

IV B.Tech I Semester Regular/Supplementary Examinations, Jan/Feb - 2022**Thermodynamics
(Mechanical Engineering)****Time: 3 hours****Max. Marks: 70***Question paper consists of Part-A and Part-B**Answer ALL sub questions from Part-A**Answer any FOUR questions from Part-B************PART-A (14 Marks)**

1. a) Define System, boundary and Surrounding. [2]
b) Explain about PMM – I. [3]
c) Write the limitations of first law of thermodynamics. [3]
d) What is triple point and critical state? [2]
e) Define Specific Humidity and Relative Humidity. [2]
f) Draw P–V and T-S diagram of sterling cycle and indicate the processes. [2]

PART-B (4x14 = 56 Marks)

2. a) What are different thermodynamic systems? Give example for each type with justification. [6]
b) A new temperature scale in Degree N is desired with freezing point at 100°N and the boiling point at 400°N . Establish a correlation between degrees Centigrade and degrees N. What will be the absolute temperature at 0°N ? [8]
3. a) Derive the steady flow energy equation. [9]
b) Explain Joule's experiment. [5]
4. a) Establish the equivalence of Kelvin-Planck and Clausius statements. [8]
b) An engine operating on a Carnot cycle works with in temperature limits of 600 K and 300 K. If the engine receives 2000 KJ of heat, evaluate the work done and thermal efficiency of the engine [6]
5. a) With a neat sketch explain the working of throttling calorimeter. [7]
b) A steam pressure of holding capacity 4 m^3 contains a mixture of saturated water and saturated steam at 250°C . The mass of the liquid present is 1 ton. Determine (i) Quality; (ii) Specific Volume; (iii) Specific Enthalpy; (iv) Specific Entropy and (v) Specific Internal Energy of steam. [7]
6. a) Explain Dalton's law of partial pressures and Avogadro's laws of additive volumes [7]
b) Atmospheric air at 1.0132 bar has a DBT of 32°C and a WBT of 26°C . Compute i) the partial pressure of water vapour, ii) Specific humidity, iii) Dew point temperature, iv) Relative humidity, v) Degree of saturation, vi) Density of air in the mixture, vii) Density of water vapour in the mixture. [7]
7. a) Compare Otto, Diesel and Dual Combustion cycles. [7]
b) With a neat sketch explain the working of Vapour compression cycle. [7]