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



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14AE2012** | **Duration :** | **3hrs** |
| **Sub. Name :** | **AIRCRAFT STRUCTURES** | **Max. Marks :** | **100** |

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

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | List the Assumptions made in computing the forces in the members of a perfect truss. | C01 | 2 |
| b. | Find the forces in the members of truss shown in Figure: | C01 | 18 |
| **(OR)** | | | | |
| 2. |  | Find the forces in the members of truss shown in Figure. | C01 | 20 |
|  |  |  |  |  |
| 3. |  | For a continuous beam ABC fixed at the ends is loaded as shown in Figure, find the support moment and draw the bending moment diagram using Clapeyron’s three moment equation. | C01 | 20 |
| **(OR)** | | | | |
| 4. | a. | Write the Clapeyron’s three-moment equation in general form and explain the terms. | C01 | 2 |
| b. | Find the support moment of the beam shown in fig, using Clapeyron’s 3 moment equation and sketch bending moment diagram. | C01 | 18 |
|  |  |  |  |  |
| 5. | a. | Explain order of indeterminacy with example. | C02 | 4 |
| b. | Find the vertical horizontal deflection of the joint C of the truss shown in Figure. The cross sectional area of the inclined member is 2000mm2 and that of horizontal member is 1600mm2. Take E=200 kN/mm2. | C02 | 16 |
| **(OR)** | | | | |
| 6. |  | A cantilever beam of angle section as shown in Figure is1m long and is fixed at one end,while it is subjected to a load of 3kN at the free end at 200 to the vertical. Calculate the bending stress at A,B and C and also the position of neutral axis. | C02 | 20 |
|  |  |  |  |  |
| 7. |  | 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 center. Assume that the walls of the section are only effective in resisting shear stresses while thebooms, each of area 300mm2, carry all the direct stresses. Find also the position of the shear center. | C02 | 20 |
| **(OR)** | | | | |
| 8. | a. | Derive the Bredt-Batho formula. | CO2 | 4 |
| b. | A steel girder has the cross-section shown in Figure. The wall thickness is uniformly 1.25 cm. The stress due to twisting should not exceed 350000 kPa. Neglect stress concentrations.  (a) Find the maximum allowable torque.  (b) Find the twist per meter length under that torque.  (c) Find the shear stress in the middle web. | CO2 | 16 |
|  | | **Compulsory**: |  |  |
| 9. | a. | With example, explain the Gerard method of crippling stress calculation. | CO2 | 10 |
| b. | Write short notes on the different types of failure modes for members subjected to compression. | CO2 | 6 |
| c. | Briefly explain the applications of composite materials in aircraft industries. | CO3 | 4 |