



School of Bio Sciences and Technology

Winter Semester 2023- 2024

Continuous Assessment Test – II

Programme Name & Branch: B. Tech (Biotechnology)

Course Name & code: Industrial Biotechnology (BBIT 308L)

Class Number (s): VL2023240502419, VL2023240502421, VL2023240502422

Slot: C1+TC1

Faculty Name (s): Dr. John Thomas, Dr. Dhanasingh Immanuel, Dr. Rashmi Kataria

Exam Duration: 90 Min.

Maximum Marks: 50

General instruction(s):

- (a) Attempt all questions.
(b) Draw diagrams and flow sheet where every it is required.

Q.No.	Question	Max Marks																																																																																																																																																																									
1.	You are a researcher in R&D laboratory of lactic acid producing industry. You are given a wild lactobacillus strain. It can produce 5g/l of lactic acid. “You need perform genetic modification” in the strain to obtain 5 times more production of lactic acid. Explain the “possible strategies and methods that can be applied”. Support your answer with diagram and flowsheets.	10																																																																																																																																																																									
2.	In an experimental Plackett-Burman (BP) experimental design approach was used and conducted, 12 experiments with 11 variables. The last four (H, I, J, K) were used as dummy variables The responses were recorded after performance of experiments in the lab. <table><tr><th>Run</th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>F</th><th>G</th><th>H</th><th>I</th><th>J</th><th>K</th><th>Response</th></tr><tr><td>1</td><td>H</td><td>H</td><td>H</td><td>H</td><td>H</td><td>H</td><td>H</td><td>H</td><td>H</td><td>H</td><td>H</td><td>50.94</td></tr><tr><td>2</td><td>L</td><td>H</td><td>L</td><td>H</td><td>H</td><td>H</td><td>L</td><td>L</td><td>L</td><td>H</td><td>L</td><td>52.31</td></tr><tr><td>3</td><td>L</td><td>L</td><td>H</td><td>L</td><td>H</td><td>H</td><td>H</td><td>L</td><td>L</td><td>L</td><td>H</td><td>50.14</td></tr><tr><td>4</td><td>H</td><td>L</td><td>L</td><td>H</td><td>L</td><td>H</td><td>H</td><td>H</td><td>L</td><td>L</td><td>L</td><td>45.84</td></tr><tr><td>5</td><td>L</td><td>H</td><td>L</td><td>L</td><td>H</td><td>L</td><td>H</td><td>H</td><td>H</td><td>L</td><td>L</td><td>45.35</td></tr><tr><td>6</td><td>L</td><td>L</td><td>H</td><td>L</td><td>L</td><td>H</td><td>L</td><td>H</td><td>H</td><td>H</td><td>L</td><td>48.36</td></tr><tr><td>7</td><td>L</td><td>L</td><td>L</td><td>H</td><td>L</td><td>L</td><td>H</td><td>L</td><td>H</td><td>H</td><td>H</td><td>40.65</td></tr><tr><td>8</td><td>H</td><td>L</td><td>L</td><td>L</td><td>H</td><td>L</td><td>L</td><td>H</td><td>L</td><td>H</td><td>H</td><td>49.35</td></tr><tr><td>9</td><td>H</td><td>H</td><td>L</td><td>L</td><td>L</td><td>H</td><td>L</td><td>L</td><td>H</td><td>L</td><td>H</td><td>48.01</td></tr><tr><td>10</td><td>H</td><td>H</td><td>H</td><td>L</td><td>L</td><td>L</td><td>H</td><td>L</td><td>L</td><td>H</td><td>L</td><td>40.86</td></tr><tr><td>11</td><td>L</td><td>H</td><td>H</td><td>H</td><td>L</td><td>L</td><td>L</td><td>H</td><td>L</td><td>L</td><td>H</td><td>44.75</td></tr><tr><td>12</td><td>H</td><td>L</td><td>H</td><td>H</td><td>H</td><td>L</td><td>L</td><td>L</td><td>H</td><td>L</td><td>L</td><td>50.32</td></tr></table> From the above data, determine following: I. Difference II. Factor Mean-square III. Standard error IV. Effect/F-test	Run	A	B	C	D	E	F	G	H	I	J	K	Response	1	H	H	H	H	H	H	H	H	H	H	H	50.94	2	L	H	L	H	H	H	L	L	L	H	L	52.31	3	L	L	H	L	H	H	H	L	L	L	H	50.14	4	H	L	L	H	L	H	H	H	L	L	L	45.84	5	L	H	L	L	H	L	H	H	H	L	L	45.35	6	L	L	H	L	L	H	L	H	H	H	L	48.36	7	L	L	L	H	L	L	H	L	H	H	H	40.65	8	H	L	L	L	H	L	L	H	L	H	H	49.35	9	H	H	L	L	L	H	L	L	H	L	H	48.01	10	H	H	H	L	L	L	H	L	L	H	L	40.86	11	L	H	H	H	L	L	L	H	L	L	H	44.75	12	H	L	H	H	H	L	L	L	H	L	L	50.32	10
Run	A	B	C	D	E	F	G	H	I	J	K	Response																																																																																																																																																															
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3.

