

R09

Code: 9A03805

B.Tech IV Year II Semester (R09) Advanced Supplementary Examinations, July 2013

GAS TURBINES AND JET PROPULSION

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

- 1 In an open cycle constant pressure gas turbine, air enters the compressor at 1 bar and 300 K. The pressure ratio is 4:1. The isentropic efficiencies of compressor and turbine are 78% and 85% respectively. The air fuel ratio is 80:1, calculate the power developed and thermal efficiency of the cycle if the flow rate of air is 2.5 kg/sec. Assume $C_p = 1.005$ and $\gamma = 1.4$ for air and gases.
- 2 (a) Prove that work ratio increases with re-heating. Prove the expression for intermediate pressure for open cycle gas turbine plant.
(b) Explain the working principle of turboprop engine and list out its merits and demerits.
- 3 (a) How jet engines are classified?
(b) Define thrust, thrust power, propulsion efficiency, thermal efficiency, overall efficiency of jet propulsion.
- 4 (a) Explain the working principle of piston engine propeller plant and list out its merits and demerits over gas turbine propeller plant.
(b) Write short notes on thrust reversal.
- 5 Explain the working principle of pulse jet with the help of neat sketch and list out its merits and demerits.
- 6 (a) How rockets are classified?
(b) Explain the working principle of solid propellant rocket.
- 7 Write short notes on injectors and expansion nozzles.
- 8 (a) Write short notes on plasma arc propulsion systems.
(b) Write short notes on importance of cryogenics in propulsion systems.
