SCIM GOVERNMENT COLLEGE TANUKU W.G.Dt-534211

Question Bank for Semester-III (Heat and Thermodynamics)

UNIT-I KINETIC THEORY OF GASES

1. Describe Maxwell's speed distribution law and explain experimental verification? (10M)
2. What is transport phenomena and derive an expression for the viscosity of gases based on kinetic theory of gases? (10M)
3. Derive an expression for the thermal conductivity of gases based on kinetic theory of gases and also obtain the relation between viscosity and thermal conductivity. (10M)
4. Explain the concept of diffusion of gases? (5M)
5. Derive an expression for the mean free path? (5M)
6. Explain the concept of degrees of freedom? (5M)
7. Explain the principle of equipartition of energy? (5M)

UNIT-II THERMODYNAMICS

1. Describe Carnot's heat engine and derive an expression for its efficiency using Carnot's cycle? (10M)
2. Explain the reversible and irreversible processes with examples. State and prove Carnot's theorem? (10M)
3. Define entropy and give its physical significance. Explain the change of entropy in reversible and irreversible processes? (10M)
4. What is T-S diagram? Derive an expression for the efficiency of Carnot's heat engine and what are the uses of T-S diagram. (5M)
5. State and explain the second law of thermodynamics? (5M)
6. State and Prove Carnot's theorem? (5M)
7. State and Explain the Kelvin scale of temperature or absolute scale of temperature? (5M)
8. Explain the change of entropy when ice changes into steam? (5M)
9. Explain the principle of refrigeration? (5M)
10. Explain the concept of entropy of universe? (5M)
11. Explain the concept of entropy and disorder? (5M)

UNIT-III THERMODYNAMIC POTENTIALS AND MAXWELL'S EQUATIONS

1. What are thermodynamic potentials and derive Maxwell's thermodynamic relations using them(10M)
2. What is Joule-Kelvin Effect? Derive an expression for Joule-Kelvin coefficient in case of ideal gas? (10M)
3. What is specific heat and obtain the relations between them? (10M)
4. Show that Cp- Cv =R? (5M)
5. Show that Cp/Cv=Y? (5M)
6. Derive the Clausius –Clapeyron latent heat equation using Maxwell's equations? (5M)

UNIT-IV LOW TEMPERATURE PHYSICS

1. What is the principle of adiabatic demagnetization and how to produce low temperatures using this method? (10M)
2. What is Joule-Thomson effect and derive an expression for Joule –Thomson cooling? (10M)
3. What are the methods for producing very low temperatures? and explain the porous plug experiment? (10M)
4. What are the distinctions between Joule expansion, adiabatic expansion and Joule-Thomson expansion? (5M)
5. How to produce liquefaction of air by Linde's method? (5M)
6. What are the applications of substances at low temperatures? (5M)

UNIT-V QUANTUM THEORY OF RADIATION

1. Derive Planck's radiation law and deduce Wien's law from it? (10M)
2. Derive Planck's radiation law and deduce Rayleigh –Jeans law from it? (10M)
3. Define Solar Constant. How to determine solar constant by using Angstrom's Pyrheliometer? (10M)
4. What is black body and explain its spectral energy distribution? (5M)
5. What are thermal radiation laws? (5M)
6. Derive Planck's radiation law? (5M)
7. How to estimate the surface temperature of sun? (5M)