

Question Bank for F. Y. B. Sc.

Semester- II

Subject : Physics

Paper Code: PHY 1201

Title of Paper : Heat and Thermodynamics

Chapter -1 : Equation of State

Short answer type questions.

1. What is equation of state:
2. Write equation of state for perfect gas.
3. Define critical temperature of gas.
4. Define critical pressure of gas.
5. what is reduced pressure?
6. What is reduced temperature?
7. What is reduced volume?
8. State law of corresponding states.
9. What are virial coefficients?
10. Write Van der Waals equation.
11. What are the drawbacks of Van der Waal's equation?
12. Explain principle of Joule Thomson experiment.
13. Write reduced equation of state for a gas.

Long answer type questions:

1. Write a note on real gases.
2. Write difference between real gas and ideal gas.
3. Describe Andrew's experiment of carbon dioxide. Discuss the results obtained by him.

4. Describe Amagat's experiment.
5. Derive Van der Waal's equation of state for real gas.
6. Define critical constants of the gas. Obtain critical constants in terms of Van der waals constants.
7. Derive reduced equation of state from Van der Waal's equation. State law of corresponding state.
8. With proper diagram discuss theory of Joule Thomson experiment.
9. With proper diagram explain Joule-Thomson experiment.

Chapter –II : Concepts of Thermodynamics.

Short answer type questions:

1. Explain thermodynamic system.
2. What are thermodynamic variables?
3. Define open system.
4. Define closed system.
5. define isolated system.
6. What is thermal equilibrium?
7. State zeroth law of thermodynamics.
8. What are the conditions for thermodynamic equilibrium?
9. what is indicator diagram?
10. what is the importance of indicator diagram?
11. What is internal energy of the system?
12. What is isothermal change?
13. What is an adiabatic change?
14. Show that change in internal energy of a non isolated system is always zero.
15. State first law of thermodynamics.

16. Give the physical significance of first law of thermodynamics.
17. Write few examples of isothermal change.
18. Write few examples of adiabatic change.
19. Draw P-V diagram representing isothermal and adiabatic change.
20. Why does temperature of a gas decrease when it is allowed to expand adiabatically?
21. A gas does work during adiabatic change. What is the source of energy to produce mechanical work?
22. Why does hot air become cooler when it goes to the top of the mountain.
23. What is meant by a reversible change?
24. Explain the concept of irreversible change.
25. Explain the necessary conditions in isothermal and adiabatic change.

Long answer type questions:

1. State and explain zeroth law of thermodynamics. What is its importance? On the basis of this law explain the concept of temperature.
2. What is meant by thermodynamic equilibrium? What are the basic requirements that are to be strictly followed?
3. Show that work is a path dependent function with the help of indicator diagram.
4. State first law of thermodynamics. Give its physical significance. What are the limitations of first law?
5. State and explain first law of thermodynamics. Discuss its use in isothermal and adiabatic processes.
6. Derive an expression for work done during an isothermal process.
7. Derive an expression for work done during an adiabatic process.
8. Show that first law of thermodynamics is a particular form of general law of conservation of energy.
9. Show that the work done during an adiabatic process depends only upon initial and final temperatures.

10. Distinguish between isothermal and adiabatic changes. Show that for an adiabatic change in a perfect gas, $PV^\gamma = \text{constant}$.
11. Prove that slope of a adiabatic curve through point in PV diagram is γ times the slope of the isothermal curve through the same point.
12. Prove that adiabatic elasticity of a gas is γ times the isothermal elasticity.
13. Derive for a perfect gas the expression connecting pressure and temperature during an adiabatic change.
14. Derive for a perfect gas the expression connecting volume and temperature during an adiabatic change.
15. Explain the term internal energy. How is it related to the heat supplied and work done in thermodynamical change?
16. Distinguish between reversible and irreversible processes.

Chapter –III : Applied Thermodynamic

Short answer type questions:

1. State joules law of heating
2. What is heat and work ?
3. What is carnot's cycle ?
4. State carnots theorem
5. What is concept of Entropy?
6. Define Enthalpy
7. What is free energy
8. Write T-dS equations
9. What is Latent heat ?

Long answer type questions:

1. Describe a carnots engine and show that its efficiency is a function of working temperature only
2. State and prove Carnots theorem
3. State and explain second law of thermodynamics
4. Explain the concept of entropy
5. Show that entropy of a system increases during an irreversible process
6. State and explain the principle of increase of entropy

Chapter –IV : Heat Transfer Mechanism

Short answer type questions:

1. What is heat engine ?
2. Give principle of heat engine
3. What are types of heat engine ?
4. What is meant by external combustion engine ?
5. What is meant by internal combustion engine ?
6. State principle of refrigeration
7. What is meant by coefficient of performance ?
8. State the principle of air conditioning

Long answer type questions:

1. Write a note on heat engine
2. Explain Otto cycle with an indicator diagram
3. Obtain an expression for the efficiency of the Otto engine in terms of Compression ratio.
4. Explain diesel cycle with an indicator diagram
5. Obtain an expression for the efficiency of the Diesel engine in terms of Compression ratio.
6. Compare Diesel and Otto engine
7. What is principle of refrigeration ?
8. Explain the coefficient of performance of the refrigerator
9. Describe vapour – Compression refrigerator

Chapter –V : Thermometry

1. What are essential requirements of good thermometer ?
 2. Give different types of thermometer
 3. Describe liquid thermometer
 4. State advantages of mercury thermometer
 5. Explain bimetallic thermometer
 6. Explain construction and working of liquid filled thermometer
 7. Explain construction and working of gas filled thermometer
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