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



**End Semester Examination – Nov/Dec - 2017**

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| **Code :** | **14AE3008** | | **Duration :** | **3hrs** |
| **Sub. Name :** | **AEROSPACE STRUCTURAL ANALYSIS** | | **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 beam of angle section 150x100x10mm is simply supported over a span of 1.6m with 150mm length vertical. A UDL of 10kN/m is applied throughout the beam. Find the bending stress of the corner points of the Angle section. | CO2 | 20 |
| (OR) | | | | |
| 2. |  | A beam having the cross-section shown in figure is subjected to a bending moment of 1500 N m in a vertical plane. Calculate the maximum direct stress due to bending stating the point at which it acts. | CO2 | 20 |
| 3. |  | Calculate the shear flow distribution in the channel and the shear center distance from the web section as shown in figure produced by a vertical shear load of 4.8 kN acting through its shear centre. Assumethat the walls of the section are only effective in resisting shear stresses while the booms, each of area 300mm2,carry all the direct stress | CO2 | 20 |
| (OR) | | | | |
| 4. | a. | Define Shear flow and its characteristics | CO2 | 5 |
| b. | Find the angle of twist per unit length in the wing whose cross-section is shown in figure. when it is subjected to a torque of 10kNm. Find also the maximum shear stress in the section. G = 25 000 N/mm2. Wall 12 (outer) = 900mm. Nose cell area = 20000mm2. | CO2 | 15 |
| 5. |  | A Cross section of channel beam with double flange and constant thickness throughout the section as shown in figure. show that the following formula for the distance ‘e’ from the center line of the web to the shear center point | CO2 | 20 |
| (OR) | | | | |
| 6. |  | Determine the shear flow distribution in the web of the tapered beam shown in figure at a section midway along its length. The web of the beam has a thickness of 2 mm and is fully effective in resisting direct stress. The beam tapers symmetrically about its horizontal centroidal axis and the cross-sectional area of each flange is 400 mm2 | CO2 | 20 |
| 7. |  | A thin-walled pin-ended column is 2m long and has the cross-section shown in figure. If the ends of the column are free to warp determine the lowest value of axial load which will cause buckling and specify the buckling mode. Take *E* = 75 000 N/mm2 and *G* = 21 000 N/mm2 | CO3 | 20 |
| (OR) | | | | |
| 8. |  | Find the Shear flow of the closed rectangular section ABCD subjected to the vertical load passing through the shear center | CO3 | 20 |
|  | | **Compulsory:** |  |  |
| 9. | a. | Explain the following   1. Properties of Stiffness Matrix 2. Properties of Shape Function | CO3 | 10 |
| b. | Explain in detail the various procedures for the formulation of the finite element problem. | 10 |

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