

**VIT[®]****Vellore Institute of Technology**(Deemed to be University under section 3 of U.M. Act 1956)

SCHOOL OF BIO SCIENCES AND TECHNOLOGY
CONTINUOUS ASSESSMENT TEST -I
FALL SEMESTER 2025-2026

Programme Name & Branch	: M.Sc (Integ) Biotechnology	
Course Code	: TBIT302L	
Course Name	: Bioprocess Engineering	
Slot	: C1+TC1	
Faculty Name(s)	: Dr M Ramesh Pathy/ Dr S Venkat Kumar	
Class Number(s)	: VL2025260101029 / VL2025260101026	
Date of Examination	:	
Exam Duration	: 90 minutes	Maximum Marks: 50

Q. No	Question	Marks	Course Outcome (CO)	Bloom's Taxonomy (BL)
1.	With a neat diagram, explain the continuous stirred tank reactor with its merits and demerits.	10	CO1	BL1
2.	Describe the airlift bioreactor with a neat diagram and also highlight its applications, advantages and disadvantageous.	10	CO1	BL1
3.	Explain on the batch fermentation process and draw the concentration profile on the batch process.	10	CO1	BL1
4.	Medium at a flow rate of $2 \text{ m}^3/\text{h}$ is to be sterilized by heat exchange with steam in a continuous sterilizer. The liquid contains bacterial spores at concentration of $5 \times 10^{12} \text{ m}^{-3}$; the activation energy and Arrhenius constant for thermal destruction of these contaminants are 283 kJ/gmol and $5.7 \times 10^{39} \text{ h}^{-1}$ respectively. A contamination risk of one organism surviving every 60 days operation is considered acceptable. The sterilizer pipe has a inner diameter of 0.1 m ; the length of the holding section is 24 m . The density of the medium is 1000 kg/m^3 and the viscosity is 3.6 kg/ (m h) . Find (a) ratio of N_2/N_1 (b) Peclet number (c) specific death constant (Kd) (d) What sterilizing temperature is required. Data: Value for $Dz/uD=0.65$, Damkohler number (Da) is 42 from graph.	10	CO2	BL3
5.	Explain on the thermal death kinetics and using a model graph, demonstrate how to find the activation energy and Arrhenius constant.	10	CO2	BL2