

Total No. of Questions : 4]

SEAT No. :

PC-440

[Total No. of Pages : 2

[6359]-561

**S.E. (Automobile & Mechanical Engineering/Mechanical Sandwich)
(Insem.)**

**ENGINEERING THERMODYNAMICS
(2019 Pattern) (Semester - III) (202043)**

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates :

- 1) Solve two questions Q.1 or Q.2, Q.3 or Q.4.
- 2) Neat diagrams must be drawn whenever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Assume the suitable data, if necessary.

- Q1)** a) What do you understand by a system and the surrounding? What is microscopic approach and macroscopic approach? [6]
- b) What is thermodynamic equilibrium? What is a reversible process and Irreversible process? [4]
- c) With the help of a neat diagram, explain the Joule's experiment. State the first law of thermodynamics. [5]

OR

- Q2)** a) Define [6]
- i) State
 - ii) Process
 - iii) Cycle
- b) Derive Steady flow energy equation for following devices: [9]
- i) Nozzles
 - ii) Hydraulic Turbines
 - iii) Compressors

P.T.O.

Q3) a) Explain [6]

- i) Boyle's Law
 - ii) Charle's Law
 - iii) Avagadro's Law
- b) What are Limitations of First law of thermodynamics? What is the concept of thermal reservoir, heat engine and heat pump? State Kelvin-Plank and Clausius Statement of Second law of thermodynamics [9]

OR

Q4) a) What is Coefficient of Performance (COP) of heat pump and refrigeration cycle? State and prove the relationship between COP of heat pump and COP of refrigeration. [7]

- b) 0.2 kg of air with $P_1 = 1.5$ bar and $T_1 = 300$ K is compressed to a pressure of 15 bar, according to the law $PV^{1.25} = \text{constant}$. [8]

Determine;

- i) Initial and final parameters of the air.
- ii) Workdone on or by the air.
- iii) Heat flow to or from the air.
- iv) Change in the entropy stating whether it is an increase or decreases.

