Question Paper

Exam Date & Time: 02-Jun-2022 (09:30 AM - 12:30 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES II SEMESTER B.Sc.(Applied Sciences) in Engg. **END SEMESTER THEORY EXAMINATION- MAY/JUNE-2022**

Introduction To Aerospace Engg. and Avionics [IAV 121]

Marks: 50

Duration: 180 mins.

Answer all questions. Any missing data may be suitably assumed. Standard atmosphere data table can be used.

- 1) What is an airfoil? With diagram, define various parameters which characterize the (5) shape of an airfoil. Draw the variation of lift coefficient w.r.t angle of attack for a A) symmetric airfoil. Write the description for NACA 2412?
 - (5) B) From the following figures based on the control surface deflections indicate the angular rotations and force directions associated with the aircraft. Also, briefly explain how the respective deflection causes such a motion of the aircraft.



- 2) With neat diagram explain how a pitot - static probe is used for air speed measurement. ⁽⁵⁾ What is Mach number and what are the different flow regimes based on Mach number. A)
 - B) (5) Derive an expression relating pressure, density and temperature for a flow in which no heat is added or taken away and also no frictional or dissipative factors are involved.
- 3) Write about pre-operational environment of a spacecraft. What are the effects of space (5) environment on human crew involved in space missions? A)
 - B) (5) Consider an aircraft with a gross weight of 38,220N. The wing area is 27.3 nf, aspect ratio is 7.5. Oswald officionov factor is 0.9 and C = = 0.03. Calculate the thrust required Page 1 of 2