6th Semester		**Aircraft Stability & Control**	**L-T-P 3-0-0**	**3 Credits**

Module – I STATIC LONGITUDINAL STABILITY AND CONTROL 10 Hours

General concepts-Degrees of freedom of a rigid body, Static and dynamic stability, Need for stability in an airplane, inherently and marginally stable airplanes, Stability and Controllability, Requirements of control surfaces, criteria for longitudinal static stability, contribution to stability by wing, tail, fuselage, wing fuselage combination, Total longitudinal stability, Neutral point-Stick fixed and Stick free aspects, Free elevator factor, static margin, Hinge moment, Power effects on stability-propeller and jet aircrafts, longitudinal control, Movement of centre of gravity, elevator control effectiveness, elevator control power, elevator angle to trim, elevator angle per g, maneuver point, Stick force gradient and stick force per g, Aerodynamic balancing

Module – II STATIC DIRECTIONAL STABILITY AND CONTROL 7 **Hours**

Directional stability-yaw and sideslip, Criterion of directional stability, contribution to static directional stability by wing, fuselage, tail, Power effects on directional stabilitypropeller and jet aircrafts, Rudder lock and Dorsal fin, Directional control, rudder control effectiveness, rudder requirements, adverse yaw, asymmetric power condition, spin recovery

Module – III STATIC LATERAL STABILTY AND CONTROL 6 **Hours**

Lateral stability-Dihedral effect, criterion for lateral stability, evaluation of lateral stability-contribution of fuselage, wing, wing fuselage, tail, total static lateral stability, lateral control, aileron reversal, aileron reversal speed

Module – IV DYNAMIC LONGITUDINAL STABILITY **7 Hours**

Aircraft Equations of motion, small disturbance theory, Estimation of longitudinal stability derivatives stability derivatives, solving the stability quartic, Phugoid motion,

Module – V DYNAMIC LATERAL AND DIRECTIONAL STABILITY **6 Hours**

Dutch roll and spiral instability, Auto rotation and spin,

Books:

1. Perkins C.D. & Hage R.E. Airplane performance, stability and control, John Wiley & Sons 1976.

2. Nelson, R.C. Flight Stability & Automatic Control, McGraw Hill, 1998.

3. McCormick, B.W. Aerodynamics, Aeronautics & Flight Mechanics John Wiley, 1995.

4. Babister, A.W. Aircraft Stability and response, Pergamon Press, 1980

5. Etkin, B., Dynamics of Flight Stability and Control, John Wiley, New York, 1982.

6. Pamadi, B.N. Performnce, Stability, Dynamics, and Control of Airplanes, AIAA, Education Series, 2004