

**B.Tech. AEROSPACE ENGINEERING
(BTAE)****Term-End Examination**

00665

December, 2014**BAS-023 : AIRCRAFT DESIGN / LAUNCH
VEHICLE / ROCKET DESIGN***Time : 3 hours**Maximum Marks : 70*

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

1. Using scale, draw a neat sketch of conventional military aircraft cockpit as per under mentioned data :
Over nose angle = 10° , and seat back angle = 13° . Seat height = 8" from the floor. Seat length = 14" and seat travel (longitudinally) = 1 foot either side. Eye point location = 32" from upper edge of seat and 13" from head rest. Instrument Panel clearance = 17" from eye point, Grazing angle = 30° ; Instrument Panel is 20° inclined with vertical plane. Rudder pedal distance or firewall distance = 50" (from seat back). Foot length = 12". Overhead canopy clearance = 1 foot from eye point. Scale 1 cm = 4". 10

2. (a) Write a short note on "Fixed Engine Sizing". 5
(b) What is the importance of "Tail volume coefficient" in Tail Plane design ? 5

3. (a) What do you understand by "Inertial-loads" ? While designing an aircraft structure, which components create inertial loads ? Which techniques are used to overcome the inertial loads ? 5
- (b) What are the properties of Titanium which lead it to be widely used to produce airframe structural components ? 5
4. (a) How will you estimate the weight of an aircraft ? 5
- (b) How will you select the type of landing gear in your aircraft design ? 5
5. (a) Explain types of air inlets for subsonic and supersonic aircraft. 5
- (b) Propeller driven aircraft are not capable of cruising at higher altitudes. Explain. 5
6. (a) How will you select fuselage width for personal utility aircraft ? 5
- (b) Explain the types of tail plane configuration with necessary sketches. 5
7. Explain the factors which influence the wing design. 10
8. (a) Write a short note on VTOL Jet Propulsion techniques with a neat sketch. 5
- (b) Explain the types of vectoring nozzles for VTOL aircraft.
9. Make use of sketches and plots to illustrate the structural layout details of an all metal wing. Hence explain the occurrence of and resistance of aerodynamic loads, torsional and divergence moments. 10