Q.27 What is a Carnot cycle? List the four stages of the Carnot cycle.

Q.28 Differentiate between single and multiple reactions with one example of each.

Q.29 What is a second-order reaction? Give an example involving two reactants.

Q.30 State the formula for the efficiency of a Carnot engine. Explain what each term represents.

Q.31 What is activation energy? Describe its role in a chemical reaction.

Q.32 What are the main differences between a batch reactor and a continuous reactor?

Q.33 Draw a simple graph comparing plus flow, mixed flow and batch reactor.

Q.34 State and explain Dalton's law and Henry's law.

Q.35 Discuss any one of the following

(i) Vander Waal's Equiation (ii) Amagat's Law

Section-D

Note: Long answer questions. Attempt any two question out of three Questions. (2x10=20)

Q.36 Explain the basic construction and working principle of a Plug Flow Reactor with its neat sketch.

Q.37 Calculate the efficiency of a Carnot engine operating between a hot reservoir at 500 K and a cold reservoir at 300K.

Q.38 Define and differentiate between a closed system, an open system, and an isolated system. Provide one practical example for each type of system.

Roll No. .....

4th Sem.

Branch: CHEMICAL ENGINEERING (P&P)

Sub : CTRE

Time : 3 Hrs. M.M. : 100

SECTION-A

Note: Multiple type Questions. All Questions are compulsory. (10x1=10)

Q.1 Which of the following is an extensive property?

a) Temperature b) Pressure

c) Volume d) Density

Q.2 Which of the following is NOT a state function?

a) Internal Energy b) Enthalpy

c) Heat d) Entropy

Q.3 The zeroth law of thermodynamics is the basis for the measurement of:

a) Temperature b) Pressure

c) Volume d) Energy

Q.4 What is the unit of entropy?

a) Joules b) Joules per Kelvin

c) Joules per mole d) Kelvin

Q.5 Henry's Law is used to describe:

a) The pressure of an ideal gas

b) The solubility of gases in liquids

c) The behavior of real gases

d) The phase diagram of a substance

Q.6 The equilibrium constant of a reaction is affected by:

a) Temperature only
b) Pressure only
c) Both temperature & pressure
d) Neither temperature nor pressure

Q.7 Activation energy of a reaction is :

a) The minimum energy required for a reaction to occur
b) The energy released during a reaction
c) The total energy of reactants
d) The energy difference between reactants and products

Q.8 A batch reactor is characterized by :

a) Continuous input and output of reactants and products
b) No flow in or out during the reaction
c) Perfect mixing of reactants and products
d) Steady-state operation

Q.9 Molecularity of a reaction refers to :

a) The order of the reaction
b) The number of molecules involved in the reaction step
c) The rate of the reaction
d) The activation energy of the reaction

Q.10 What defines an elementary reaction?

a) A reaction involving multiple steps
b) A reaction that occurs in a single step
c) A reaction that reaches equilibrium
d) A reaction that does not involve any intermediates

Section-B

Note: Objective type questions. All questions are compulsory. (10x1=10)

Q.11 Expand MFR.

Q.12 Define entropy.

Q.13 What is isobaric process.

Q.14 Define molecularity of reaction.

Q.15 Give one example of open system.

Q.16 Write ideal gas equation.

Q.17 What is state function.

Q.18 What is equilibrium.

Q.19 Write raoult's law.

Q.20 Write any two scales of temperature measurement.

Section-C

Note: Short answer type Question. Attempt any twelve questions out of fifteen Questions. (12x5=60)

Q.21 Explain the difference between intensive and extensive properties. Provide one examples of each.

Q.22 State the Zeroth Law of Thermodynamics and explain its significance in temperature measurement.

Q.23 Define a thermodynamic system and classify it into open, closed, and isolated systems with examples.

Q.24 Explain the First Law of Thermodynamics for a closed system. With one example.

Q25 Derive the ideal gas law from the basic principles and state its assumptions.

Q.26 Calculate the value of universal gas constant (r) from ideal gas law in m^3 atm/k. mol. K.