

Code.No: 37149

R05

SET-3

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**  
**IV.B.TECH - I SEMESTER REGULAR EXAMINATIONS NOV/DEC, 2009**  
**FLIGHT VEHICLE DESIGN**  
**(AERONAUTICAL ENGINEERING)**

**Time: 3hours**

**Max.Marks:80**

**Answer any FIVE questions**  
**All questions carry equal marks**

- - -

1. Explain various steps involved in an air craft preliminary design process in detail?(16)
2. a) List out various types of military airplanes and describe their roles and mission profiles?(10)  
b) Describe how one can design a multiple role of an air craft? (6)
3. a) Sketch the pressure distribution over an air foil at subsonic speeds at high and low angle of attack and the effect on  $C_l$  and  $C_d$  (8)  
b) Describe critical Mach number and drag divergence mach number of an airfoil and state their significance. (8)
4. Briefly discuss the major difference in the designs of fuselages of an military cargo plane and a passenger plane. Justify your answers with neat sketches? (16)
5. Explain with neat sketches.  
a) Water lines  
b) Butl – Plane cuts  
c) Flat wrap (5+6+5)
6. Explain the following  
a) Roll damping  
b) Aileron reversal effect  
c) Spin recovery concept. (4+6+6)
7. Describe in detail about various types of flaps including leading edge device and the effect on  $C_L$  Vs  $\alpha$  curves (16)
8. a) How does the empty weight affect the economy of a passenger or a cargo aircraft? Justify. (8)  
b) Specific fuel consumption with also affect the economy of an aircraft? Justify. (8)