



GIET UNIVERSITY, GUNUPUR – 765022
B. Tech (Fifth Semester Regular) Examinations, December – 2023
21BBTPC35004 – Bioreactor Design and Analysis
 (Biotechnology)

Time: 3 hrs

Maximum: 70 Marks

(The figures in the right hand margin indicate marks)

PART – A**(2 x 5 = 10 Marks)**Q.1. Answer **ALL** questions

	CO #	Blooms Level
a. Describe the relationship between temperature and reaction rates using the Arrhenius equation.	CO1	K2
b. How can you express a reaction rate in terms of the rate law equation?	CO1	K1
c. Differentiate between ideal and non-ideal reactors, and explain their significance in bioprocesses.	CO2	K4
d. Why is mass transfer crucial in bioreactors, especially for oxygen and nutrient transport?	CO3	K1
e. Explain why oxygen transfer is a critical consideration in bioreactor design for aerobic processes.	CO4	K1

PART – B**(15 x 4 = 60 Marks)**Answer **ALL** questions

	Marks	CO #	Blooms Level
2. a. Discuss the role of catalysts in chemical reactions. Provide examples of catalyzed reactions and explain how catalysts affect reaction rates.	15	CO1	K2
(OR)			
b. Compare and contrast zero-order and first-order reactions, providing examples of each. How do these reaction orders affect the design of reactors in bioprocesses.	15	CO1	K2
3.a. Compare and contrast batch and continuous bioreactors, highlighting their advantages and disadvantages. Provide examples of bioprocesses where each type is preferred.	15	CO2	K2
(OR)			
b. Explain the concept of conversion in chemical reactions and its calculation. How does conversion relate to reactor performance in bioprocesses?	15	CO2	K2
4.a. Explain the significance of oxygen transfer in bioreactors for microbial growth. Discuss the factors affecting oxygen transfer rates and their implications in bioprocesses.	15	CO3	K2
(OR)			
b. Define and discuss the importance of three-phase fluidized bed reactors in	15	CO3	K2

bioprocesses. Provide examples of their applications and advantages.

- 5.a. Explain the concept of bioprocess control systems and their role in automation. How do computer-coupled bioreactors contribute to efficient bioprocess operation and product formation? 15 CO4 K2

(OR)

- b. Describe the role of mechanical fittings in bioreactors, including vessel design, piping, and valves. Why are these components crucial for efficient bioprocess operation? 15 CO4 K2

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