No. of Printed Pages : 2

**BAS-023**

# B.Tech. AEROSPACE ENGINEERING (BTAE)

## Term-End Examination

00318

## June, 2016

## BAS-023 : AIRCRAFT DESIGN / LAUNCH VEHICLE / ROCKET DESIGN

*Time : 3 hours* *Maximum Marks : 70*

***Note :*** *Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is permitted.*

**1.** Define the following : *5×2=10*

(a) Induced drag

(b) Rudder

(c) Static margin

(d) Aerodynamic centre

(e) Angle of attack

**2.** What are the different arrangements/layouts of wings for airplanes ? Illustrate with sketches and plots. *10*

**3.** Discuss in detail, the phenomenon of fluttering and give its remedy also. *10*

4. Explain in detail the V-n diagram, minimum stall velocity and $C_{L_{max}}$. Also draw the aerodynamic and structural boundary. *10*

5. Elaborate the design differences between a civilian and a fighter aircraft. *10*

6. Discuss the layout of a cockpit in commercial airplanes alongwith the meters and instruments in it. Draw a neat sketch also. *10*

7. (a) What are the working Mach number regimes of different engines used in aircrafts ? *6*

   (b) What is the necessity/advantage of afterburning in an aircraft gas turbine engine ? Elaborate. *4*

8. (a) Explain the difference between the lift curve slope of a positively cambered and non-cambered airfoil with neat sketches.

   (b) Differentiate between :

   (i) Laminar flow airfoil geometry and conventional airfoil

   (ii) Shock waves and expansion waves in a supersonic flow *5+5=10*

9. Compare Turbofan, Turbojet and Ramjet engines in detail, with neat sketches. *10*