

Roll No.

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Total No. of Questions : 09

B.Tech. (ME) (Sem.-3)

BASIC THERMODYNAMICS

Subject Code : BTME305-18

M.Code : 76422

Date of Examination: 20-12-2023

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. Write briefly :

- a) What do you understand by property of a system? Distinguish between different type of properties.
- b) Show that work is a path function and not a state function.
- c) Define internal energy. Is it a function of state or process ?
- d) Explain the first law of thermodynamics as referred to closed system undergoing a cyclic changes.
- e) How I.C. engines are classified?
- f) Write down the steady flow energy equation and point out the significance of various terms involved.
- g) Define Clausius inequality equation.
- h) What do you mean by term Entropy?
- i) Define dryness fraction of steam.
- j) List the assumptions made in the analysis of air standard cycle.

SECTION-B

2. Differentiate between 2-stroke and 4-stroke IC engines.
3. A gas at 1 bar and 300 K is compressed adiabatically upto 10 bar and then expanded isothermally upto initial specific volume and then cooled at constant volume to initial conditions. Find work, heat and change in internal energy per kg of gas for each process and for the entire processes. Take $R = 297 \text{ J/KgK}$ and $\gamma = 1.4$.
4. Explain the concept of the third law of thermodynamics.
5. Apply steady state flow energy equation to a nozzle and derive an equation for velocity
6. What do you understand by the term quality as applied to the steam? Does it have any meaning in superheated vapour regions?

SECTION-C

7.
 - a) What factors render the Carnot cycle an impractical cycle?
 - b) Define an expression for the air standard efficiency of the Diesel cycle in terms of the compression ratio, cut off ratio and the adiabatic index.
8.
 - a) Write down kelvin plank statement for 2nd law of thermodynamics.
 - b) A reversible heat engine working between two thermal reservoirs at 875 K and 315 K drives a reversible refrigerator which operates between the same 315 K reservoir and a reservoir of 260 K. The engine is supplied 2000 kJ of heat and the network output from the composite system is 350 kJ. Calculate the heat transfer to the refrigerator and the network interaction with the reservoir at 315 K temperatures.
9. Explain in detail the construction, working, classification and applications of gas turbine.

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.