Aircraft Design
Week-2

1. Airplane data : Weight = 33112 kg, S = 88.26 m^2 , $C_{D,0}$ = 0.015, K = 0.08, $\rho_\infty = 0.459\ kg/m^3$,
   (I) At velocity 122 m/sec, what will be L/D
      a) 9.98 Ans a
      b) 6.88›
      c) 0.75
      d) 7.65

   (II) What will be thrust required for cruise at same altitude

      a. 32494 N Ans a
      b. 4808 N
      c. 2.4963 N
      d. 7243 N

2. For an aircraft $\left.\frac{C_L}{C_D}\right|_{max} = 13.62$, $\left.\frac{{C_L}^{3/2}}{C_D}\right|_{max} = 12.81$, propeller efficiency $\eta = 0.8$, specific fuel consumption $c = 2.0025\ N/(hp)(h)$, gross weight $w_0 = 13127.5N$, empty weight $w_1 = 11489.76N$ and wing area $S = 16.165\ \mathrm{m}^2$.
   Density of air at sea level $\rho_\infty = 1.225\ kg/m^3$
   (hint: $2.0025\ N/(hp)(h) = 7.456\ X\ 10^{-7}\ m^{-1}$)

   I. What is maximum range:
      ans : c
      a. 1740 km.
      b. 1820 km.
      c. 1937 km.
      d. 2153 km.

   II. What will be maximum endurance Ans : a

a. 14.4 hour
b. 13.2 hour
c. 12.6 hour
d. 11.2 hour

3. When maximum range Ans : a

a. $\left.\frac{C_L}{C_D}\right|_{max}$, $C_L = \sqrt{C_{D_0}/(\frac{1}{\pi .AR.e})}$

b. $\left.\frac{C_L}{C_D}\right|_{min}$, $C_L = \sqrt{C_{D_0}/(\frac{1}{\pi .AR.e})}$

c. $\left.\frac{{C_L}^{3/2}}{C_D}\right|_{min}$, $C_L = \sqrt{3C_{D_0}/(\frac{1}{\pi .AR.e})}$

d. $\left.\frac{{C_L}^{3/2}}{C_D}\right|_{max}$, $C_L = \sqrt{3C_{D_0}/(\frac{1}{\pi .AR.e})}$