

III B.Tech II Semester Supplementary Examinations, January 2005
AEROSPACE PROPULSION-II
(Aeronautical Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
 All Questions carry equal marks

1. (a) Derive the optimum compression ratio for the gas turbine cycle of Max. work output?
 (b) What are different factors affecting the performance of the gas turbine cycle? Explain.
2. (a) Explain the working principle of turbojet engine with a neat sketch?
 (b) Derive the thermal efficiency and thrust of a turbojet engine?
3. A turbojet engine is traveling at 850 km/hr at standard sea-level conditions. The ram efficiency is 85%. The compressor ratio is 4; the compressor efficiency is 80%, the burner pressure coefficient is 2%, the fuel air ratio is 0.0122, the turbine inlet total temperature is 700°C, *the turbine efficiency is 84% and equivalent jet efficiency is 95%, Calculate :*
 (a) Specific net thrust
 (b) Thrust specific fuel consumption.
4. (a) What are the favourable conditions for the development of shocks in convergent-divergent Nozzle?
 (b) Explain the losses in steam nozzles and how to reduce them?
5. (a) Derive the relation between minimum area ratio and external deceleration ratio in a subsonic jet engines?
 (b) Explain the reverse diffuses and discuss its starting problems?
6. (a) Derive the equations to calculate thrust, power and fuel consumption for a Ramjet engine?
 (b) what are different combustion chambers used in ramjet engine? Explain.
7. In a solid propellant rocket engine following data is obtained:
 Area under thrust time trace = 8^S/m
 Time scale on thrust time trace = 8s/m
 Force scale on thrust time trace = 1000 N/m
 Acceleration due to gravity = 9.807m/s²
 Mass of motor and propellant before firing = 1.40 kg
 Mass of motor as propellant after firing = 1.37 kg
 Burning time = 1.2s
 Combustion chamber pressure = 4.64MN/m²
 Nozzle throat dia = 0.0032 m; exit dia = 0.00714 m

The ratio of the combustion pressure to the nozzle exit pressure is 40 and atmospheric pressure = 1.013 br.

Calculate specific impulse, total impulse and velocity of gases leaving the nozzle.

8. (a) Compare the solid propellants with liquid propellants used in rocket engines.
- (b) Explain the working of Ion rocket engine with a neat sketch?
