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



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

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| **Code :** | **14AE2001** | **Duration :** | **3hrs** |
| **Sub. Name :** | **INTRODUCTION TO AEROSPACE ENGINEERING** | **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. | Explain the contributions of the Wright brothers. | CO1 | 5 |
| b. | Air flowing at high speed in the working section of a wind tunnel has pressure and temperature values equal to 0.6 atm at sea level and -400C respectively. Calculate air density and density ratio. | CO1 | 3 |
| c. | Define standard atmosphere. Derive an expression for pressure and density ratio, i. in the isothermal region of the standard atmosphere ii. in the gradient region of the standard atmosphere. | CO1 | 12 |
| (OR) | | | | |
| 2. | a. | Enumerate the works of Otto Lilienthal- the Glider man. | CO1 | 5 |
| b. | Define geopotential altitude. | CO1 | 3 |
|  | c. | Calculate the values of pressure, density and temperature for the standard atmosphere at an altitude of 15000 m.  The standard sea level values are pressure = 101325 N/m2, density = 1.2256 kg/m3 and temperature = 288.16 K. The temperature lapse rate a = -0.0065 K/m. | CO1 | 12 |
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| 3. | a. | Define the term pressure coefficient and plot C p vs x/c - along the chord direction at the selected angle of attack for a standard airfoil. | CO1 | 5 |
|  | b. | An airplane is flying with Mach number 0.218 at a standard altitude of 5 km. The pressure cofficient at a point on the fuselage is - 1.2. What is the pressure at this point.  The standard sea level values are pressure = 101325 N/ m2, density = 1.2256 kg/m3 and temperature = 288.16 K. The temperature lapse rate a = -0.0065 K/m. | CO2 | 15 |
| (OR) | | | | |
| 4. | a. | Explain the classification of aircraft according to the wing, landing gear, and engine with a neat sketch. | CO2 | 10 |
|  | b. | Explain the function of flight control surfaces. | CO2 | 10 |
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| 5. | a. | What is spar? Explain in detail how it is used in carrying the Load? | CO2 | 5 |
|  | b. | List the structural component of the aircraft wing and explain with neat sketch the functions associated with them. | CO2 | 15 |
| (OR) | | | | |
| 6. | a. | Distinguish between the monocoque and semi monocoque structures. | CO2 | 5 |
|  | b. | Explain the function of ribs, spar and wing box with figures. | CO2 | 15 |
| 7. | a. | Write down the difference between the turboprop and turbojet engine. | CO2 | 5 |
|  | b. | Define the following terms and derive the equations for Jet propulsion. i. Drag ii. Thrust iii. Thrust Power iv. Propulsive power v. Overall efficiency | CO1 | 15 |
| (OR) | | | | |
| 8. |  | A turbojet powered airplane has a Mach number 0.517 flying at a standard altitude of 15000 m . The turbojet engine itself has inlet and exit areas of 0.55 m2 and 0.4 m2 respectively. The velocity and pressure of the exhaust gas at the exit are 420 m/s and 0.25 bar respectively. Calculate the thrust of the turbojet.  The standard sea level values are pressure = 101325 N/ m2, density = 1.2256 kg/m3 and temperature = 288.16 K, lapse rate = -0.0065 K/m | CO2 | 20 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | Discuss the working principle of rocket with neat sketch. Derive the expression for specific impulse (Isp) for a rocket engine in terms of the temperatureof combustion chamber (To) and the molecular weight of the propellant. | CO2 | 10 |
|  | b. | Explain the working of the following with neat sketches.   1. A liquid prolellant rocket with pump fed system. 2. A solid propellant rocket. | CO2 | 10 |

ALL THE BEST