Reg. No. :

Question Paper Code : X86916

M.E./M.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2021
Second Semester
Structural Engineering
ST5202 – STABILITY OF STRUCTURES
(Regulations 2017)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions

PART – A   (10×2=20 Marks)

1. Describe the equilibrium.

2. Distinguish the Rayleigh Ritz method and Galerkin's method.

3. Discuss the beam column with examples.

4. What do you mean by sway ? And how it can be reduced ?

5. Where the torsional buckling will occur ? Give example.

6. Write the governing equation for the bending of beam with proper notation.

7. List out the methods available to analysis the buckling of plates.

8. Write short notes on elastic buckling of thin plates.

9. What do you mean by eccentrically loaded inelastic buckling ?

10. List out the theory available to analyse the inelastic buckling.

PART – B   (5×13=65 Marks)

11. a) i) Find the Euler load for the column of one end fixed and other end hinged. **(8)**
       ii) Discuss the classification of buckling in details.   **(5)**
            (OR)
    b) i) Determine the critical load of a column having both ends fixed using
            Ray-Ritz method.   **(8)**
       ii) Describe the shear on buckling.   **(5)**

12. a) i) Explain the modes of buckling of portal frames. **(7)**

   ii) A single bay two storey frame with its base fixed is subjected to an axial
   load of 375 kN at the junction of beam and column and an axial load of
   of P kN at the middle junction of beam and column. The value of EI/L^2
   for column and beam = 105 kN. Determine the value of P using stability
   function. **(6)**

   (OR)

   b) i) Enlighten the stability of beam column with single concentrated loads. **(7)**

   ii) A beam column is subjected to compressive force at the ends in addition
   to moments at the two ends. Find the expression for the maximum
   deflection. **(6)**

13. a) i) Explain the lateral buckling of simply supported beam of narrow rectangular
   section. **(8)**

   ii) Write a technical note on combined Torsional and Flexural buckling. **(5)**

   (OR)

   b) Calculate the buckling load and the type of buckling of a thin walled section
   of mean depth 100 mm and mean flange width 60 mm. The thickness is 5 mm
   and is uniform through. Effective length is 2.80 m. Let E =200 GPa and
   G = 80 GPa. **(13)**

14. a) Explain the Galerkins method of finding the critical load of a thin plate.

   (OR)

   b) Find the critical load of a square plate of size a × a whose edge are simply
   supported and subjected by a uniformly distributed load of w along the entire
   boundary using Finite difference method.

15. a) i) Discuss the elastic and inelastic buckling of columns. **(6)**

   ii) Derive the critical value of the compressive force for buckling of simply
   supported rectangular plates uniformly compressed in two directions **(7)**

   (OR)

   b) Discuss in detail about Tangent modulus theory of inelastic buckling with
   neat sketches.

PART – C **(1×15=15 Marks)**

16. a) i) Discuss the stability of plates under in plane and transverse loading. **(8)**

   ii) What is lateral torsional buckling ? And how it can be prevented ? **(7)**

   (OR)

   b) Write short notes on :

   i) Creep buckling. **(4)**

   ii) Orthogonality relation . **(4)**

   iii) Pure bending . **(4)**

   iv) Difference between lateral and longitudinal buckling. . **(3)**

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