Code No: C7602

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH I SEMESTER EXAMINATIONS, APRIL/MAY 2012
ENGINEERING ANALYSIS OF FLIGHT VEHICLES
(AEROSPACE ENGINEERING)

Time: 3hours   Max.Marks:60

Answer any five questions
All questions carry equal marks
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1.   Compare and contrast the external configurations of a subsonic and a supersonic aircraft with the help of neat sketches.

2.   Derive the equations of motion of an aircraft symmetrical about the plane passing through the longitudinal and yaw axes. The sketches should be neat and the symbols used should be explained very clearly.

3.(a) Describe the aerodynamic forces acting on an aircraft and the vehicle parameters that influence the magnitudes of these forces.
  (b) Explain the variations of the aerodynamic forces and moments occurring on an airfoil as the relevant parameters vary.

4.   State the equations of motion of an aircraft, and from them, derive the small perturbation equations of motion in longitudinal plane.

5.(a) Explain the forces and moments acting on an aircraft in the pitch plane.
  (b) Derive an expression for the elevator deflection angle required to ensure a trimmed flight in longitudinal plane.

6.   Explain, in the case of a vehicle boosting from a non-rotating planet,
      (a) Thrust and characteristic velocity,
      (b) Change in speed,
      (c) Effect of gravity,
      (d) Loss due to drag.

7.   Derive the equations of motion of a rocket lifting from the earth, considering the effect of angular velocity of the earth.

8.   Define non-dimensional altitude used to define the density of earth's atmosphere. With the help of this, derive the equations of motion of a reentry body.

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