Fdqu.2103   Biochemical Engineering (1+1)   Marks:50

Time: 2 hours

I   **Fill in the blanks:**   (10x1=10)

1   A type of bacterial growth where the cells never reach its stationary phase is called _____culture.

2   The type of curve obtained for the kinetics of allosteric enzymes is _____.

3   The efficient utilization of physical, chemical and biological processes to convert raw materials into useful products, at minimal cost, energy and impact on the environment is _____.

4   _____ inhibitors have identical affinities for E and ES and they do not change Km, but decreases Vmax.

5   Wash out in steady state fermentation occurs when _____ rate is less than maximum specific growth rate.

State True or False

6   Bubble column reactor has large height to diameter ratio.

7   The double reciprocal of Michealis – Menton is known asEadie- Hofste Plot.

8   The correct sequences during the industrial production of substances are: inoculation, screening, fermentation, downstream processing and removal of wastes.

9   For the reaction A $\rightarrow$ B, ΔG = - 60 KJ/mol. The reaction is started with 10 mmol of A; no B is initially present. After 24 h, 2 mmol of B, 8 mmol of A are present. The most likely explanation is that the formation of B is kinetically slow; equilibrium has not been reached in 24h.

10   Enzymes are proteins that lower the activation energy of a reaction and in doing this enzymes increase the rate of a reaction, helping it to occur faster.

II   **Write Short notes on ANY FIVE of the following**   (5x2=10)

1   Briefly write on the factors which affect enzyme activity.

2   Outline the range of fermentation processes.

3   Give the applications of fermenter in food industries.

4   Explain the importance of Fed batch reactor.

5   Write in brief on common on-line instrumentation used on bioreactor?

6   Briefly explain the role of biochemical engineering with reference to cell as reactors.

7   List the various methods of cell disruption for product recovery operation.

III   **Answer ANY FIVE of the following**   (5x4=20)

1   What are the considerations for design and construction of a fermenter?

2   Give an account on the working and application of continuous flow stirred tank reactors.

3   State the factors affecting oxygen transfer in a fermentation process.

4   State various methods of sterilization. Discuss batch and continuous sterilization process.

5   Explain the various methods involved in downstream processing.

6   How do agitation and aeration affect microbial growth? How does aeration help agitation and mixing? Explain.

7   Describe the kinetic classification of fermentation process with suitable examples and also describe them mathematically.

IV   **Write an essay on ANY ONE of the following**   **(1x10=10)**

1   Derive Michaelis – Menten equation for a single substrate enzymatic biochemical reaction stating all the assumptions. How are the parameters in the above equation evaluated? Explain with neat sketches.

2.   Describe with a neat sketch an ideal fermenter for an aseptic process. Bring out the process considerations in a typical fermentation. Discuss the various problems associated with the scale up of fermenters

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