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Total No. of Pages : 03

Total No. of Questions : 09

B.Tech.(ANE) (Sem.–5)

AIRCRAFT STRUCTURES-II

Subject Code : ANE-313

M.Code : 60522

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION–A

1. Write briefly :

a) Write statement of energy approach for prediction of buckling of a column.

b) What is dynamic approach for prediction of buckling of a column?

c) Write boundary conditions for a simply supported plate.

d) Explain application of Rayleigh Ritz method for prediction of buckling of a plate.

e) Explain application of Galerkin's method for prediction of buckling of a plate.

f) What do you understand by effective width of a plate?

g) Differentiate between a pure tension field beam and a semi tension field beam.

h) Write stiffness matrix of a single spring of stiffness 'k' placed along x axis.

i) What is flexible method used for matrix analysis?

j) What are advantages of finite element method over matrix method of analysis?

SECTION-B

2. The pin-jointed column as shown below carries a compressive load P applied eccentrically at a distance e from the axis of the column. Determine the maximum bending moment in the column.

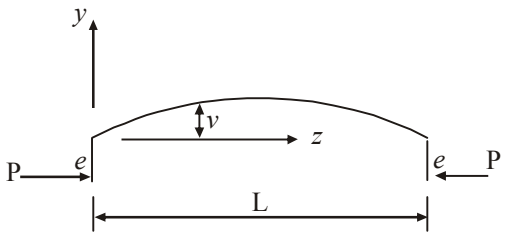

FIG.1

3. A rectangular plate shown below is compressed by a uniformly distributed load N_x acting along two opposite ends which are simply supported. Obtain the buckling load of the plate by Rayleigh-Ritz method.

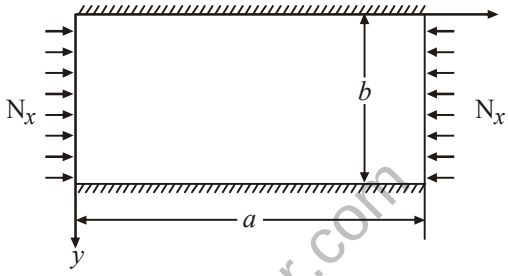

FIG.2

4. Obtain the buckling load of a curved rectangular plate subjected to uniform compressive load N_r distributed around the edge of the plate.

5. Determine the horizontal and vertical components of the deflection of node 2 of the pin-jointed frame work as shown below. The product AE is constant for all members.

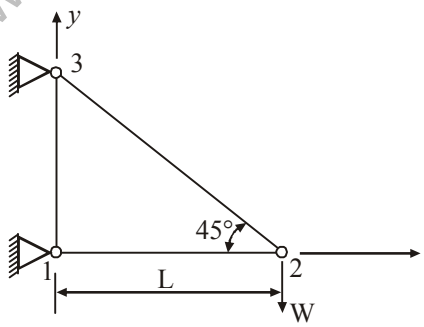

FIG.3

6. A constant strain triangular element has corners 1(0,0), 2(4,0) and 3 (2,2) referred to a Cartesian Oxy axes system and is 1 unit thick. Obtain the expressions for displacements 'u' and 'v'.

SECTION-C

7. Develop stiffness matrix [Kij] for a uniform beam as shown below. The beam has flexural rigidity EI and length L. It is subjected to nodal forces Fy,i, Fy,j and nodal moments Mi, Mj in the *xy* plane.

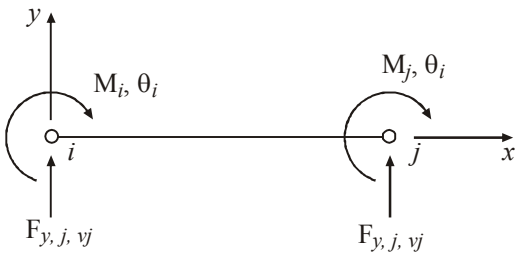

FIG.4

8. Consider a column of symmetrical I section as shown below. It is subjected to a compressive load P all along its flanges and it undergoes torsional buckling. Obtain the values of critical load and buckling loads due to flexure.

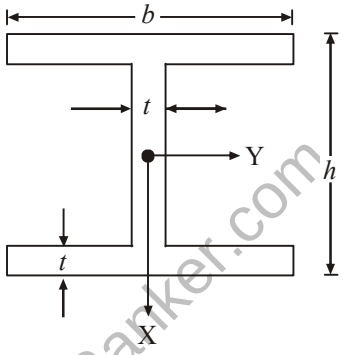

FIG.5

9. A diagonal tension field beam is tapered along its lengths as shown below. Calculate the loads in top and bottom flanges, σ_t and stiffener load P.

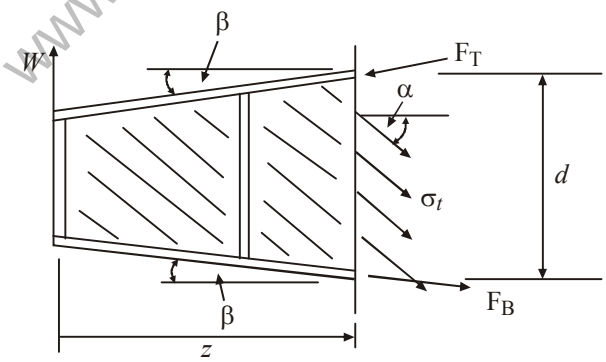

FIG.6

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.