Time: 2.30 Hours **Marks: 75**

1. **Attempt all questions.**
2. **All questions carry equal marks.**
3. **Draw neat labelled diagram wherever necessary.**
4. **Use of log table & non programmable calculator is allowed.**
5. **For Q.2,Q.3 & Q.4 attempt A&B OR C&D**

Q. 1 **Do as directed. (any fifteen)** 15M

Define the following terms:

1 System

2 Adiabatic wall

3 Exothermic reaction

4 Unimolecular reaction

5 Chemical kinetics

6 Redox reaction

7 Reduction

Fill in the blanks:

8 Enthalpy of the system is represented by the symbol --------.

9 If work is done by the system, W is ---------. (Positive/ Negative)

10 S.I. unit of internal energy is ----------.

11 In Second order reaction, the rate of the reaction is proportional to the product of ---------- concentration.

12 The minus sign indicating that concentration of the reactant ---------- with time.

Name the following :

13 A process in which volume of the system remains constant.

State True or False:

14 Decomposition of hydrogen peroxide is an example of first order reaction.

15 The half time require to complete reaction is same for first & second order reaction.

16 An element that loses an electron to another chemical species in a redox chemical reaction is known as reductant.

Balance the following reaction:

17 $Fe_3O_4 + C \rightarrow Fe + CO$

18 $S + HNO_3 \rightarrow SO_2 + NO_2 + H_2O$

Give one word for the following:

19 A chemical reaction in which reactant involves more than one phase.

20 A molecule that gain electrons.

Q.2 A i)	Classify the thermodynamic systems based on the nature of the boundary.	4M
Q.2.A ii)	Calculate q, w and ΔE, when one mole of monoatomic gas expands adiabatically against constant external pressure of 1 atm. from volume of 2.0 dm^3 to 8.0 dm^3 at 300K.	4M
Q.2 B	Explain the term 'Entropy' and enlist its characteristics.	7M
	OR	
Q.2 C	Discuss the four steps of Carnot Cycle.	8M
Q.2 D	State the objective and limitations of thermodynamics	7M
Q.3 A	Derive integrated rate equation for first order reaction.	8M
Q.3 B	Discuss the kinetic characteristics of second order reaction.	7M
	OR	
Q.3 C	Show that for first order reaction time to complete first order reaction is independent of initial concentration.	8M
Q.3 D	A second order reaction with equal initial concentration is 66.67 % complete in 2 hours. Calculate specific reaction rate.	7M
Q.4 A	Justify oxidation and reduction reaction proceed side by side.	8M
Q.4 B	Write the balanced chemical equation of following reaction. $Cr_2O_7^{-2} + Fe^{+2}(aq.) \longrightarrow Cr^{+3}(aq.) + Fe^{+3}(aq.)$	7M
	OR	
Q.4 C	Explain the ion electron method of balancing equations.	8M
Q.4 D	What are addition reactions? Explain using suitable examples.	7M
Q.5	**Write short note on (any three)**	15M
a	Zeroth law of thermodynamics.	
b	Graphical method for determining order of reaction.	
c	Order of reaction.	
d	Oxidizing agents.	
e	Oxidation number of C in CO_2 and S in H_2S.	
