BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: M.Sc **SEMESTER : II**
BRANCH: Biotechnology **SESSION : SP/2024**

SUBJECT: BT416 ENZUME & BIOPROCESS TECHNOLOGY

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Justify that 'biomass produced in a turbidostat is a function of limiting substrate used and yield of biomass on it'.	[5]	1	5
Q.1(b)	Discuss the application of Luedeking- Piret equation for product formation. Modify Luedeking- Piret equation for growth associated and non- growth associated product formation.	[5]	1	5
Q.2(a)	Glucose oxidase was allowed for catalysis in the presence of glucose. The following data were obtained. Calculate V_{max} and K_m. Given $[E_o]$= 0.02 g/l.	[5]	2	3
Q.2(b)	Propose methods for immobilization of enzyme by adsorption and ionic bonding. Compare two techniques.	[5]	2	6
Q.3(a)	What do mean by sterilization of medium in fermentation industry? Derive an expression to show the death kinetics in batch autoclave.	[5]	3	3
Q.3(b)	Draw a bioreactor and illustrate the aeration system present in it. Also, explain how to achieve aseptic aeration in bioreactor.	[5]	3	4
Q.4(a)	Draw a bioreactor and illustrate the agitation system present in it. Also, explain processes of mixing and aseptic operation in it.	[5]	2	3
Q.4(b)	Calculate the K_La value from the given data of bacterial culture (3 g/L) in a CSTR. Given that C* = 7.8 mg/L.	[5]	2	3
Q.5(a)	Draw the steps you will undertake to design a bioreactor of 50000L for production of metabolite A from bacteria B on medium C. It may be supposed that initial data is available from 5 L laboratory bioreactor.	[5]	3	6
Q.5(b)	Justify the statement that 'for primary metabolite production in CSTR, continuous culture is better'.	[5]	3	6

V_o (g/l-min)	0.88	0.77	0.58	0.42	0.25
S_o (g/l)	60	38	20	8.0	3

DO (% O_2 saturation)	48	48	48	21	7	11	18	32	37	42	45
Time (min)	0	2	4	6	8	10	12	14	16	18	20
Air (on/off)	on	on	off	Off	on	on	on	on	on	on	on

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