Printed Pages : 04 CE-925

(Following Paper ID and Roll No. to be filled in your Answer Books)

PAPER ID : ME21

Roll No. | | | | | | | | | | |

M. TECH. (Sem.II)

THEORY EXAMINATION 2015-16

STABILITY ANALYSIS

Time : 3 Hours **Total Marks :** 100

Note : Attempt all questions.

1. (a) Explain the concept of stability of structure with reference to the equilibrium conditions. (10 marks)

   (b) Explain Euler's theory of columns stability, write assumptions and limitations. (10 marks)

   (c) Explain stable and unstable equilibrium. (5 marks)

OR

2. (a) Describe the dynamic approach for column buckling with an example. (10 marks)

   (b) Derive the higher order governing equation for stability of columns. Hence analyse the column with one end clamped and other hinged boundary condition. (15marks)

3. (a) Stability of structure is an eigen value problem. Discuss. (5 marks)

(b) What are the merits of energy method. (5 marks)

(c) What is elasticate? Prove that a load 15.2 percent more than Euler load will produce a deflection corresponding to an angular deflection of 60^o at the ends of the column measured with respect to the vertical. (15 marks)

OR

4. (a) Differentiate between elastic buckling and Inelastic buckling of columns. (10 marks)

(b) A non prismatic two hinged column is shown in figure1. Compute the critical load by the finite difference method, descrstizing the column in to four segments. (15 marks)

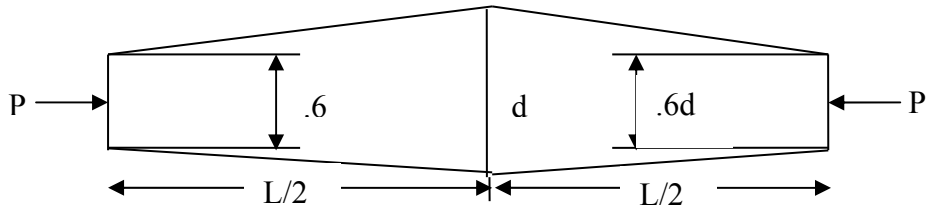

Fig. 1

5. (a) A beam column subjected to a uniformly distributed load and an axial load is shown in figure 2.

Obtain the expression for maximum deflection and maximum moment. (12 marks)

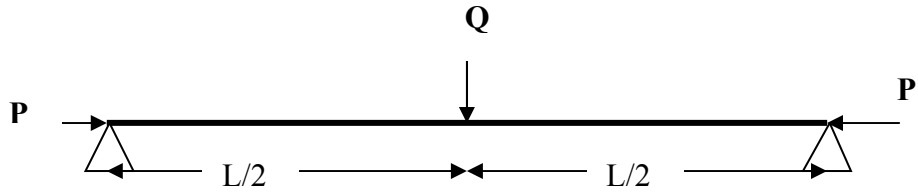

Fig.2

(b) Compute the critical load of the frame shown in figure 3 by the energy method. All the members have the same EI and L. (13 marks)

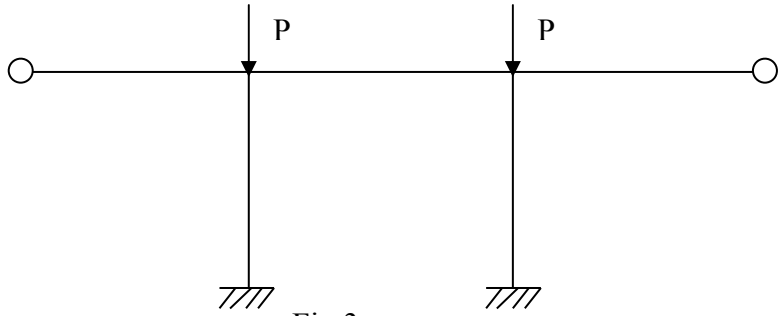

Fig.3

OR

6 (a) Explain the equilibrium approach for the buckling analysis of beam columns with example. (10 marks)

(b) With suitable sketches discuss the different modes of buckling of portal frames. (5 marks)

(c) Determine the critical load of portal frame with sway shown in figure 4 using equilibrium approach. (10 marks)

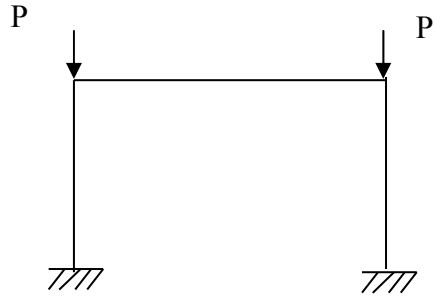

Fig. 4

7. (a) Explain the role of finite element method in structural stability analysis. What is stress stiffness matrix? (10 marks)

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

OR

8. (a) Derive the general formula for stiffness matrix[k_{cr}]. (12 marks)

(b) Explain the properties and uses of [k_{cr}]. (5 marks)

(c) Calculate torsional buckling load of I section column under axial load. (8 marks)

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