Reg. No. : | | | | | | | | | | |

Question Paper Code: 32961

M.E. DEGREE EXAMINATION, NOVEMBER 2015.

Elective

Structural Engineering

01PSE512 – STABILITY OF STRUCTURES

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Explain the concept of stability of structure with reference to the equilibrium conditions.
2. List the various approaches for analyzing stability of column.
3. State theorem of minimum potential energy.
4. Quote the uses of Shanley's model.
5. Define beam-column.
6. How the buckling load of a column with variable cross section is obtained?
7. Write a note on St.Venant's torsion.
8. Discriminate between local buckling and lateral buckling.
9. Write down the expression for evaluating the critical stress in uni-axially loaded plate.
10. Draw elastic buckling of thin plates.

PART - B (5 x 14 = 70 Marks)

11. (a) Derive the critical load by equilibrium method for
    (i) Hinged-Hinged column (ii) Fixed-Fixed column (14)

Or

(b) Obtain the critical load by imperfection approach for both ends fixed column. (14)

12. (a) Determine the critical buckling load for column with fixed-hinged boundary condition using Galerkin's method. (14)

Or

(b) Briefly discuss about the double modulus theory. Also derive the differential equation for the column buckling in the inelastic range. (14)

13. (a) Derive an expression for simply supported plate subjected to compressive force along boundary by finite difference method. (14)

Or

(b) Arrive at an expression for non-sway buckling frame to find the critical load. (14)

14. (a) Find the critical buckling load of a rectangular plate whose boundaries are fixed and it is subjected to uniform compressive force acting along the entire boundary. Use energy approach. (14)

Or

(b) Derive the expression for the critical lateral buckling moment for the beam subjected pure moment. (14)

15. (a) Derive the governing differential equations of equilibrium for buckling of thin plate subjected to in-plane forces. (14)

Or

(b) Determine the critical buckling load of uniaxially compressed square plate, fixed along all edges by energy method. With suitable assumptions. (14)

PART - C (1 x 10 = 10 Marks)

16. (a) Explain in detail about Newman's method and finite difference method with examples. (10)

Or

(b) (i) Outline the application of buckling of frames. (5)

(ii) Differentiate between buckling of frames and buckling of plates. (5)