B. Tech. (Aerospace Engineering (Semester – 5th)
AUTOMATIC FLIGHT CONTROL
Subject Code: BASES1-502
Paper ID: [19113014]

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. Classical and Modern Control theory
    b. Zeros and Poles
    c. Linear system and Non-linear system
    d. Types of test input signals
    e. Gain and phase margin
    f. Lateral autopilot
    g. Phugoid mode
    h. Bode plot
    i. Peak overshoot
    j. Rise time and Settling time

Section – B   **(5 marks each)**
Q2. Explain 'Root locus Method' with the help of an example and diagram.
Q3. Explain 'Dutch Roll, Dutch Roll approximation and Damping of Dutch Roll.
Q4. Explain acceleration control system in longitudinal auto-pilots.
Q5. Explain 'Routh Hurwitz criterion'.
Q6. Distinguish between forward-path compensation and feedback-path compensation.

Section – C   **(10 marks each)**
Q7. (a) Determine whether the characteristic equation given below has stable or unstable roots.   **(5,5)**
$$2\lambda^3 + 4\lambda^2 + 4\lambda + 12 = 0$$
(b) Find range of values of k for which the system represented by following characteristic equation is stable:
$$\lambda^3 + 3\lambda^2 + 3\lambda + 1 + k = 0.$$
Q8. Write notes on the following: **(4,3,3)**
    a. Instrument Landing System
    b. Fly-by-Wire System
    c. Stability Augmentation System
Q9. Write notes on the following: **(6,4)**
    a. PI & PID controllers with the help of examples.
    b. Types of feedback control systems