Roll No……..….. **Total No. of Printed Pages: 2**

Total No. of Questions: [09]

B. Tech (Aerospace Engg.) (Semester – 3rd)

BASICS OF AERONAUTICS

Subject Code: BASES1301

Paper ID: [19113002]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:

a) Discuss wings Fuselage Joining Methods.
b) Define the centre of pressure.
c) Write the different types of Under Carriages.
d) Write about the Compressibility Correction.
e) How to differentiate between finite and infinite wings?
f) Define the induced drag.
g) Differentiate between absolute and service Ceilings.
h) Define the Static Margin.
i) Differentiate between Ramjet and Rocket Engine.
j) Write about the Instruments landing system.

Section – B **(5 marks each)**

Q2. Derive the minimum thrust required condition for level, unaccelerated flight.

Q3. Explain the following,

(i) Critical Mach number
(ii) Drag divergence Mach number
(iii) Compressibility correction factor
(iv) Effect of aspect ratio.

Q4. Derive the condition for maximum rate of climb.

Q5. Explain about the Different Navigation Methods.

Q6. Explain the following:

a) Turbojet engine
b) Turbofan engine
c) Turboprop engine
d) Ramjet engine.

Section – C **(10 marks each)**

Q7. Consider a low-speed airplane flying at a velocity of 55m/sec. If the velocity at a point on the fuselage is 62m/sec, what is pressure coefficient at this point?

Q8. Consider a wing with an aspect ratio of 10 and an NACA 23012 aerofoil section. Assume Re= 5 × 106. The span efficiency factor e=0.95. If the wing is at a 40 angle of attack, Calculate CL and CD.
(For the NACA 2412 Aerofoil Cl=1.2 at $\alpha = 10^{o}$ and Cl=0 at $\alpha = -2^{o}$ angle of attack and zero lift drag is 0.06)

Q9. (a) Describe the criteria for longitudinal Static Stability.
(b) Discuss and explain the Static Stability equations.