

**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

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- 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.

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