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BAS-023

00501

B.Tech. (AEROSPACE ENGINEERING) (BTAE)

Term-End Examination

December, 2013

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

Time : 3 hours *Maximum Marks : 70*

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

1. Prepare a conceptual design with preliminary weight estimate and weight break down, 3 views of an airplane with the following initial specifications; **10**

5 passengers +1 crew, carry bags of 15 kgs allowed per passenger.

Maximum level speed at mid – cruise weight = 400 kmph

Range = 2000 kms

Abs. ceiling = 8000m

Rate of climb at sea level = 350 m/min

Stalling speed = 120 kmph

Landing distance = 670 m

Take off distance = 760 m

Power Plant : Conventional piston engine with constant speed.

Propeller = 1 number.

2. What are possible locations of jet engines on an airplane (both civil and military) ? Illustrate each of these with sketches / diagrams of existing / past airplanes. Describe merits of each option. **10**

3. (a) What are the reasons behind giving twist to main wing ? Explain with neat sketch. **5**

   (b) How will you choose proper engine for the given design ? Explain with necessary graph. **5**

4. (a) Explain different types of air inlets for subsonic and supersonic aircraft. **5**

   (b) Explain the statement "Propeller driven aircrafts are not capable to cruise at higher altitudes". **5**

5. (a) How will you select fuselage width for personal utility aircraft ? **5**

   (b) Explain various types of tail plane configuration with necessary sketches. **5**

6. (a) How will you estimate weight of aircraft ? **5**

   (b) How will you select type of landing gear in your aircraft design ? **5**

7. What are different arrangements / layouts of landing gears for airplanes? Illustrate with sketches and plots. Hence illustrate the functioning of an oleo strut. **10**

8. A light UAV is to be designed for carrying an instrument equipment load of 15 kgs. Its maximum velocity is 75 kmph. A pusher type piston - prop weighing 4.5kgs, capable of delivering 14 IHP is readilly avilable. **5x2=10**

(a) Work out gross weight for an endurance of 4 hrs.

(b) Carry out weight break down analysis.

(c) Prepare preliminary design of the wing.

(d) Work out major dimensions,and

(e) Prepare a 3 view drawing

Be reasonable to assume data required with justification.

9. Make use of sketches and plots to illustrate the structural layout details of an all metal wing. Hence explain the occurrence resistance of aerodynamics loads, torsinal and divergence moments. **10**