

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Mid Semester Examination – September 2019

Semester: V

Course: B. Tech in chemical engineering

Subject Name: chemical engineering thermodynamics-II Subject Code: BTCHC 501

Max Marks: 20

Date:-23/09/2019

Duration:- 1 Hr.

Instructions to the Students:

1. Question 1 is compulsory and carries 6 marks
2. Figures to right indicate marks
3. If any data is missing, you may assume it and mention it in your answer sheet
4. Usual symbols apply

		(Level/CO)	Marks
Q.1			6
Pick the correct alternative for the following question			
1.Necessary and sufficient condition for equilibrium between two phases is		Understanding	
a. Concentration of each component should be same in two phases			
b. The pressure should be same in two phases			
c. The temperature should be same in two phases			
d. The chemical potential of each component should be same in two phases		Understanding	
2. at constant temperature and pressure, the decrease in free energy is a measure of			
a. the maximum work			
b. the maximum net work			
c. the unavailable energy		Understanding	
d. the loss in capacity to do work			
3. Chemical potential is			
a. an extensive property			
b. an intensive property			
c. a path property			
d. a reference property		Understanding	
4. which one of the following is incorrect with respect to partial molar properties?			
a. they are intensive properties			
b. they are always positive			
c. they represent the contribution of individual component to the solution properties		Remembering	
d. they vary with composition of solution			
5. the value of activity coefficient for an ideal solution is			
a. one			
b. zero			
c. three			
d. four		Understanding	
6. the equation $dU = T dS - P dV$ is applicable to infinitesimal changes occurring in			
a. an open system of constant composition			
b. a closed system of constant composition			
c. an open system with change in composition			
d. a closed system with change in composition			
Q.2			3 X 2
Solve Any Two of the following.			
(A)	Derive Gibbs Duhem's equation from fundamentals.	Remembering	
(B)	What is modified Rault's law? How we can use it in vapor liquid calculation?	Remembering	

(C)	n-heptane and toluene form ideal solution at 373 K, their vapour pressure are 106.74 kPa and 101.3 kPa respectively. Determine the composition of the liquid and vapour in equilibrium at 373 K and 101.3 kPa.	Analyzing	
Q. 3	Solve Any One of the following.		8
(A)	State the Raoult's law. Show that it is a simplified form of Lewis-Randall rule.	Understanding	
(B)	Will it be possible to prepare 0.1 m ³ of alcohol-water solution by mixing 0.03 m ³ alcohol with 0.07 m ³ pure water? If not possible, what volume should have been mixed in order to prepare a mixture of same strength and of required volume? Density of ethanol and water are 789 and 997 respectively. Partial molar volume of ethanol and water are 53.6×10^{-3} m ³ /mol and 18×10^{-3} m ³ /mol respectively at the desired composition	Analyzing	
	*** End ***		