



End Semester Examination – Nov/Dec – 2016

Code : 14BT2047

Sub. Name : BIOCHEMICAL ENGINEERING

Semester : 5

Duration : 3hrs

Max. marks : 100

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks																																													
1.	a.	Elaborately explain the difference between chemical and Biochemical process in detail.	CO-1	15																																													
(OR)																																																	
2.	a.	Describe in detail about the methods to isolate industrially important microorganisms	CO-1	15																																													
3.	a.	Explain in detail how MM parameters are estimated?	CO-1	15																																													
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4.	a.	<p>The following data have been obtained for the enzymatic reaction. Calculate and compare MM parameters using LB plot and MM plot.</p> $E + S \xrightleftharpoons[k_2]{k_1} ES \xrightarrow{k_3} E + P$ <table border="1"><tr><td>V (hr⁻¹)</td><td>2.1</td><td>1.8</td><td>1.5</td><td>1.2</td><td>0.9</td><td>0.6</td><td>0.3</td></tr><tr><td>S (g/L)</td><td>14</td><td>12</td><td>10</td><td>8</td><td>6</td><td>4</td><td>2</td></tr></table>	V (hr ⁻¹)	2.1	1.8	1.5	1.2	0.9	0.6	0.3	S (g/L)	14	12	10	8	6	4	2	CO-1	15																													
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S (g/L)	14	12	10	8	6	4	2																																										
5.	a.	<p>The production of penicillin was carried out in a batch reactor and the following data were obtained.</p> <table border="1"><tr><th>Time (hr)</th><th>Glucose concentration (g/l)</th><th><i>Penicillium notatum</i> concentration (g/l)</th><th>Penicillin concentration (g/l)</th><th>Ethanol Concentration (g/l)</th></tr><tr><td>0</td><td>150</td><td>1.1</td><td>0</td><td>0</td></tr><tr><td>5</td><td>135</td><td>2.5</td><td>2.2</td><td>0.15</td></tr><tr><td>15</td><td>107</td><td>3.2</td><td>3.5</td><td>0.23</td></tr><tr><td>30</td><td>89</td><td>6.7</td><td>6.1</td><td>0.45</td></tr><tr><td>40</td><td>72</td><td>12.1</td><td>8.4</td><td>0.5</td></tr><tr><td>50</td><td>55</td><td>16.8</td><td>10.7</td><td>0.77</td></tr><tr><td>60</td><td>40</td><td>25.7</td><td>13.9</td><td>1.3</td></tr><tr><td>70</td><td>22</td><td>29.3</td><td>18.5</td><td>2.5</td></tr></table> <p>Determine net specific growth rate, growth rate @60hrs, biomass and product yield coefficient, doubling time and max cell concentration if 12gm/l and 200 g/l of biomass and glucose are used as initial inoculum and substrate concentration.</p>	Time (hr)	Glucose concentration (g/l)	<i>Penicillium notatum</i> concentration (g/l)	Penicillin concentration (g/l)	Ethanol Concentration (g/l)	0	150	1.1	0	0	5	135	2.5	2.2	0.15	15	107	3.2	3.5	0.23	30	89	6.7	6.1	0.45	40	72	12.1	8.4	0.5	50	55	16.8	10.7	0.77	60	40	25.7	13.9	1.3	70	22	29.3	18.5	2.5	CO-1	15
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6.	a.	Elaborate on any two inhibition kinetic models for microbial growth	CO-1	15																																													
7.	a.	Explain in detail about various methods to determine K _L a? List out the	CO-2	1																																													

		disadvantages of using sulphite oxidation and gassing out methods.		5
(OR)				
8.	a.	A fermentation process requires 7.7 liters batch of complex medium to be steam sterilized at 121 °C. Assuming that the medium before sterilization contains 10^6 bacterial spores of <i>Bacillus stearothermophilus</i> per ml and the probability of non-sterility after sterilization is 1 in 1000, Determine the holding time at 121°C and ∇_{holding} . The time of heating from 100°C to 121°C is 9 min and the time of cooling from 121°C to 100°C is 11 min. Assume that the spore death below 100°C is insignificant. And the value of $\nabla_{\text{table}}=12.549$, $A=9.5 \times 10^{37} \text{ min}^{-1}$, $E=283 \text{ KJ/mol}$ and $R=8.314 \text{ J/(mol K)}$.	CO-1	1 5
<u>Compulsory:</u>				
9.	a.	Explain the bioreactor consideration of any two immobilized bioreactor with a neat sketch.	CO-3	1 5

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