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



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

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| **Code :** | **17AE2012** | **Duration :** | **3hrs** |
| **Sub. Name :** | **AIRCRAFT STRUCTURES-I** | **Max. Marks :** | **100** |

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

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. |  | Determine the support reactions and the forces in the members of the truss shown in Fig.1 using the method of joint.    Fig.1 | CO2 | 20 |
| 2(OR) | | | | |  |  |  |  |
| 2. |  | Determine the vertical displacement of joint C of the steel truss shown in Fig.2. The cross sectional area of each member is  A=400 mm2 and E = 2 x 105 N/mm2.    Fig.2 | CO2 | 20 |
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| 3. |  | A continuous beam ABCD, 20m long is loaded as shown in the Fig.3., Draw the B.M. and S.F. diagram using three moment equation.    Fig.3 | CO2 | 20 |
| (OR) | | | | |
| 4. |  | A continuous beam ABC consists of two consecutive spans AB and BC 4 meters each and carries a distributed load of 60 kN/m. The A is fixed and the end B and C are simply supported. Using Moment Distribution method, find support moments, reactions and Draw the Bending moment and shear force diagram. | CO2 | 20 |
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| 5. |  | Derive the Euler’s crippling load for a column when it has both ends fixed and one end fixed and other end free. | CO3 | 20 |
| (OR) | | | | |
| 6. | a | Calculate the safe compressive load on a hollow cast iron column (one end fixed and other hinged) of 150 mm external diameter, 100 mm internal diameter and 10 m length. Use Euler’s formula with a factor of safety of 5 and E= 95 GN/m2. | CO3 | 10 |
| b | Compare the crippling loads given by Rankine’s and Euler’s formula for tubular strut 2.25m long having outer and inner diameters of 37.5 mm and 32.5mm loaded through pin-joint at both ends. Take: Yield stress as 315 MN/m2; a = 1/7500 and E = 200 GN/m2. If elastic limit for the material is taken as 200 MN/m2 ; then for what length of the strut does the Euler formula cease to apply? | CO3 | 10 |
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| 7. |  | A beam having the cross-section shown in Fig.4 is subjected to a bending moment of 1500 Nm in a vertical plane (Mx = 1500 Nm). Calculate the maximum direct stress due to bending stating the point at which it acts. (Use principle axes Method)    Fig.4 | CO6 | 20 |
| (OR) | | | | |
| 8. | a. | Derive the equation of motion of undamped single degree of freedom system. | CO4 | 10 |
| b. | A blot is under an axial thrust of 9.6 kN together with a transverse force of 4.8 kN. Calculte its diameter according to:   1. Maximum Principal stress theory 2. Maximum shear stress theory 3. Strain energy theory   Given: Factor of safety = 3, Yield strength of material of bolt = 270 N/mm2, Poisson’s ratio = 0.3. | CO5 | 10 |
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|  | | **Compulsory**: |  |  |
| 9. |  | Briefly explain the classification of composite materials and its application. | CO1 | 20 |