

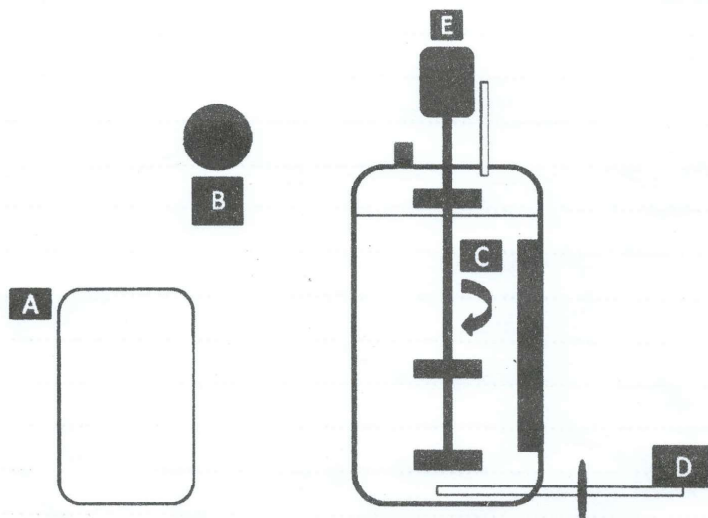


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1.3 Explain the methods that can be applied in microbial strain selection. **(20 marks)**

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1.4 Answer the questions based on the diagram given below.



1.4.1 Name the diagram.

*(05 marks)*

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1.4.2 Label the parts A, B, C, D and E

*(05 marks)*

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1.4.3 What are the factors you have to consider when preparing the nutrition media?

*(15 marks)*

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1.4.4 Draw the graph related to the concentrations of biomass, nutrient and product against the time of fermentation.

*(15 marks)*

2.

2.1 Explain the methods of **four** fermenter controls during fermentation.

(50 marks)

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2.2 Write short notes on following,

2.2.1 Continuous Cell Culture

(25 marks)

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2.2.2 Uses of cell culture

(25 marks)

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3. Downstream processing includes, recovering the therapeutic protein from its producer cell source, purifying and formulating the protein into the final product format.

3.1 List **five (05)** techniques used in disruption of microbial cells in the initial stage of downstream processing. **(10 marks)**

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3.2 Describe Briefly the drawbacks of protein extraction procedure using chemicals such as detergents.

**(15 marks)**

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3.3 State **four** methods used in initial product concentration.

**(20 marks)**

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3.4 Describe briefly the diafiltration technique.

**(20 marks)**

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