



**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

MAKEUP EXAMINATION – JAN 2023

Course Code: MEC 2005

Course Name: Fundamentals of Aerospace Engineering

Program & Sem: B. Tech & I Sem

Date: 23 Jan 2022

Time: 09:30 AM to 12:30 PM

Max Marks: 100

Weightage: 50 %

Instructions:

- (i) Read all the questions carefully and answer accordingly.
(ii) All questions are mandatory.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks.

(5Qx 2M= 10M)

- 1 The angle between chord and relative wind is known as _____. (C.O.No.2) [Knowledge]
- 2 The maximum thickness of *NACA 4414* when chord length is 200 mm is _____ mm. (C.O.No.2) [Application]
- 3 When the mass entering and mass leaving a system is same, we can say that the mass is conserved. State if this statement is TRUE/FALSE. (C.O.No.1) [Knowledge]
- 4 The cross-sectional shape obtained by the intersection of the wing and a plane perpendicular to the wing is called _____. (C.O.No.3) [Knowledge]
- 5 Absolute altitude is the sum of _____ & _____. (C.O.No.1) [Knowledge]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries 15 marks.

(4Qx15M=60M)

6. Conservation of mass says that mass can neither be created nor destroyed. If we consider a converging duct, explain this and derive continuity equation. (C.O.No.2) [Comprehension]
7. Explain the working principle of a propeller with proper diagrams. (C.O.No.4) [Comprehension]

8. Name and explain the types of orbits with appropriate diagrams, based on :

i) Altitude

ii) Inclination

iii) Shape

(C.O.No.3) [Comprehension]

9. Draw and explain airfoil terminology.

(C.O.No.2) [Comprehension]

Part C [Problem Solving Questions]

Answer all the Questions.

(30M)

10. Define Escape Velocity. Calculate escape velocity for earth while mass of earth is 5.97219×10^{24} kg, Universal gravitational constant is 6.67408×10^{-11} m³/kg.s² and radius of earth is 6378 km.

[10M] (C.O.No.2) [Comprehension]

11. An aneroid barometer in an Airbus A-380 cruising at a geometric altitude of 14km displays the static pressure of air outside to be 1.41×10^4 Pa. Determine the error in this reading as per the standard atmosphere model. Also, determine density and temperature of air at the same geometric height. [Radius of earth = 6357km, $R_{air} = 287$ J/Kg.K, Density of air at sea level is 1.225 kg/m³, Temperature and pressure at sea level are 288.16K and 101.325 kPa]

[20M] (C.O.No.1) [Application]