Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_

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**End Semester Examination – Nov/Dec – 2018**

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| **Code :** | **16AE2003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **AIRCRAFT STRUCTURES - II** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. |  | Plot the shear flow and find the shear center location for the section show in figure. | CO1 | 20 |
| (OR) | | | | |
| 2. |  | Calculate the shear ﬂow distribution in the channel section shown in figure produced by a vertical shear load of 4.8 kN acting through its shear centre. Assume that the walls of the section are only effective in resisting shear stresses while the booms, each of area 300 mm2, carry all the direct stresses. | CO1 | 20 |
| 3. |  | Find the shear flow for the closed section shown in figure. Subjected to a vertical force V passing through the shear center. Thickness **t** for the entire wall. | CO1 | 20 |
| (OR) | | | | |
| 4. |  | The thin-walled single cell beam shown in Figure has been idealized into a combination of direct stress carrying booms and shear stress only carrying walls. If the section supports a vertical shear load of 10 kN acting in a vertical plane through booms 3 and 6, calculate the distribution of shear ﬂow around the section. Boom areas: *B*1=*B*8=200 mm2, *B*2=*B*7=250 mm2, *B*3=*B*6=400 mm2*, B*4 = *B*5 =100 mm2. | CO1 | 20 |
| 5. |  | Derive the governing equation of a thin plate subject to a pure bending load and twisting. | CO2 | 20 |
| (OR) | | | | |
| 6. | a. | Explain the Needham and Gerard method method of estimating crippling stress. | CO3 | 10 |
| b. | Explain the principle of semi-Tension field beam and find an expression for Web stiffener load and Flange axial load. | CO3 | 10 |
| 7. |  | 1. Find the margin of safety in buckling for the box beam shown in figure given P1 = P2 =10kN. Area of the each stringer = 2 cm2 and the sheet thickness is 1.5mm throughout. Assume the sheets are effective in bending and made of 2024-T3 Aluminum alloy. For a/b= 3, kc = 4, ks= 5.8. | CO3 | 20 |
| (OR) | | | | |
| 8. |  | Calculate the distribution of stiffener loads and the shear flow distribution in the web panels shown in figure. Assuming that the latter are effective only in shear. | CO3 | 20 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Write the short notes on the idealization and analysis of aircraft fuselage. | CO3 | 10 |
| b. | Part of a wing section is in the form of the two-cell box shown in figure in which the vertical spars are connected to the wing skin through angle sections all having a cross- sectional area of 300 mm2. Idealize the section into an arrangement of direct stress carrying booms and shear stress only carrying panels suitable for resisting bending moments in a vertical plane. Position the booms at the spar/skin junctions. | CO3 | 10 |