

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree (S, FE) Examination June 2024 (2015 Scheme)

**Course Code: MR307****Course Name: THERMODYNAMICS**

Max. Marks: 100

Duration: 3 Hours

PART A*Answer all questions. Each question carries 5 marks*

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|---|---|---|
| 1 | Explain Thermodynamic equilibrium. | 5 |
| 2 | Explain free expansion. | 5 |
| 3 | What is a Carnot cycle and explain its four processes? | 5 |
| 4 | Derive Clausius' inequality. | 5 |
| 5 | State Third law of thermodynamics. | 5 |
| 6 | What is inversion curve? | 5 |
| 7 | Define DBT and WBT. | 5 |
| 8 | What is meant by specific humidity and relative humidity? | 5 |

PART B*Answer any three questions. Each question carries 10 marks*

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|----|--|---|
| 9 | a) Differentiate between microscopic and macroscopic approach. | 6 |
| | b) Define the term Continuum concept. | 4 |
| 10 | a) Define Zeroth law of thermodynamics. | 4 |
| | b) Explain path function and point function with example. | 6 |
| 11 | a) State second law of thermodynamics. | 6 |
| | b) What is PMM2? | 4 |
| 12 | a) Explain refrigerator with neat figure. | 5 |
| | b) Explain heat pump with neat figure. | 5 |
| 13 | a) What is meant by dead state and availability? | 5 |
| | b) What are the different types of irreversibility? | 5 |

PART C

Answer any two questions. Each question carries 15 marks

- 14 a) Explain Joule Kelvin effect plot T-P curve showing cooling and heating zones. 10
b) What is meant by Throttling process? 5
- 15 a) Derive Maxwell's Equations. 5
b) Derive first and second Tds equations. 10
- 16 a) What is dew point temperature? 5
b) An air-water vapour mixture enters an adiabatic saturator at 30°C and leaves at 20°C, which is the adiabatic saturation temperature. The pressure remains constant at 100 kPa. Determine the relative humidity and the humidity ratio of the inlet mixture. 10
- 17 a) Explain sensible heating. 5
b) Atmospheric air at 1.0132 bar has a DBT of 32°C and a WBT of 26°C. Compute
(a) The partial pressure of water vapour
(b) the specific humidity
(c) the dew point temperature
(d) the relative humidity
(e) the degree of saturation
(f) the density of the air in the mixture 10
(g) the density of the vapour in the mixture, and
(h) the enthalpy of the mixture.