Registration No:

Total Number of Pages : 02   M.TECH

AR-17
M.TECH 1ST SEMESTER EXAMINATIONS(BACK), NOV/DEC 2019
ST,MSEPC1020
ELASTIC STABILITY AND BEHAVIOR OF METAL STRUCTURES
Time: 3 Hours   Max Marks : 70

The figures in the right hand margin indicate marks.

PART-A   (10 X 2=20 MARKS)

1. Answer the following questions.
   a) Write the expression for deflection curve of beam column subjected to couple M_1 and M_2 at two ends.
   b) What do you mean by slenderness ratio?
   c) Write the expression for flexural rigidity of plate.
   d) Define form factor.
   e) Mention the advantages of plastic analysis over elastic analysis.
   f) Define beam-column.
   g) State uniqueness theorem.
   h) State upper bound and lower bound theorem.
   i) Define plastic hinge.
   j) Explain the term warping rigidity.

PART-B   (5 X 10=50 MARKS)

Answer any five questions from the following.

2. a. Derive the differential equation of beam column with continuous lateral load.

   b. Calculate the shape factor of circular cross section.

3. a. Derive general equation for lateral buckling of cantilever beam.

   b. What do you mean by ideal column with examples? (5)

4. a. Derive the deflection curve of beam column with end moments.

   b. Describe load factor with examples.

5. a. A slender vertical column is built at both the ends. Derive the expression for critical load.

   b. State the fundamental case of buckling of prismatic bar.

6. a. Determine an appropriate value for critical load of an axially loaded column hinged at one end and fixed at other using energy method

    b . State the necessary and sufficient conditions for general collapse condition of a structure.

7. a. Using energy method, determine critical load of hinged column i.e. supporting along its entire length by elastic foundation. As the column deflects the foundation exerts a force of αy per unit length per unit lateral deflection on the column, assume that deflection of column is given by finite series

    $Y = \sum_{n=1}^{\varpi} a \ sin(\frac{n\Pi x}{L}).$

    b. Which property of a material deals with large flow of material at a constant stress?

8. a. Derive the warping displacement of pure torsion for channel section.

    b. A simply supported beam carries beam of length L carries a concentrated load w at the centre. Find the collapse load.

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