



M.E DEGREE EXAMINATIONS: NOV/DEC 2014

Regulation 2013

Third Semester

STRUCTURAL ENGINEERING

P13SETE13: Stability of Structures

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 10 Marks)

1. Explain the concept of imperfection in columns.
2. Explain large deflection theory.
3. Compare flexural buckling and torsional buckling.
4. Compare double modulus and tangent modulus.
5. Illustrate the differences in behavior of a short beam column compared to a long beam column.
6. Show the buckling mode shapes of rigid portal frames with and without sway.
7. Explain the various factors that influence the elastic buckling strength of a laterally unsupported beam.
8. Explain equilibrium and energy approach method
9. Compare buckling of columns and the buckling of thin plates.
10. List the assumptions involved in buckling of thin plates.

Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)

Q.No:11 is Compulsory

11. Formulate an expression for the mid – height deflection of an imperfect column with hinged ends. Discuss its behaviour with an ideal column.
12. Estimate the critical buckling load of an initially bent column using imperfect method where $y = a \sin\left(\frac{\pi x}{l}\right)$

13. Estimate the buckling load of a column laterally supported at three points such that the length is 'a' times the inner length L and when the entire length is uniformly compressed. Plot the variation of P verses a. Use the governing differential equation to solve the problem.
14. A beam-column AB of span L is loaded with Q at one-third points, Estimate the maximum deflection and maximum moment.
15. A cantilever beam of uniform cross-section and length 'l' is subjected to a lateral load at the end through the centroid of the section. Estimate the buckling load.
16. A rectangular plate of size (ax2a) is simply supported at all the edges. It is subjected to in-plane line load Nx/m. along the shorter direction. Estimate the critical value of Nx.
