



## QUESTION 2

a. Explain the following major types of intermolecular forces that operate between molecules;

6 marks

i. Ion-induced dipole forces

ii. Ion-dipole forces

iii. Van der Waals forces

b. Explain how the London force or induced dipole-induced dipole interaction operates in atom or molecules with non-zero dipole moments. 4 marks

c. i. State the third law of thermodynamics (2 Marks)

iii. What is main application of the third law of thermodynamics? (1 Mark)

iv. Which one is stronger between intermolecular forces and intra molecular forces? Why?

2 marks

## QUESTION 3

a. i. State the Dalton's law of partial pressure (2 Marks)

ii. What is the mathematical representation of Dalton's law? (2 Marks)

b. Explain the terms of partial molar quantity with examples. 6 marks

c. Explain the following;

i. cyclic process 2 ½ marks

ii. phase 2 ½ marks

## QUESTION 4

a. i. What is Van der Waal equation of state? 2 marks

ii. Give reasons why the London force is said to be universal among all intermolecular forces  
1 ½ mark

iii. What is the mathematical expression of Van der Waal equation? 1 ½ marks

iv. Describe the relationship between the ideal gas equation and the Van der Waals equation of state Solution 3 marks

b. i. What is a state function? 2 marks

ii. What is a thermodynamic process? **2 marks**

c. Describe the following;

i. Heat **1 ½ marks**

ii. Work **1 ½ marks**

### **QUESTION 5**

a. Mention and explain the major types of intermolecular forces **6 marks**

b. Mention and describe the types of processes involved in temperature-entropy conjugate pair that involve transfer of thermal energy as the result of heating. **6 marks**

i. An isothermal process **2 marks**

ii. An adiabatic process **2 marks**

iii. An isentropic process **2 marks**

c. Give three limitations of the third law of thermodynamics. **3 marks**