



Continuous Assessment Test -1 (CAT-1) Fall Semester (2022-23)

Course Name & code: Principles of Chemical Engineering & BBIT201L

Programme Name & Branch: B.Tech. Biotechnology

Class Number: VL2022230101386; VL2022230101385

Slot: F2+TF2

Faculty Name: K. Ramanathan, V. Shanthi

Exam Duration: 90min Maximum Marks: 50

General instruction(s):

Write and explain the assumptions whenever made

Any other specific instruction: - NA -

Q. No.	Question	Max Marks	CO	BL
✓ 1.	a. Convert 1200 mmHg into atm (5 marks) b. Prove that $\text{kcal/h} = 1.163 (\text{N} \cdot \text{m})/\text{s}$. (5 marks)	10	1	1
2.	The analysis of the gas sample is given below (volume basis): $\text{CH}_4 = 66\%$, $\text{CO}_2 = 30\%$, $\text{NH}_3 = 4\%$. Calculate: (i) The average molecular weight of the gas (ii) The density (kg/m^3) of the gas at 2 atm and 303 K.	10	1	2
✓ 3.	Calculate the volume occupied by 1 gmol of water vapour at 900 °C and 100 atm. (i) By perfect gas law (ii) By using Vander Waals equations. The Vander Waals constant for water are $a = 5.404 (\text{l}^2 \cdot \text{atm})/(\text{gmol})^2$; $b = 0.3049 \text{ l/gmol}$. Take $R = 0.082 \text{ l} \cdot \text{atm/gmol K}$	10	1	3
4.	In a mixing process, two salt solutions having the following compositions are mixed: 25 kg of 20% solution and 10 kg of 30% solution. Calculate the amount and the concentration of the final salt solution. ??	10	2	3
✓ 5.	A single effect evaporator is fed with 4000 kg/h of weak liquor containing 17% caustic by weight and is concentrated to get thick liquor containing 40% by weight caustic (NaOH). Calculate: (i) Amount (in kg) of water evaporated and (ii) Amount (in kg) of thick liquor obtained	10	2	3