This question paper contains 1 printed page.

3056 *Your Roll No.....*

MEC

Paper – CE.554

THEORY OF PLATES AND ELASTIC STABILITY

J

Time : 3 hours Maximum Marks : 100

(Write your Roll No. on the top immediately on receipt of this question paper)
Attempt any **five** questions. All questions carry equal marks.

1. a) Derive and compare the effective length and critical load using Euler formula for various end conditions of a column with self explanatory figures. Draw a plot between critical stress and slenderness ratio. **20**
   b) Find out deflection of an initially bent column.

2. a) What is double modulus theory for a column? How you propose an equivalent reduced modulus for an idealized I-section? **20**
   b) Determine the critical load of the column on three supports separated by a distance L. Assume top and bottom of the column fixed.

3. a) How the columns analysis is approximated using calculus of variation? **20**
   b) How the critical load is found by the finite difference method?

4. a) What is beam column load deflection characteristics at various levels of loads relative to the critical? Find out an expression for the maximum deflection of the beam column. **20**
   b) Draw variation of bending stiffness with ratio of axial to the critical load.

5. Derive an expression of critical load of a frame using natural equilibrium using symmetric buckling. **20**

6. Derive a differential equation for the deflection curve for cylindrical bending of plates. Explain the procedure of determination of stresses in a rectangular plate subjected to cylindrical bending. **20**

7. State and prove the relationship between the direction of zeroslope and maximum slope in case of pure bending of plates. **20**

8. Write notes on a) Inelastic column behavior b) Imperfect columns. **20**