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Roll No.					Total No. of Pages: 04

Total No. of Questions: 09

B.Tech.(CE) (2011 Onwards) (Sem.-4) STRUCTURAL ANALYSIS - I Subject Code: BTCE-406

Paper ID : [A1176]

Time: 3 Hrs. Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- 3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly:

- (a) Define Bending moment and Shear force.
- (b) What is relation between number of members and number of joints for a determinate truss?
- (c) What is degree of indeterminacy for a simply supported beam? Explain.
- (d) Define Muller Breslau Principle.
- (e) What is the use of stiffening girders in suspension bridges?
- (f) What will be the value of horizontal thrust if a cable supported at same level with dip 'd' is subjected to *udl* of intensity 'w' throughout its length 'L'.
- (g) What is middle third rule? Describe in brief.
- (h) Describe conjugate beam method in brief.
- (i) Define Castigliano's theorem I.
- (j) Describe the method of tension coefficients for the analysis of plane trusses.

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SECTION-B

2. The quadrantal ring AB shown in Fig. 1 is of radius *r*. It supports a concentrated load P at the free end A. Find the vertical and horizontal deflections of A. Assume uniform flexural rigidity.

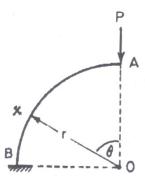


Fig.1

- 3. A suspension cable is supported at two points 25 m apart. The left support is 2.5 m above the right support. The cable is loaded with a uniformly distributed load of 10 kN/m throughout the span. The maximum dip in the cable from the left support is 4 m. Find the maximum and minimum tensions in the cable.
- 4. A three hinged symmetric circular arch is loaded as shown in Fig. 2. Determine the bending moment, normal thrust and radial shear at 9 m from the left support.

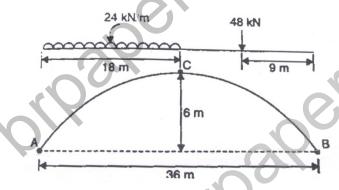


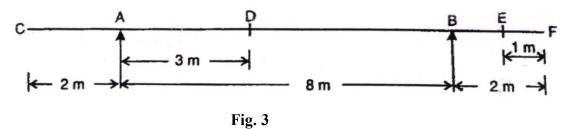
Fig.2

- 5. Draw influence lines for
 - (a) Reaction at $A(R_A)$
 - (b) Reaction at $B(R_B)$
 - (c) Shear force at $D(F_D)$
 - (d) Bending moment at $D(M_D)$
 - (e) Shear force at E (F_E) and
 - (f) Bending moment at $E(M_E)$

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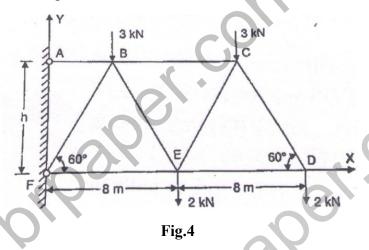
The beam is overhanging at both ends as shown in following figure 3.



6. A retaining wall 6.5 m high has a smooth vertical back. The back fill has a horizontal level surface, level with the top of the wall. The soil surface is subjected to an external vertical load of 45 kN/mm². The soil has an angle of internal friction of 30° and its cohesion is zero. The back fill has a specific weight of 19 kN/m³. Find the magnitude and the point of application of active pressure on the wall per metre run of the wall.

SECTION-C

7. Using the method of tension coefficients, determine the forces in the members of the frame shown in Fig. 4.



8. The truss shown in Fig. 5 carries vertical loading uniformly divided between the panel points of the lower chord while the cross-section of the members are such that all loaded ties are stressed to 135 N/mm² and all loaded struts to 90 N/mm² under the loading. All joints are pin-joints and value of E for the material of the truss is 2.02×10^5 N/mm². Find the vertical deflection of the point A.

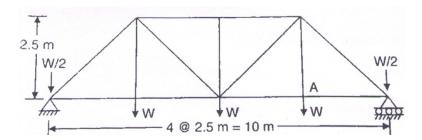


Fig.5

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- 9. A girder having a span of 18 m is simply two supported at the ends. It is traversed by a train of loads as shown in Fig. 6. The 50 kN load is leading. Find the maximum bending moment which can occur
 - a) Under the load 200 kN load.
 - b) Under 50 kN load.

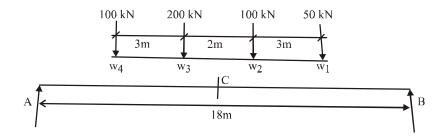


Fig.6

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