theorem.
g) What do you mean by shear centre?
h) Differentiate between straight and curved beam.
i) Write the statement of first and second theorem for conjugate beam method.
j) State and prove the Betti's theorem.

SECTION B

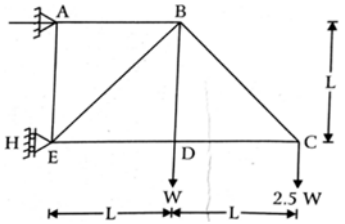
2. Attempt any *three* of the following: 10 x 3 = 30

a) Two wheel loads 150 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) Draw the influence line diagram for radial shear of a three hinged parabolic arch at a section D.
c) Determine the vertical deflection at a free end of the frame as shown in figure, by using unit load method.



d) A of beam of rectangular section 80 mm wide and 120 mm deep is subjected to a bending moment of 10 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.

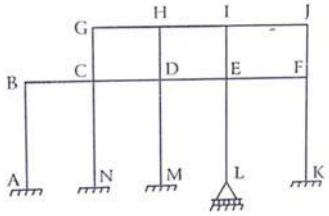
e) A braced cantilever is loaded as shown in figure. All the members are of same cross sectional area. Find the force in BE.



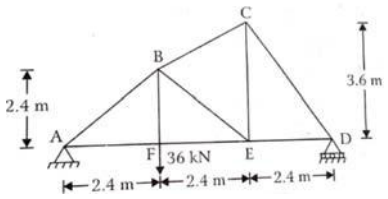
SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

a) Determine the static indeterminacy (D_s), external indeterminacy(D_{se}), internal indeterminacy(D_{si}), and Kinematic indeterminacy (D_k) for a given frame.



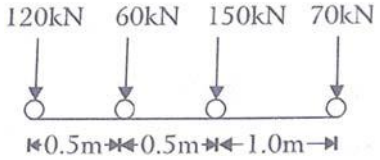
b) The loading and support condition of a plane truss is shown in fig. find the forces in member AB and AF.



4. Attempt any *one* part of the following: 10 x 1 = 10

a) 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.

b) The load system shown in fig. moves from left to right on a girder of span 12 m. Find the absolute maximum bending moment for the girder.



5. Attempt any *one* part of the following: 10 x 1 = 10

a) A three hinged parabolic arch of span 40 m and rise 10 m carries concentrated loads of 30 KN and 70 KN at a distance 8 m and 16 m from the left and a uniformly distributed load of 60 KN/m on the right half of the span. Find the horizontal thrust.

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

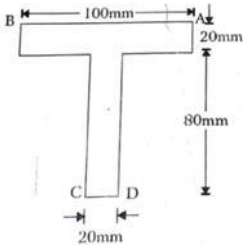
6. Attempt any *one* part of the following: 10 x 1 = 10

a) Determine the slop and deflection at free end of cantilever beam of span 2L, and uniformly loaded with load ' ω' . EI = constant

b) A simply supported beam of uniform cross section subjected to concentrated load 2W 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.

7. Attempt any *one* part of the following: 10 x 1 = 10

a) 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.



b) 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.