

GATE Aerospace Coaching By IITians GATE CLASSES

Assignment-II

- 1). What is the condition of minimum drag of an airplane.
 - 2). As altitude increases, what happens to minimum drag of an airplane. Whether it increases, decreases (or) remains constant.
 - 3). The relation between the minimum power $\left(\frac{L}{D}\right)$ ratio and the minimum drag $\left(\frac{L}{D}\right)$ ratio.
 - 4). The condition at which max. range of jet engine aircraft occurs.
 - 5). In a jet engine aircraft what happens to maximum speed of aircraft up to tropopause and above tropopause. State the reasons
 - 6). What happens to power available and power required, as weight increases for an aircraft.
 - 7). For service ceiling, the altitude is taken at which rate of climb is.....
- For piston engine aircraft, the service ceiling is taken as the altitude at which rate of climb is
- 8). For the airplane with the drag polar, $C_D = 0.04 + 0.015C_L^2$, flies at a speed of 100 m/s with a wing area of 44 m², produces a thrust of 27000N with a weight of 15 tonnes. Find the maximum and minimum speed of take density as 0.649 kg/m³.
 - 9). For the airplane with following characteristic, $S = 42 \text{ m}^2$, $SFC = 0.6 \text{ N/W/hr}$, weight of fuel 4.5 tonnes, total weight of an airplane 15 tonnes, flying at speed of 100m/s, the drag polar is given as $C_D = 0.016 + 0.546 C_L^2$. Find the range and endurance. Assume $\rho = 0.649 \text{ kg/m}^3$
 - 10). For the airplane characteristics given in problem (9), find the maximum range and maximum endurance.
 - 11). In the problem (9), if the range is reduced to half, find the weight of the fuel consumed.
 - 12). In the problem (9), if SFC is taken to 0.6 N/W/hr and $\eta_P = 0.85$. Find the maximum range and maximum endurance.
 - 13). For the airplane characteristic in problem (9), find the maximum rate of climb and maximum climb angle if $T = 160000 \text{ N}$