

R09**Code: 9A21601**

B.Tech III Year II Semester (R09) Supplementary Examinations December/January 2015/2016

FLIGHT MECHANICS - II
(Aeronautical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain how the forces & moments acting on the aeroplane are controlled.
(b) Explain briefly the need for stability in an airplane.
- 2 The aerodynamic forces and moments on the body are due to only two basic sources are given below. Explain them with sketches.
(a) Pressure distribution over the body surface.
(b) Shear stress distribution over the body surface.
- 3 Prove that the wing sweep back (+A) produces positive dihedral effect (negative $C_{l\beta}$). Draw the necessary diagrams.
- 4 (a) Explain using an appropriate sketch, the relative positions of centre of gravity of an airplane & the stick fixed and stick free neutral points.
(b) Explain the requirements of c.g limits of an aircraft for the two cases referred to above.
- 5 Derive an expression for stick force in a stick free longitudinal stability of an aircraft. Also explain the term elevator gearing.
- 6 (a) Explain the orientation & position of an airplane in terms of a fixed frame of reference. Illustrate with sketch.
(b) Three dynamic modes describe the lateral motion of an aircraft. What are they? Explain in detail.
- 7 Bring out the relationship between yaw and roll of an airplane in the following cases:
(a) Rolling moment with yaw rate.
(b) Yawing moment with roll rate.
- 8 A rocket is flying at an airspeed of 300 m/sec. The angle of attack is 30° and the sideslip angle is 20° , with back angle of 40° and elevation angle of 20° & an Azimuth angle of 70° . Assuming no wind, what is its velocity in earth – fixed coordinates?
