B.Tech II Year II Semester (R09) Supplementary Examinations May/June 2017

AEROSPACE VEHICLE STRUCTURES – I

(Aeronautical Engineering)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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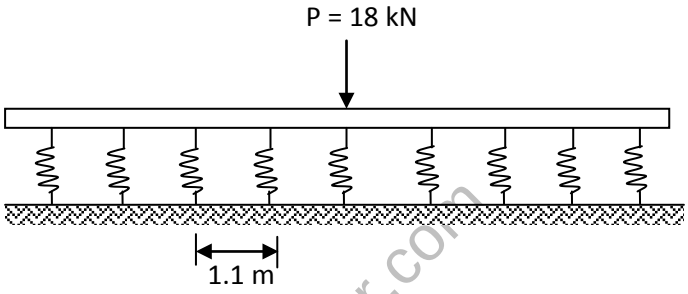
1 (a) Discuss about Claypron's method with example.

(b) Find the deflection of the cantilever beam at the point of application of 1000 N load. Assume elastic deflections with EI = 10^6 N-m^2.

2 (a) Draw the stress distribution diagram for curved beam.

(b) An infinite beam rests on equally spaced linear coil springs located every 1.1 m along the beam. A concentrated load of 18 kN is applied to the beam, over one of the springs. EI of the beam is 441 x 10^9 Nmm^2, K = 275 N/mm for each spring. Compute the largest spring force and largest bending moment in the beam.



3 (a) Derive the expression for crippling load of a column with both ends hinged.

(b) Calculate the Euler's critical load for a strut of T-section, the flange width being 10 cm, overall depth 8 cm and both flange and stem 1 cm thick. The strut is 3 m long and is built in at both ends. Take E = 2 x 10^5 N/mm^2.

4 (a) Explain stress strain relationship for 3D elastic body.

(b) Explain Airy's stress function and consider the stress function $\varphi = Ax^2 + Bxy + Cy^2$ and explain the stress distribution for rectangular plane.

5 (a) Determine the strains on inclined plane with neat sketches.

(b) A structural member supports loads which produce, at a particular point, a direct tensile stress of 80 N/mm^2 and a shear stress of 45 N/mm^2 on the same plane. Calculate the values and directions of the principal stresses at the point and also the maximum stress, stating on which planes this will act.

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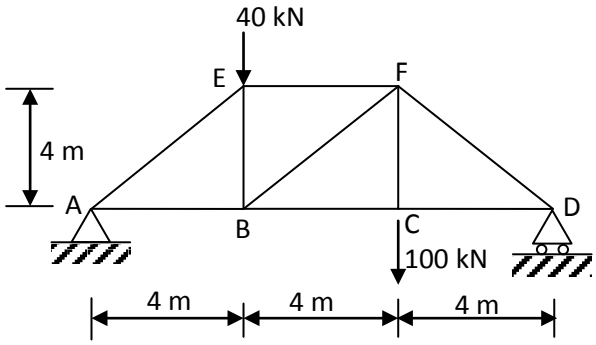
6 Calculate the vertical deflection of the joint B and the horizontal movement of the support D in the truss shown in figure. The cross-sectional area of each member is 1800 mm^2 and Young's modulus, E, for the material of the members is 200 000 N/mm^2.



7 Explain Rayleigh Ritz method with suitable examples and also explain some important characteristics of Rayleigh Ritz method.

8 (a) Discuss about monocoque and semi-monocoque structures.

(b) Determine the variation of shear flow throughout the tube of a rectangular cross section whose outer width and height are 100 mm and 200 mm respectively. The uniform thickness (t) of the tube is 4 mm; the tube is subjected to shear force of 20 kN.

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