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F203

B. Tech. EXAMINATION, 2020

(Sixth Semester)

(B Scheme)

(Main & Re-appear)

AER

AER306B

Aircraft Structure–II

Time : 3 *Hours*] [*Maximum Marks* : 75

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

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

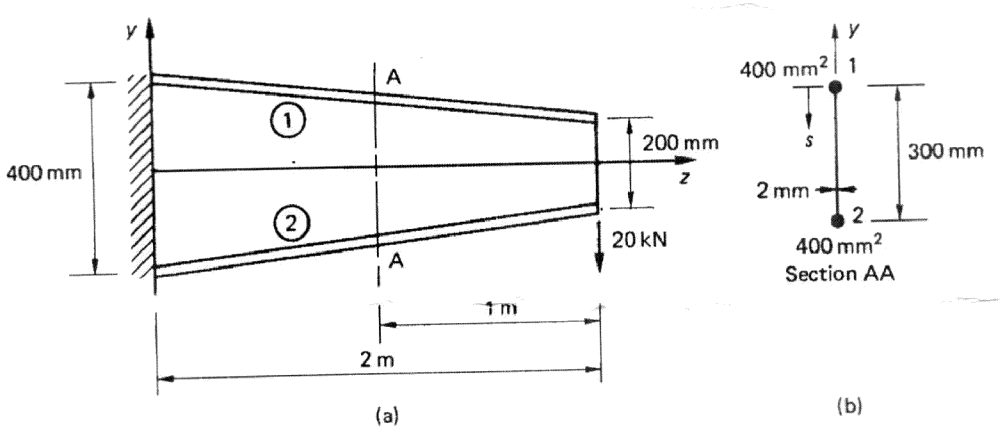
1. A column of length L is subjected to a compressive load P. The column is fixed at one end and other end is pinned. Find the buckling load of the column. **15**

2. A columm of length L is pinned at both the ends and it is subjected to compressive load P at its ends. Obtain the expressions for total potential energy of the column and derive the value of buckling load. **15**

Unit II

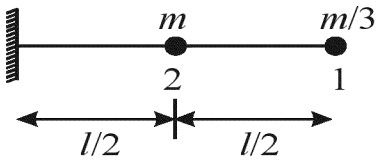
3. A member of a pin-jointed frame work is inclined at an angle θ with the *x*-axis. It is subjected to forces $\overline{F}_{x,i}$ and $\overline{F}_{x,j}$ at nodes *i* and *j*. Obtain the expression for stiffness matrix in global coordinates. **15**

4. Determine the shear flow distribution in the web of the tapered beam shown below, at a section midway along its length. The web of the beam has a thickness of 2 mm and is fully effective is resisting direct stress. The beam tapers symmetrically about its horizontal centroidal axis and cross-sectional area of each flange is 400 mm^2. **15**

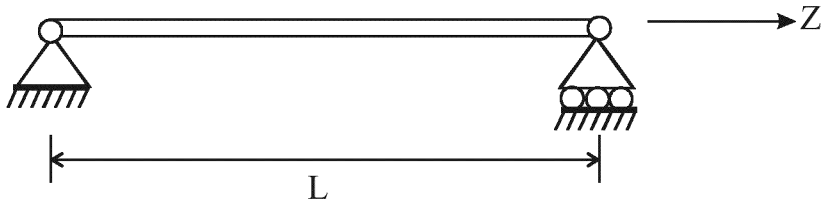


Unit III

5. Determine the normal modes and frequencies of vibration of a weightless cantilever supporting masses $m/3$ and m at points 1 and 2 as shown below. The flexural rigidity of contilever is EI. **15**

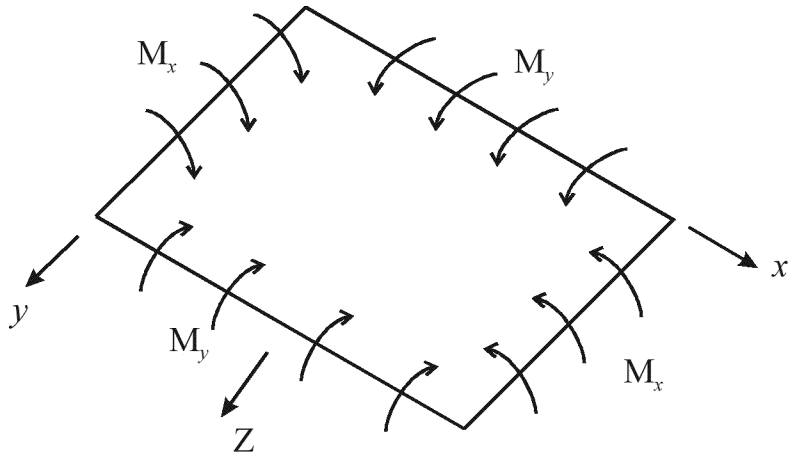


6. Determine the first three normal modes of vibration and corresponding natural frequencies of the uniform, simply supported beam shown below. **15**



Unit IV

7. A thin rectangular plate is subjected to pure bending moments of intensity M_x and M_y per unit length uniformly distributed along its edges as shown below. Obtain the expressions of M_x and M_y in terms of flexural rigidity and deflection 'W' of any point on the plate in q-direction. **15**



8. A thin rectangular plate $a \times b$ is simply supported along its edges and carries a uniformly distributed load of intensity q_0. Determine the deflected form of the plate and the distribution of bending moment. **15**