

**23382**

M.Tech. 2nd Semester Civil Engineering

(Specialisation in Structural Engg.) (Elective-II)

Examination, July-2022

**STABILITY OF STRUCTURES**

Paper-CE-612

Time allowed : 3 hours ] [ Maximum marks : 100

*Before answering the questions, candidates should ensure that they have been supplied correct and complete question paper. No complaint in this regard, will be entertained after examination.*

*Note : Attempt five questions. All questions carry equal marks.*

1. (a) What is meant by stability of a structure? Explain the concept with reference to the equilibrium conditions. 10
- (b) Describe Torsional buckling including the effects of Wagner's effect with an example. 10
2. Derive the expression for lateral buckling of simply supported I beams. 20

P.T.O.

23382-P-3-Q-8 (22)

( 2 )

23382

3. (a) Distinguish between Galerkin's method and Rayleigh Ritz method. 5  
(b) Using Rayleigh Ritz method, derive expression for buckling load of columns with variable cross section and hinged at both the ends. 15
4. Obtain expression for maximum deflection of beam-column simply supported at ends and subjected to concentrated loads 'Q' at mid span and axial load 'P' at it ends. The flexural rigidity of beam column is uniform throughout. 20
5. Determine the coefficient  $\eta_r$  required for the estimation of inelastic buckling load for an axially loaded column, when the cross-section is : (a) rectangle with width band depth  $d$ , and (b) an I-section with negligibly small web thickness. 20
6. (a) List out assumptions made in differential equation for a thin plate undergoing lateral or transverse displacements. 5  
(b) Discuss in detail Buckling of thin rectangular plates in compression and shear. 15

23382

( 3 )

23382

7. Discuss in detail about the procedure adopted for determining stresses acting on eccentrically loaded inelastic columns subjected to buckling. 20
8. Write short note on : 4×5=20
  - (a) Application of trigonometric series
  - (b) Inplane buckling of bars
  - (c) Bar under distributed axial loads
  - (d) Stability functions

23382