

QP CODE: D4BCH2403	(Pages: 2)	Reg. No :
		Name :
FOURTH SEMESTER FYUGP EXAMINATION, APRIL 2026		
Discipline Specific Core (DSC) Courses - Major		
CHE4CJ206 : PHYSICAL CHEMISTRY II: CHEMICAL THERMODYNAMICS, KINETICS, CATALYSIS AND PHOTOCHEMISTRY		
(Credits: 4)		
Time: 2 Hours	Maximum Marks: 70	
Section A		
Answer the following questions. Each carries 3 marks (Ceiling: 24 marks)		
1. Define open system. Give two examples.	BL1	CO1
2. What are macroscopic properties? Give examples.	BL1	CO1
3. Distinguish between the terms bond dissociation enthalpy and mean bond enthalpy.	BL1	CO1, CO2
4. State the limitations of the first law of thermodynamics.	BL1	CO1
5. State the Clausius inequality and mention its significance.	BL1	CO1
6. Write the criteria for spontaneity and equilibrium in terms of Gibbs free energy.	BL1	CO1
7. What is meant by a catalytic poison ? Give one example for catalytic poisoning.	BL2	CO4
8. Draw the energy profile diagram for an endothermic reaction according to ACT.	BL2	CO4
9. What is meant by a chain reaction in photochemistry?	BL1	
10. Give an example for a photosensitized reaction.	BL2	
Section B		
Answer the following questions. Each carries 6 marks (Ceiling: 36 Marks)		
11. The standard enthalpies of formation of carbon dioxide(g) and water(l) are -393.5 and -285.8 kJ/mol respectively. The standard enthalpy of combustion of ethane is -1560.0 kJ/mol. Calculate the standard enthalpy of formation of ethane.	BL3	CO2 (PTO)

12.	Define Gibb's free energy and explain its physical significance.	BL1	CO1
13.	Explain the influence of temperature on reaction rate on the basis of collision theory.	BL1	CO4
14.	Discuss the third law of thermodynamics. Explain how it is useful in determining the absolute entropies of solid, liquid and gaseous systems?	BL2	CO1
15.	Derive a relationship connecting absorbance and transmittance.	BL2	
16.	Explain the following concepts: (i) Steady state (ii) Equilibrium state (iii) Thermodynamic equilibrium	BL1	CO1
17.	Derive an expression for the chemical potential of an ideal gas and in a mixture of ideal gases.	BL2	CO1
18.	Calculate the rate of disappearance of oxygen in the gas phase reaction: $4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}$, if the rate of appearance of NO is $3.6 \times 10^{-3} \text{ mol dm}^{-3}\text{s}^{-1}$.	BL2	CO3

Section C

Answer any one question. Each carries 10 marks (1 x 10 = 10 Marks)

19.	Derive the integrated rate equation for second order reaction when the two reactants have different initial concentrations. Explain the characteristics of second order reaction.	BL2	CO4
20.	Explain the Joule-Thomson experiment. Describe the application and methodologies employed to achieve it.	BL2	CO1

CO : Course Outcome

BL : Bloom's Taxonomy Levels (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)