U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: Biotechnology **Duration: 3 hrs.**
Course Code: 19BT5DCBPT **Max Marks: 100**
Course: Bioprocess Technology **Date: 01.03.2023**

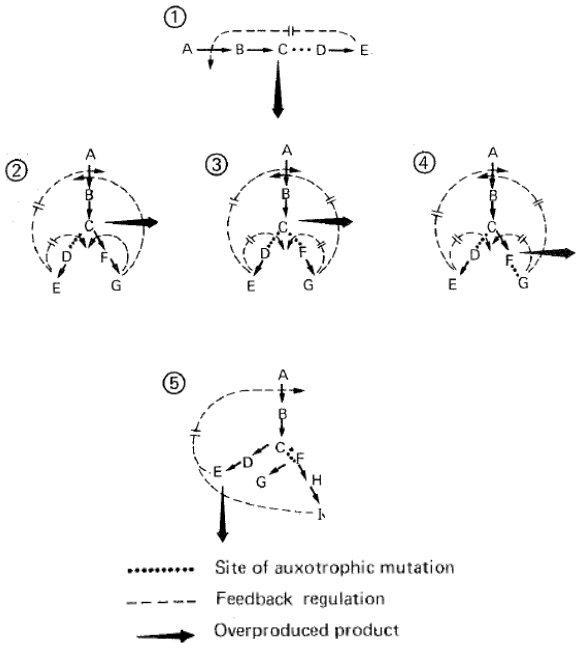
Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

B.M.S.C.E. CBCS 2022-23

UNIT - I

1 a) Mutant which do not produce certain feedback inhibitors/repressors may be useful for the production of intermediates of unbranched pathway and intermediates and end products of branched pathways. Compare and interpret the following "blue prints" of hypothetical mutants for the intermediate and end products. **10**



b) "The physiological condition of the inoculum when it is transferred to the next culture stage can have a major effect on the performance of the fermentation". Substantiate. **10**

UNIT - II

2 a) A genetically engineered harmless microorganism is being used for the large scale (more than 10 dm^3) production of sector-II Biotechnology product. Pertaining to this Biotechnological operation, **10**

i. Determine the most suitable containment level.
ii. Summarize and justify the appropriate containment requirements which should be applied within the European federation of Biotechnology.

b) Derive an equation to determine heat-transfer surface necessary to obtain adequate temperature control. **10**

OR

3 a) Describe the consequences of the fermentation when a Biotechnologist is intended to cultivate the process organism A to produce the desired product P but accidentally invaded by a foreign microorganism F. Also suggest how you overcome to avoid the entry of foreign organisms. **10**

b) Describe the methods used to calculate the K_{La} by Lowering dissolved oxygen concentration. **10**

UNIT - III

4 a) Describe on how the following properties of biological substances that are relevant in separation processes to select the suitable unit operation: **10**

i. Size and shape
ii. Electrostatic charge and polarity
iii. Solubility and Diffusivity
iv. Partition coefficient and volatility

b) Describe on how Darcy's law is used in selection of the appropriate filtration equipment for separation of solids from slurry. **10**

OR

5 a) Demonstrate the process design criteria for the production and recovery of Monoclonal antibodies. **10**

b) Compare and contrast how the process design criteria for the separation of product factor VIII vary from citric acid? **10**

UNIT - IV

6 a) A protein solution (concentration = 4.4 g/1) is being ultrafiltered using a spiral wound membrane module, which totally retains the protein. At a certain transmembrane pressure the permeate flux is 1.3×10^{-5} m/s. The diffusivity of the protein is 9.5×10^{-11} m^2/s while the wall concentration at this operating condition is estimated to be 10 g/1. Predict the thickness of the boundary layer. If the permeate flux is increased to 2.6×10^{-5} m/s while maintaining the same hydrodynamic conditions within the membrane module, what is the new wall concentration? **10**

b) "When designing a new membrane separation facility or considering its integration into an existing plant, there are many factors which must be considered." justify the statement. **10**

UNIT - V

7 a) With a schematic representation discuss the liquid-liquid extraction process. **10**

b) Recommend the most popular product polishing operation for the most of bulk pharmaceuticals and organic fine chemicals which are manufactured in crystalline form. Also comment on necessity of such operations. **05**

c) Describe the freeze-drying technique with a schematic representation. **05**

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