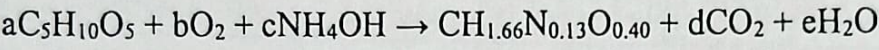
- a) In a laboratory experiment you are provided with two types of gram-positive bacterial cells, *Bac 1* and *Bac 2*. Both types of these bacterial cells are without cell wall. Identify the type of these cells. Define the term and discuss the methods to prepare these kinds of cells in bacteria. Further, design the experiment to induce the recombinants from these cells and explain two techniques involved in recombinants identification.
- b) Identify the following point mutations represented in DNA and in RNA as (1) transitions, (2) transversions, or (3) reading frameshifts.
- I. A to G
 - II. C to G
 - III. T to A
 - IV. UAU ACC UAU to UAU AAC CUA
 - V. UUG CUA AUA to UUG CUG AUA.

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4.

A yeast ($\text{CH}_{1.66}\text{N}_{0.13}\text{O}_{0.40}$) is growing aerobically on arabinose ($\text{C}_5\text{H}_{10}\text{O}_5$) and ammonium hydroxide (NH_4OH) with a respiratory quotient of 1.4. Estimate the stoichiometric coefficient of the equation:



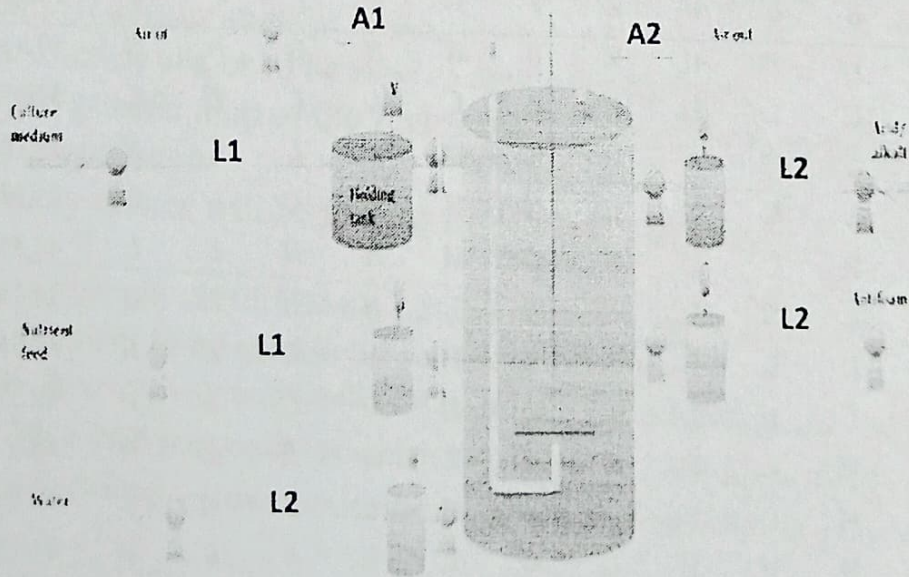
Calculate the biomass yields, ($Y_{x/s}$) and (Y_{x/o_2})

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5.

- a) If the overall Del factor is 32.2 and if it is taken that the heating Del factor was 7.8 and the cooling Del factor 9.1 during batch sterilization, what would be the holding time if the specific death rate for *Pseudomonas Putida* at 121°C is 2.54 min^{-1}
- b) In the given fermentation process, there are placed certain blocks A1, A2, L1 and L2 in different feeds. Identify these and explain these and explain the mechanism, structure, and importance in the process.

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