

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

**B.Tech.(ME) (Sem.-4)**  
**APPLIED THERMODYNAMICS-II**

Subject Code : BTME404

M.Code : 59132

Date of Examination : 09-07-22

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

**1. Answer briefly :**

- a) Draw Brayton cycle.
- b) Define volumetric efficiency of a reciprocating air compressor.
- c) What do you mean by surging and choking?
- d) Why centrifugal compressors are not suitable for aircraft applications?
- e) Enumerate the various uses of gas turbine.
- f) What are the advantages of multi stage compression?
- g) What is Turbojet?
- h) What is stalling?
- i) List the fuels and oxidiser used for rocket engines.
- j) Write the classification of jet propulsion devices.

## SECTION-B

2. State the merits and demerits of closed cycle gas turbine over open cycle gas turbine.
3. Explain with a neat sketch the working of a centrifugal compressor and obtain an expression for the work done.
4. Prove that with 50% reaction blading, axial flow compressors have symmetrical blading.
5. What are the various methods which are used to improve the efficiency and output of a gas turbine?
6. A turbojet engine flying at a speed of 800 Km/hr consumes air at the rate of 45kg/s. Calculate.
  - a) Jet exit velocity, the enthalpy change for the nozzle is 44.5 kcal/kg and the velocity coefficient is 0.95.
  - b) Fuel flow in kg/hr and thrust specific fuel consumption assuming the air fuel ratio is 80.

## SECTION-C

7. Draw P-V and T-S diagram for a single stage reciprocating air compressor without clearance. Derive the expression for the work done when compression is
  - a) isothermal
  - b) isentropic.
8. A gas turbine plant with a pressure ratio of 1:5 takes in air at 15°C. The maximum temperature is 600°C and develops 2200 KW. The turbine and compressor efficiencies are equal to 0.85. Taking  $C_p = 1 \text{ KJ/Kg K}$  and  $C_v = 0.714 \text{ KJ/Kg K}$ ; determine
  - a) Actual overall efficiency of the turbine and
  - b) Mass of air circulated by the turbine.
9. What is the principle of rocket propulsion and what are the different types of rocket engines?

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**