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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
Second Semester, M. Tech - Civil Engineering (MCAD)
Semester End Examination; May / June - 2019
Structural Stability Analysis - Classical and FE Approach

Time: 3 hrs   Max. Marks: 100

*Note: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a. Using the expression of the deflection of beam column, derive the differential equation for a beam column subjected to several concentrated loads.   10

b. Derive the fourth order differential equation for a beam column.   10

2. Using the fourth order differential equation obtain the first three critical loads for,   20

    i) Pinned-Pinned column   ii) Fixed-Pinned column

UNIT - II

3. Using energy method, determine the expression for the foundation modulus at which the number of half waves switches over from *m* to (*m* + 1), critical load for a simply supported beam-column resting on an elastic foundation.   20

4. Determine the frequency equation for cantilever column subjected to a follower tangential load.   20

UNIT - III

5. Determine the buckling load for the pin jointed truss shown in Fig. Q(5), axial rigidity of both the members is AE = 1 N.   20

FIG. Q(5)
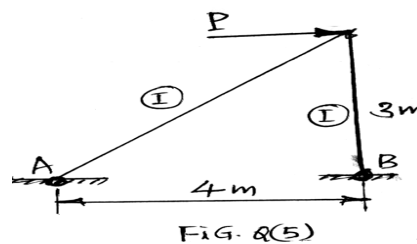
6. Determine the critical load for a fixed column by discritizing into two elements, compare the answer with the close form solution, take length of column = 2 m and EI = 2 N-m^2.   20

UNIT - IV

7. Derive the differential equation for non-uniform torsion of thin walled bars of open section.   20

8. Determine the critical moment for an I-section beam subjected to pure bending against lateral buckling.   20

UNIT - V

9. Determine the critical load for the buckling of uniformly compressed rectangular plate simply supported along two opposite sides perpendicular to the direction of compression. The side Y = 0 is simply supported, the side Y = b is free.   20

10. Determine the critical load for the buckling of a rectangular plate simply supported along two opposite sides and uniformly compressed in the direction parallel to those sides.   20

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