

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**FOURTH SEMESTER B.TECH DEGREE EXAMINATION (S), AUGUST 2023
MECHANICAL ENGINEERING****(2020 SCHEME)****Course Code : 20MET202****Course Name: Engineering Thermodynamics****Max. Marks : 100****Duration: 3 Hours***Use of Steam Tables and Thermodynamic Charts may be permitted***PART A***(Answer all questions. Each question carries 3 marks)*

1. Write note on System, boundary and surroundings.
2. Define thermodynamic property of a system with any two examples.
3. Explain the term 'flow work'.
4. State first law for closed system undergoing a change of state.
5. What is cyclic heat engine?
6. State Clausius theorem.
7. Define 'pure substance'. Give two examples.
8. Explain the law of corresponding state.
9. What is Dalton's law of gas mixtures?
10. Explain volumetric analysis.

PART B*(Answer one full question from each module, each question carries 14 marks)***MODULE I**

11. a) Define the following terms associated with a thermodynamic system. (7)
 - (i) State
 - (ii) Path
 - (iii) Process
 - (iv) Cycle
 - (v) Intensive & Extensive property
- b) Explain Quasi-static process with neat sketch. (7)

OR

12. a) Explain any two temperature measuring devices. (10)
b) What is thermodynamic equilibrium of a system? (4)

MODULE II

13. a) Explain 1st law of Thermodynamics for a Cycle with an experiment. (6)
b) Derive the expression for work transfer and heat transfer in a polytropic process. (8)

OR

14. Derive steady flow energy equation. (14)

MODULE III

15. A reversible heat engine operates between two reservoirs at temperatures 600°C and 40°C. The engine drives a reversible refrigerator which operates between the reservoirs at temperatures 40°C and -20°C. The heat transfer to the engine is 2 MJ and the net work output of the combined engine and refrigerator plant is 360 kJ. Find the heat transfer to the refrigerant and the net heat transfer to the reservoir at 40°C. (14)

OR

16. a) State and prove Carnot's theorem. (7)
b) Explain entropy principle and its application (7)

MODULE IV

17. a) Define dryness fraction. Draw the p-v-T diagram of water (7)
b) Differentiate between characteristic gas constant and universal gas constant. (7)

OR

18. Define Virial Expansion. Also explain the Law of the corresponding state. (14)

MODULE V

19. a) What is Kay's rule? (4)
b) Describe Joule – Kelvin effect and plot inversion curve. (10)

OR

20. a) Derive the Maxwell's equation (7)
b) Derive Clausius clapeyron equation. (7)
