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**End Semester Examination – Nov/Dec– 2018**

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| **Code :** | **12BT210** | **Duration :** | **3hrs** |
| **Sub. Name :** | **CHEMICAL AND ENZYME REACTION ENGINEERING** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Marks** |
| **PART-A(10X1=10 MARKS)** | | |
| 1. | What is ideal mixed flow reactor? | 1 |
| 2. | How do you classify chemical reactions | 1 |
| 3. | Write the criteria for stability of reactors | 1 |
| 4. | What are the limitations of batch reactor | 1 |
| 5. | What is the role of state of aggregation in determining reactor behavoiur? | 1 |
| 6. | Sketch the RTD curve for ideal Plug flow and ideal batch reactor. | 1 |
| 7. | Differentiate the apoenzyme with holoenzyme? | 1 |
| 8. | What is the significance of Km? | 1 |
| 9. | Limitation of immobilization technique | 1 |
| 10. | List the classification of Biosensors | 1 |

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| **PART B(5 X 3= 15 MARKS)** | | |
| 11. | On doubling the concentration of a reactant, the rate of reaction triples. Determine the order of reaction | 3 |
| 12. | Define Space time and Space velocity | 3 |
| 13. | Discuss different types of enzyme specificity with suitable examples? | 3 |
| 14. | What are the advantages of immobilization technique | 3 |
| 15. | Properties of support matrix used in immobilization | 3 |

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| **PART C(5 X 15= 75 MARKS)** | | | |
| 16. | a. | Calculate the activation energy for the decomposition of benzene diazonium chloride to give chlorobenzene and nitrogen.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | K(s-1) | 0.00043 | 0.00103 | 0.00180 | 0.00355 | 0.00717 | | T(K) | 313.0 | 319 | 323 | 328 | 333 | | 8 |
| b. | The activation energy of a bimolecular reaction is about 9150 cal/mol. How much faster is this reaction takes place at 500 K than at 400K? | 7 |
| (OR) | | | |
| 17. |  | Show that the following scheme  2  2  Is consistent with the rate equation rAB=kCB2 | 15 |
|  |  |  |  |
| 18. |  | In an isothermal batch reactor, the conversion of a liquid reactant A achieved in 13 minutes is 70%. Find the spacetime and space velocity necessary to effect this conversion in a plug flow reactor and in a mixed flow reactor. Consider first order kinetics. | 15 |
| (OR) | | | |
| 19. |  | Derive the design equation for the steady state plug flow reactor. | 15 |
|  |  |  |  |
| 20. |  | The data given below represent a continuous response to a pulse input into a closed vessel which is o be used as a chemical reactor. Calculate the mean residence time of fluid in the vessel and tabulate and construct the E curve.   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | t(min) | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | | Cpulse, g/l (tracer output concentration) | 0 | 3 | 5 | 5 | 4 | 2 | 1 | 0 | | 15 |
| (OR) | | | |
| 21. |  | Derive an equation for a first order reaction, using the segregation model if the RTD is equivalent to an ideal PFR. Compare the conversion with that of design equations | 15 |
|  |  |  |  |
| 22. |  | Derive the Michaelis –Menton equation for a single substrate reaction catalyzed enzyme?  a) Michaelis Menton Approach.  b) Briggs Haldane Approach. | 15 |
| (OR) | | | |
| 23. |  | Derive the expression for Toxic compound Inhibition models for enzymes | 15 |
|  |  |  |  |
| 24. |  | Explain the principle and design of Amperometric biosensors? | 15 |
| (OR) | | | |
| 25. |  | Describe the Physical and Chemical techniques used in immobilization of enzymes? | 15 |