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Sub Code: NCE-401

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**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

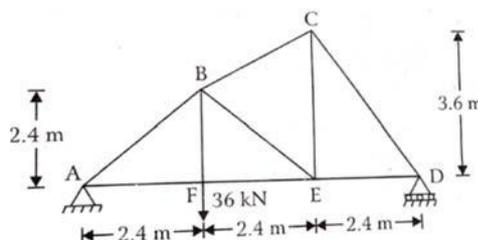
- a) What do you mean by static and kinematic indeterminacy of a structure?
- b) Define space truss with suitable example.
- c) Draw the influence line diagram of bending moment for a simply supported beam at a section D.
- d) State the Eddy's theorem.
- e) Three hinged arch is a determinate structure.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

**SECTION B**

2. Attempt any *three* of the following:

10 x 3 = 30

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



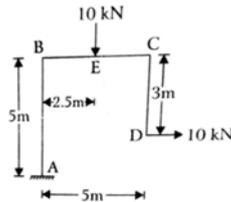
- b) A uniformly distributed load of 50 kN/m longer than the span rolls over a girder of 30 m span. Determine the maximum S.F. and B.M. at a section 12 m from left hand support.



6. Attempt any *one* part of the following:

10 x 1 = 10

- 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:

10 x 1 = 10

- a) A 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  $45^\circ$  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.

