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

Question Paper Code: 49261

M.E. DEGREE EXAMINATION, DECEMBER 2014.

First Semester

Structural Engineering

14PSE517 - STABILITY OF STRUCTURES

(Wood chart or Stability functions table are permitted)

(Regulation 2014)

Duration: Three hours | Maximum: 100 Marks

Answer ALL Questions.

PART A - (5 x 1 = 5 Marks)

1. A vertical column has two moment of inertia (i.e I_{xx} and I_{yy}). The column will tend to buckle the direction of the

   (a) Axis of load | (b) Perpendicular to the axis of load

   (c) Maximum moment of inertia | (d) Minimum moment of inertia

2. Euler's formulae holds good only for

   (a) Short columns | (b) Long columns

   (c) Both short and long columns | (d) weak columns

3. Minimum number of equilibrium equation required for a space frame analysis of structure is

   (a) 3 | (b) 6 | (c) 8 | (d) 9

4. Other name of flexural torsional buckling is

   (a) Lateral buckling | (b) Transverse buckling

   (c) Linear buckling | (d) Snap through buckling

5. Thin plates are initially flat structural members bounded by

   (a) Three parallel planes | (b) Four parallel planes

   (c) Two parallel planes | (d) None of these

PART - B (5 x 3 = 15 Marks)

6. What are the assumptions made in Euler's theory.
7. Define classical beam theory.
8. What do you meant by inelastic buckling of columns?
9. List out the conditions under torsional flexural buckling may occur.
10. What are the techniques to determine the buckling of plates?

PART - C (5 x 16 = 80 Marks)

11. (a) Describe the dynamic approach for column buckling with an example. (16)

Or

(b) Derive the higher order governing equation for stability of columns. Also analyze the columns with both ends clamped. (16)

12. (a) What is elastica? Prove that an angular deflection of 60º is allowed at the ends of a hinged – hinged column at the ends, the critical load is 15.2% more than the Euler load. (16)

Or

(b) A non prismatic two hinged column is shown in figure 1. Compute the critical load by the finite difference method, descrstizing the column in to four segments.

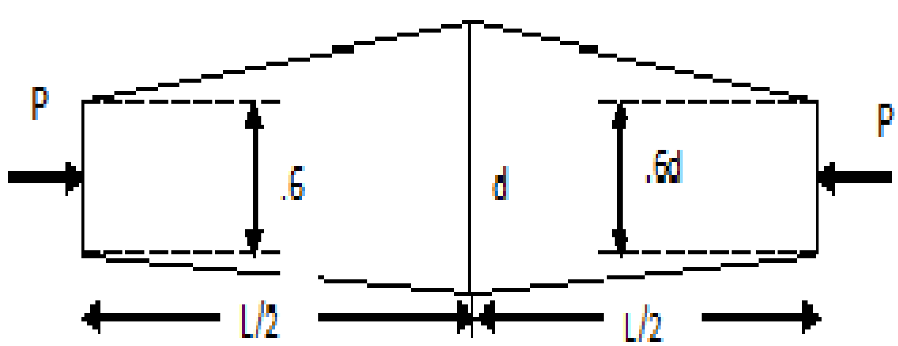

Fig. 1 (16)

13. (a) Compute the critical load of the frame shown in figure 2 by the energy method. All the members have the same EI and L.

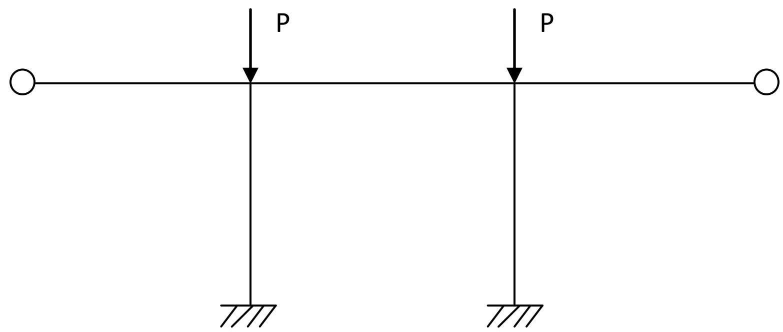

Fig. 2 (16)

Or

(b) Derive the expression for the maximum bending moment of a simply supported beam of length ‘l’ carrying an axial compressive force ‘P’ and a uniformly distributed load q unit length. (16)

14. (a) Calculate torsional buckling load of I section column under axial load. (16)

Or

(b) Determine the critical moment of a simply supported I beam subjected to pure bending. (16)

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

Or

(b) Discuss the stability of plates under inplane and transverse loading. (16)

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