Paper Code: CE-401 **Roll No.** | | | | | | | | | | |

B.Tech.
(SEM IV) EVEN SEMESTER EXAMINATION, 2015-16
STRUCTURAL ANALYSIS-I

[Time: 3 hrs.] **[Max. Marks: 100]**

Note: Attempt ALL Questions. All Questions carry equal marks.

1. Attempt any four parts of the following:- **[5x4=20]**

(a) Explain the method of tension coefficient with example.
(b) Explain the substitute method to analyse complex truss.
(c) Determine the forces in all the members of the truss shown in the fig. 1, by using the method of joints.
(d) Use method of section; determine the forces in the members BD and CD in the fig. 2.
(e) Determine the forces in the space frame member. Point D is 4.5 m above horizontal plane. Fig. 3.

2. Attempt any two parts of the following:- **[10x2=20]**

(a) Derive the theorem to get maximum bending moment at a given section, when several point loads are rolling over a simply supported span.
(b) When a uniformly distributed load w/m, shorter than the span passes over a simply supported girder of span L, determine the condition to find the maximum bending moment at a section when load is partially on the left of the section.
(c) A rolling uniformly distributed load of length 5m crosses a simple span. What is the length of the udl to the left of section, whose distance from left support is 0.4 times the span for maximum bending moment when span is 10m.

3. Attempt any two parts of the following:- **[10x2=20]**

(a) A simply supported beam of span 20 m is subjected to a set of point loads of 20 KN, 30 KN, 15 KN and 10KN spaced at 1.0 m, 2.0 m and 1.5 m respectively with 20 KN leading. System of loads moving from left to right. Draw the influence line diagram for bending moment at a section 5 m from left support and determine maximum bending moment at the section.
(b) A load of 15.0 KN/m extending over a length of 50 m crossing a girder of 45 m. Draw the diagram of maximum positive shearing force and maximum bending moment and determine the respective values at sections 15 and 22.5 m from the left support.

(c) State and prove castigliano's First Theorem.

4. Attempt any two parts of the following:- **[10x2=20]**

(a) Calculate the displacement and rotation at 'C' in fig. 4 use Conjugate Beam method.
OR slope at point B in Fig.6, using Unit Load Method.

(b) Use Moment Area Theorem and determine slope and deflection at free end of a cantilever beam in following fig. 5
(c) State and prove Maxwell's reciprocal theorem.

5. Attempt any two parts of the following:- **[10x2=20]**

(a) (i) Why bending moments are smaller in arches compared to beams of the same span and loadings?
(ii) How do you apply Eddy's theorem to prove that bending moment is zero in three hinged parabolic arch subjected to uniformly distributed load?

(b) A three parabolic arch has a span of 20 m and rise of 4 m. it has loaded with a uniformly distributed load of intensity of 5 KN/m on left 8 m span. Find (i) direction and magnitude at support hinges. (ii) the maximum positive and negative bending moment and position.

(c) A tree hinged circular arch has a span of 16 m and rise of 4 m at central hinge. A vertical load of 16 KN at 4 m from left hinge. Calculate (a) reaction and magnitude of thrust at support level (b) bending moment at 6 m from left support.

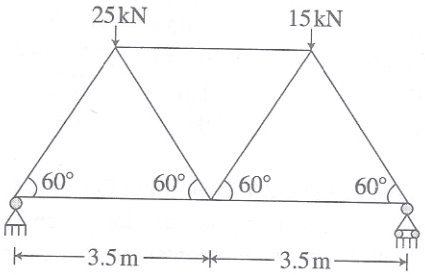

Fig. 1

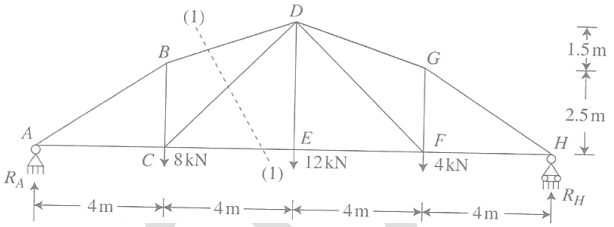

Fig. 2

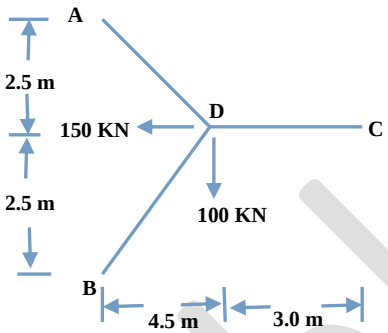

Fig. 3

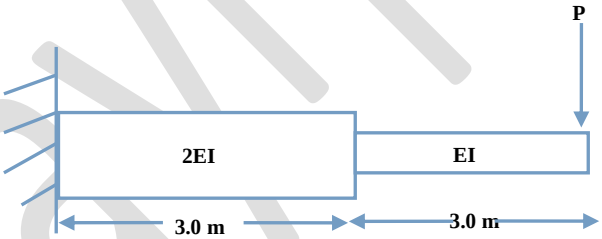

Fig. 5

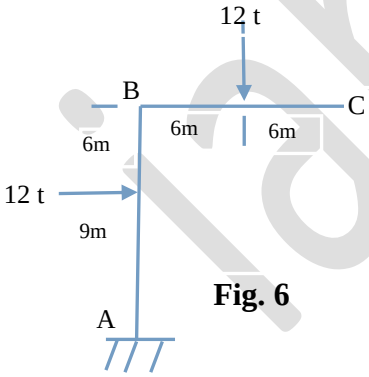

Fig. 6

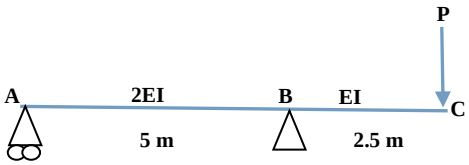

Fig. 4