

Code: 13A03805

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  $1.03 \text{ kg/cm}^2$  and  $5.0 \text{ kg/cm}^2$ . The inlet air temperature to the compressor is  $15^\circ\text{C}$  and the air entering the turbine is at a temperature of  $537^\circ\text{C}$ . If the volume rate of air entering the compressor is  $1400 \text{ m}^3/\text{min}$ , 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:

$$W_{ratio} = 1 - \frac{r_p^{\frac{r-1}{r}}}{\eta_c \eta_t} \cdot \frac{T_{01}}{T_{03}}$$

**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.