

Model Question Paper-1 with effect from 2019-20 (CBCS Scheme)

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Fourth Semester B.E. Degree Examination Biochemical Thermodynamics

TIME: 03 Hours

Max. Marks: 100

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

Module -1			*Bloom's Taxonomy Level	Marks
Q.01	a	Explain the meaning of thermodynamics. Define its laws	L3	6
	b	State and prove the Clausius inequality	L3	4
	c	Define C_p and C_v . Why is C_p is always greater than C_v ?	L2	10
OR				
Q.02	a	State the different statements of second law of thermodynamics	L3	6
	b	Explain the concept of entropy	L3	6
	c	Elucidate the following terms. i) Heat reservoir ii) Extensive property iii) Phase rule iv) State & path function	L2	8
Module-2				
Q. 03	a	Derive the expression for workdone for adiabatic process from the fundamentals.	L3	10
	b	Explain van der waals equation and Redlich-Kwong equation	L1	10
OR				
Q.04	a	Calculate the heat of formation of methane gas from the following heat of combustion data: a) $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O} \quad \Delta H_{298}^0 = -890.94\text{KJ}$ b) $\text{C} + \text{O}_2 \rightarrow \text{CO}_2 \Delta H_{298}^0 = -393.78\text{KJ}$ c) $\text{H}_2 + 1/2\text{O}_2 \rightarrow \text{H}_2\text{O} \Delta H_{298}^0 = -286.03\text{KJ}$	L2	10
	b	Describe the effect of temperature on std. heat of reaction	L2	10
Module-3				
Q. 05	a	Derive Maxwell's equations of thermodynamics from the fundamentals	L3	10
	b	Explain any two methods for estimating the fugacity of a pure gas	L2	10
OR				
Q. 06	a	Obtain the entropy heat capacity relationship. Prove that $dS = C_v/T dT - (\partial V / \partial T)_P / (\partial V / \partial P)_T dV$	L3	10
	b	Define Activity. Discuss the effect of temperature on Activity.	L2	10
Module-4				
Q. 07	a	Explain how the partial molar properties can be estimated	L1	10
	b	Describe the effect of pressure on activity co-efficient	L2	10
OR				
Q. 08	a	What are the criteria for phase equilibrium	L2	10
	b	Describe fugacity in solution	L2	10
Module-5				
Q. 09	a	A gas mixture containing 2 moles nitrogen, 7 moles hydrogen & 1 mole ammonia initially, is undergoing the following reaction: $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$ Develop expressions for the mole fraction of the species in terms of the extent of reaction.	L3	10

	b	Write a short note on: i)Phase rule for reacting system ii) liquid phase reaction	L2	10
OR				
Q. 10	a	What are the factors affecting equilibrium conversion	L2	10
	b	Discuss heterogeneous reaction equilibria for i) reaction in solutions ii) equilibria involving pure solids & liquids	L2	10

*Bloom's Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to be attained by every bit of questions.