

AMAE11 PROPULSION-I

UNIT-1 FUNDAMENTALS OF GAS TURBINE ENGINES

- 1.1 Illustration of working of gas turbine engine- The thrust equation- Factors affecting thrust
- 1.2 Effect of pressure, velocity and temperature changes of air entering compressor
- 1.3 Methods of thrust augmentation
- 1.4 Characteristics of turboprop, turbofan and turbojet- Performance characteristics.

UNIT-2 SUBSONIC AND SUPERSONIC INLETS FOR JET ENGINES

- 2.1 Internal flow and Stall in subsonic inlets- Boundary layer separation
- 2.2 Major features of external flow near a subsonic inlet
- 2.3 Relation between minimum area ratio and external deceleration ratio
- 2.4 Diffuser performance- Supersonic inlets- Starting problem on supersonic inlets
- 2.5 Shock swallowing by area variation- External deceleration- Models of inlet operation.

UNIT-3 COMBUSTION CHAMBERS

- 3.1 Classification of combustion chambers
- 3.2 Important factors affecting combustion chamber design- Combustion process
- 3.3 Combustion chamber performance- Effect of operating variables on performance
- 3.4 Flame tube cooling- Flame stabilization- Use of flame holders – Numerical problems.

UNIT-4 NOZZLES

- 4.1 Theory of flow in isentropic nozzles- nozzles and choking- Nozzle throat conditions
- 4.2 Nozzle efficiency- Losses in nozzles- Over expanded and under- expanded nozzles
- 4.3 Ejector and variable area nozzles- Interaction of nozzle flow with adjacent surfaces
- 4.4 Thrust reversal.

UNIT-5 COMPRESSORS

- 5.1 Principle of operation of centrifugal compressor- Work done and pressure rise
- 5.2 Velocity diagrams- Diffuser vane design considerations-
- 5.3 Concept of prewhirl, rotation stall and surge- Elementary theory of axial flow compressor
- 5.4 Velocity triangles- degree of reaction- Three dimensional
- 5.5 Air angle distributions for free vortex and constant reaction designs
- 5.6 Compressor blade design- Centrifugal and Axial compressor performance characteristics

References Books:

1. Cohen, H. Rogers, G.F.C. and Saravanamuttoo, H.I.H. “Gas Turbine Theory”, Longman, 1989.
2. Oates, G.C., “Aero thermodynamics of Aircraft Engine Components”, AIAA Education Series, New York, 1985.
3. “Rolls Royce Jet Engine” – Third Edition – 1983.