Roll No……..….. **Total No. of Printed Pages: 1**
Total No. of Questions: [09]

B. Tech (Aeronautical Engg.) (Semester – 6th)
AIRCRAFT STABILITY AND CONTROL
Subject Code: BANES1-603
Paper ID: 18110233

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) Write the criteria of longitudinal static stability.
b) Define neutral point.
c) Define elevator effectiveness.
d) What do you understand by trim condition?
e) What do you understand by the static margin?
f) Name the parameters on which the hinge moment depends.
g) Differentiate between stick free and stick fixed static longitudinal stability.
h) Define the Dihedral Effect on lateral stability.
i) How is maneuver flight differ from steady-level flight?
j) Define the adverse Yaw.

Section – B **(5 marks each)**

Q2. How does the location of CG contribute to longitudinal static stability?
Q3. Explain the contribution of different tail parameters to the longitudinal static stability of the aircraft.
Q4. Discuss the Different types of tabs used on airplanes.
Q5. What do you understand by stick-free stability?
Q6. Find the expression for an increase in the angle of attack of the tail during the pull-up maneuver.

Section – C **(10 marks each)**

Q7. What do you understand by stick-fixed static stability? Find the expression of the static margin of stick-fixed longitudinal static stability.
Q8. Prove that the stability level in stick-free maneuver flight is higher than that of corresponding steady-level flight.
Q9. Consider a model of a wing-body shape mounted in a wind tunnel. The wing area and chord of the test model are 2 m^2 and 0.45, respectively, placed in the stream of air at 110 m/s. The moment about CG, when the lift is zero, is found to be -13 N-m. When the model is pitched to another AOA, the lift and the moment about the CG are 4000 N and 25 Nm., respectively. Calculate the value of the moment coefficient about the aerodynamic center and its location.