Code No: 123AB

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, December - 2019

THERMODYNAMICS

(Common to ME, AE, MSNT)

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 Clasius - 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.
b) Discuss about Vanderwaal's equation of state. [5+5]

OR

7.a) State law of corresponding states.
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% CH_4, 20% C_2H_6, 25% H_2 and 15% N_2. Determine molar mass of the fuel and gravimetric analysis.
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]

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