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**PRESIDENCY UNIVERSITY**

**BENGALURU**

**SCHOOL OF ENGINEERING**

**MAKEUP EXAMINATION – JULY 2024**

**Date**: 01 JULY 2024

**Course Code**: MEC 2005

**Time**: 09:30 AM to 12:30 PM

**Course Name**: Fundamentals of Aerospace Engineering **Max Marks**: 100

**Program & Sem**: B. Tech

**Weightage**: 50 %

**Instructions:**

1. *Read all the questions carefully and answer accordingly.*
2. *All questions are mandatory.*

# Part A [Memory Recall Questions]

**Answer any five 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]

1. The maximum thickness of *NACA 4414* when chord length is 200 mm is \_\_\_\_\_\_\_\_ mm.

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

1. 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]
2. 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]
3. Absolute altitude is the sum of \_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_. (C.O.No.1) [[Knowledge]
4. What are the Advantages of designing aerofoil design (C.O.No.2) [Application]
5. Write required material behaviour of aerospace components (C.O.No.2) [Application]

# Part B [Thought Provoking Questions]

**Answer any four Questions. Each question carries 15 marks. (4Qx15M=60M)**

1. 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]
2. Explain the working principle of a propeller with proper diagrams.

(C.O.No.4) [Comprehension]

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

i) Altitude ii) Inclination iii) Shape (C.O.No.3) [Comprehension]

1. Draw and explain airfoil terminology. (C.O.No.2) [Comprehension]
2. What are the advantages and disadvantages of wind tunnel research?

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

# Part C [Problem Solving Questions]

**Answer any two Questions. 2QX15M=30M**

**13.** Define Escape Velocity. Calculate escape velocity for earth while mass of earth is 5.97219 x

1024 kg, Universal gravitational constant is 6.67408 x 10-11 m3/kg.s2 and radius of earth is 6378 km.

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

**14**. An aneroid barometer in an Airbus A-380 cursing at a geometric altitude of 14km displays the static pressure of air outside to be 1.41x104 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, Rair = 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]

**15**. The stress at a point in a material is given by \sigmax = 80MPa, \sigmay = 70MPa and \sigmaz = 80MPa, \tauxy=20MPa, \tauyz= --20MPa and \tauxz = 0, and cos \alpha =12/25, cos\beta = 15/25 and cos \gamma = 16/25. Find out 1. Resultant stress, 2. Normal stress 3. Shear stress.

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

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