Code: 13A03805

R13

B.Tech IV Year II Semester (R13) Advanced Supplementary Examinations July 2018
GAS TURBINES & JET PROPULSION
(Mechanical Engineering)

Time: 3 hours   Max. Marks: 70

PART – A
(Compulsory Question)
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1   Answer the following: (10 X 02 = 20 Marks)
  (a)   Sketch open cycle and closed cycle gas turbine engine.
  (b)   Explain the basic principles of gas turbine.
  (c)   List the gas turbine applications.
  (d)   What is meant by intercooling?
  (e)   What is meant by thrust augmentation?
  (f)   Define propulsion efficiency.
  (g)   What is ramjet engine?
  (h)   List the advantages of rocket engine.
  (i)   What is plasma arc propulsion?
  (j)   Explain expansion nozzles.

PART – B
(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2   A gas turbine operates between pressure limits of 1.03 kg/cm^2 and 5.0 kg/cm^2. The inlet air temperature
        to the compressor is 15°C and the air entering the turbine is at a temperature of 537°C. If the volume rate
        of air entering the compressor is 1400 m^3/min, calculate the net available power output for the cycle.
        Assume that the cycle operates under ideal conditions. Also calculate efficiency.

OR

3   What is work ratio? Show that work ratio is given by:

$$W_{ratio} = 1 - \frac{r_p^{\frac{r-1}{r}}}{\eta_c \eta_t} \cdot \frac{To_1}{To_3}$$

UNIT – II

4   Derive the condition for maximum output of a gas turbine using reheater and regenerator.

OR

5   Explain the following with a sketch:
  (a)   Turboprop engine.
  (b)   Turbofan engine.

UNIT – III

6   Derive an expression for propulsive efficiency of turbo jet engine.

OR

7   Write a detailed notes on thrust augmentation and afterburner.

UNIT – IV

8   Explain in detail liquid and solid propellants.

OR

9   Explain with a neat sketch the following:
  (a)   Pulse jet.
  (b)   Serquejet.

UNIT – V

10   Discuss the possibility of rocket powdered vehicle having a flight velocity greater than the exhaust
        velocity of the rocket motor.

OR

11   Explain with a neat sketch Ion Rocket Engine.
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