Reg. No. :

Question Paper Code: 52163

M.E. DEGREE EXAMINATION, DECEMBER 2015

First Semester

Structural Engineering

15PSE104 - STABILITY OF STRUCTURES

(Wood chart and Stability functions table may be permitted)

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

(5 x 20 = 100 Marks)

1. (a) (i) Determine the buckling load of a fixed-hinged column using equilibrium approach. (12)

    (ii) Explain stable and unstable equilibrium. (8)

Or

   (b) (i) Explain in detail the behavior of imperfect column either initially bent or eccentrically loaded. (16)

    (ii) Explain the concepts of equilibrium with neat sketches. (4)

2. (a) (i) Using finite difference method, determine the buckling load of a fixed-fixed column. Obtain solutions with the column divided into two, three and four segments and extrapolate these results using Richardson's method. (16)

    (ii) What is known as difference ratio? (4)

Or

   (b) Derive the higher order governing equation for stability of columns. Hence analyze the column with one end clamped and other hinged boundary condition. (20)

3. (a) (i) Explain the equilibrium approach for the buckling analysis of beam columns with example. (18)

    (ii) Define: Beam-Column. (2)

Or

    (b) (i) Derive the stability analysis of Beam-Column with central concentrated load. (16)

    (ii) What is the amplification factor for deflection in Beam-Column? (4)

4. (a) (i) Determine the critical load of portal frame with sway shown in figure using equilibrium approach. (16)
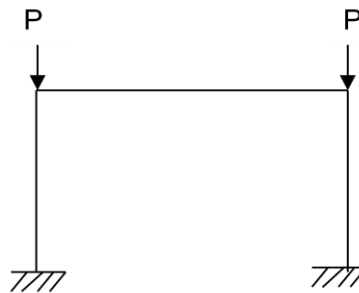
    (ii) Sketch the buckling modes of frames with and without sway. (4)

Or

    (b) (i) Explain the role of finite element method in structural stability analysis. What is stress stiffness matrix? (16)

    (ii) Define: Stability functions and Rotation functions. (4)

5. (a) (i) Derive the governing moment equilibrium equation for the buckling of a thin plate. (16)

    (ii) Write the deflection equation for buckling of plate subjected to shear. (4)

Or

    (b) (i) Explain the governing of differential equation and buckling of thin plates. (12)

    (ii) Explain the various edge condition of equilibrium equation. (8)

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