

R13

Code No: 113AB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**B.Tech II Year I Semester Examinations, December - 2019****THERMODYNAMICS****(Common to ME, AE)****Time: 3 Hours****Max. Marks: 75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit.

Each question carries 10 marks and may have a, b, c as sub questions.

PART- A**(25 Marks)**

- 1.a) Define system, control volume, surroundings, boundaries, universe. [2]
- b) Explain heat pump with the help of a neat sketch. Derive its COP. [3]
- c) Write the use of compressibility charts. [2]
- d) Define DBT, WBT, DPT, RH and specific humidity. [3]
- e) Draw p-v and T-s plots of Lenoir cycle and derive air standard efficiency. [2]
- f) Clearly differentiate between microscopic and macroscopic view points. [3]
- g) Explain heat engine with the help of a neat sketch. Derive its efficiency. [2]
- h) Derive Clausius - Clapeyron equation from Maxwell's equations. [3]
- i) Draw psychrometric chart and indicate all constant property lines on it. [2]
- j) Draw p-v and T-s plots of Ericsson cycle and derive air standard efficiency. [3]

PART-B**(50 Marks)**

2. Derive steady flow energy equation. Show difference applications of it. [10]
- OR
3. Explain working of constant volume gas thermometer with help of a neat sketch. [10]
4. Prove equivalence of Kelvin- Planck and Clausius statement. [10]
- OR
5. Prove that internal energy is a point function. [10]
- 6.a) What are the deviations from perfect gas model. [5+5]
- b) Discuss about Vanderwaal's equation of state. [5+5]
- OR
- 7.a) State law of corresponding states. [5+5]
- b) Explain Generalised compressibility chart and observations made from it. [5+5]
8. Define mole fraction, mass fraction, volume fraction, equivalent gas constant. [10]
- OR
- 9.a) The molar analysis of a gaseous fuel indicates that it contains 40% CH₄, 20% C₂H₆, 25% H₂ and 15% N₂. Determine molar mass of the fuel and gravimetric analysis. [5+5]
- b) Write a note on Gibbs function. [5+5]
10. Draw p-v, T-s plots of Otto cycle and derive expressions for air standard efficiency, work done and mean effective pressure. [10]
- OR
11. Draw layout, p-v and T-s plots of Bell Coleman Cycle and derive expression for COP. [10]