



Reg No.: _____

Name: _____

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), DEC 2019**

Course Code: MR307

Course Name: THERMODYNAMICS

Max. Marks: 100

Duration: 3 Hours

(Use of psychometric chart permitted)

PART A

Answer all questions. Each question carries 5 marks

- 1 Explain Macroscopic and Microscopic view points (5)
- 2 Explain thermodynamics equilibrium (5)
- 3 Explain Clausius' inequality (5)
- 4 What is a Carnot cycle? What are the four processes which constitute the cycle? (5)
- 5 What is third law of thermodynamics? Explain (5)
- 6 Derive TdS equations. (5)
- 7 What is meant by specific humidity, relative humidity, and degree of saturation (5)
- 8 What do you understand by dry bulb temperature, wet bulb temperature and dew point temperature (5)

PART B

Answer any three questions. Each question carries 10 marks

- 9 a) What is PMM1? Why is it impossible (4)
- b) Air of pressure 1.02 bar at a temperature of 22°C, initially occupying a cylinder volume of 0.015 m³, is compressed reversibly and adiabatically to a pressure of 6.8 bar. Calculate (i) Final temperature (ii) Work done on the air. (6)
- 10 a) Explain Gibb's and Helmholtz function (5)
- b) Briefly explain Available Energy, Unavailable Energy and Dead state (5)
- 11 a) Elaborate Second law of thermodynamics with neat sketch (4)
- b) An inventor claims to have developed an engine which receives 1000kJ of heat at 160°C. It rejects heat at a temperature of 5°C and delivers 0.12 kWh of mechanical work. Is this valid claim? Justify your answer. (6)
- 12 a) What is first law of thermodynamics? What is its limitation? (4)
- b) What are the intensive and extensive properties? (3)
- c) What are thermodynamic systems? Explain the different thermodynamic system With example. (3)

- 13 a) Explain law of degradation of energy (5)
b) What are the causes of irreversibility process? (5)

PART C

Answer any two questions. Each question carries 15 marks

- 14 a) Explain Joule- Kelvin effect. What is inversion temperature? (8)
b) Derive Maxwell's equations (7)
- 15 a) Derive Clausius Clapeyron equation (7)
b) What is Joule – Kelvin coefficient? Why is it zero for an ideal gas? (8)
- 16 a) Explain Sensible heating and Sensible cooling (6)
b) Atmospheric air with dry bulb temperature of 28°C and a wet bulb temperature of 17°C is cooled to 15°C without changing its moisture content Find (9)
1. initial relative humidity
2. Final relative humidity
3. Final wet bulb temperature
- 17 The atmospheric air at 760mm of Hg, dry bulb temperature 15°C and wet bulb temperature 11°C enters a heating coil whose temperature is 41°C . Assuming by-pass factor of heating coil as 0.5, determine dry bulb temperature wet bulb temperature and relative humidity of air leaving the coil. Also determine sensible heat added to the air per kg of dry air. (15)
