ME3391 ENGINEERING THERMODYNAMICS

IMPORTANT QUESTIONS

UNIT - I BASICS, ZEROTH AND FIRST LAW

2 - Mark

1. Define thermodynamic system.
2. Should the automobile radiator be analyzed as a closed system or as an open system? Explain.
3. Define thermodynamic equilibrium.
4. What do you mean by quasi-static process?
5. Name and explain the two types of properties.
6. What is a steady flow process?
7. Prove that for an isolated system, there is no change in internal energy.
8. Define system.
9. Define cycle.
10. Explain Chemical equilibrium.
11. Explain Thermal equilibrium.
12. Define Zeroth law of Thermodynamics.
13. What are the limitations of first law of thermodynamics?
14. What is perpetual motion machine of first kind?
15. Define: Specific heat capacity at constant pressure.
16. Define: Specific heat capacity at constant volume.
17. Define the term enthalpy?
18. Define the term internal energy
19. What is meant by thermodynamic work?
20. What is meant by reversible and irreversible process?

13 - Mark

1. Explain the different types of system.
2. Indicate the practical application of steady flow energy equation.
3. Differentiate between point function and path function.
4. Explain homogeneous and heterogeneous system.
5. Explain Mechanical equilibrium.

UNIT - II SECOND LAW AND ENTROPY

2 - Mark

1. Define heat reservoir and source.
   What is Helmholtz free enginery function?
2. State Clausius statement of II law of thermodynamics.
3. Reframe a schematic diagram of a heat pump.
4. State kelvin Planck's second law statement.
5. What is thermal energy reservoir? Explain the term source and sink.
6. Discuss reversed heat engine in practically.

13 - Mark

1. A reversible heat engine operates between a source at 800'C and sink at 30"C. What is the least rate of heat rejection per KW network output of the engine?
2. An inventor claims to develop an engine which absorbs 100KW of heat from reservoir at 1000 K produces 60 KW of work and rejects heat to a reservoir at 500 K. Will you advise investment in its development?
3. Compare difference between adiabatic and isentropic process.

UNIT - III AVAILABILITY AND APPLICATION OF II LOW

2 - Mark

1. 11. How irreversibility in a process is define.
2. What is meant by dead state?
4. Point out the purpose of second law of thermodynamics.
3. What are the causes of irreversibility?
4. Sketch temperature entropy diagram.
5. Illustrate the principle of increase of entropy.
6. Summarize high grade and low-grade energy.

13 – Mark

1. Explain the difference between a refrigerator and an air conditioner?
2. A turbine gets a supply of 5kg /s of steam at 7 bar, 250.C and discharges it at 1 bar. Solve the availability.
3. When a system is adiabatic, what changes will be happened in entropy of a substance in the system?
4. Describe Clausius statement.

UNIT - IV PROPERTIES OF PURE SUBSTANCES

2 - Mark

1. Write a short note on Mollier Chart.
2. What are compressed solid and compressed liquid?
3. Discuss the critical condition of steam.
4. Illustrate meant by dead state.
5. Define pure substance.
6. Recite triple point represented in P-V diagram.
7. Discuss latent heat of vaporization
8. Give the possible ways to increase thermal efficiency of Rankine cycle.
9. Summarize the advantages of using superheated steam in turbines.
10. Why is excessive moisture in steam undesirable in steam turbines?
11. Analysis the effects of condenser pressure on the Rankine Cycle.
12. Show Camot cycle cannot be realized in practice for vapour power cycles.
13. State the advantages of regenerative cycle.

13 - Mark

1. Superheated steam at 30 bar and 300-C enters a turbine and expanded to bar and quality 0.974 dryness, compute the loss in availability for the adiabatic process if the atmospheric temperature is 270uC
2. Explain the terms, Degree of super heat, degree of sub-cooling
3. Draw P-T (Pressure-Temperature) diagram of a pure substance.
4. Explain the different components in steam power plant working on Rankine cycle.
5. Draw and explain the standard Rankine cycle on P-V and T-S coordinates.
6. Describe the different operations of Rankine cycle.

7. Explain various operation of a Carnot cycle.

UNIT - V GAS MIXTURES AND THERMODYMAMICS RELATION

2 - Mark

1. State the principle of corresponding states.
2. How does the Vander Waal's equation differ from the ideal gas equation of state?
3. What is meant by partial volume?
4. Define the Boyle temperature. How is it Computed?
5. What are virial coefficients? When do they become zero?
6. Show that for an ideal gas Cp - Cv = R.
7. List the effect of compressibility factor.
8. Define isothermal Compressibility.
9. Summarize the examples of real gases.
10. Recite thermodynamic gradients.
11. What is known as equation of state and when it can be used for engineering calculations?
12. What is meant by semi-perfect or permanent gases?
13. What are Maxwell relations?

13 - Mark

1. State the assumptions made in deriving ideal gas equation using the kinetic theory of gases.
2. One Kg of ideal gas is heated from 18oC to 93-C. Taking R=269 N-m / Kg -K and y=1.2 for the gas. Calculate the change in internal energy.
3. Using Clausius-Clapeyron equation, estimate the enthalpy of vaporization at 200℃ Vg=0.1274 m3/Kg: Vf= 0.01157 m3/Kg; dp/dt = 32KPa/K.
4. Draw and explain a generalized Compressibility Chart and its significance
5. Determine the molecular volume of any perfect gas at 600 N/m2 and 30℃. Universal gas constant may be taken as 8314 J/Kg mole- K.
6. Distinguish between the characteristic gas constant and the universal gas constant.
7. Difference between an ideal and a perfect gas.

8. State Boyle's and charle's laws and derive an equation of the state for a perfect gas.
9. Determine the molecular volume of any perfect gas at 600 Nim2 and 300C, Universal gas constant may be taken as 8314 kJ/kq mole-k.