Progressive Education Society's
Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16
End Semester Examination
Faculty: Science and Technology

Program: BScGen03 **Semester: V** **SET: A**
Program (Specific): BSc. Microbiology **Course Type: DSC**
Class: T.Y. B.Sc. **Max.Marks: 35**
Name of the Course: Industrial Microbiology
Course Code: 24-MB-355 **Time: 2Hr**
Paper: V

Instructions to the candidate:

1) ***There are 4 sections in the question paper. Write each section on separate page.***
2) ***All Sections are compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Draw a well labelled diagram wherever necessary.***

SECTION: A

Q1) Multiple Choice Questions (MCQs) **5X1 = 5 Marks**

I. What is the **primary objective** of strain improvement in industrial microbiology?

A) To decrease the yield of the product.
B) To enhance the safety of the product.
C) To improve the genetic stability of the strain.
D) To increase the production of the metabolite.

II. Evaluate the efficiency of using the gradient plate technique over the replica plate technique for isolating mutants.

A) Gradient plate is less efficient due to uneven distribution of mutations throughout colonies.
B) Replica plate is more efficient as it directly compares growth on different media.
C) Gradient plate allows for a continuous selection pressure, enhancing mutant isolation.
D) Replica plate offers more control over environmental conditions.

III. Which downstream processing method is best for separating a product from a complex mixture using a solvent?

A) Filtration B) Cell disruption
C) Liquid-liquid extraction D) Drying

IV. What does the term ‘validation’ refer to in a process?

A) Confirming the effectiveness of a marketing strategy
B) Ensuring a process or system performs consistently
C) Verifying employee performance
D) Testing product aesthetics

V. Which type of intellectual property right (IPR) protects inventions?

A) Trademark
B) Copyright
C) Patent
D) Trade secret

Q2) Answer any FOUR of the following **4X1 = 4 Marks**

I. State the primary goal of strain improvement in industrial biotechnology.
II. Define media optimization.
III. Explain the Del factor (Δ) in sterilization.
IV. Name a method used to remove water from fermentation products.
V. Name a method used for detecting endotoxins.
VI. Define patent protection.

SECTION: B

Q3) Answer any FOUR of the following **4X2 = 8 Marks**

I. Define an auxotroph and provide an example of its use in biotechnology.
II. Comment on the advantages of continuous sterilization over batch sterilization.
III. Enlist the advantages and disadvantages of using Full Factorial Design in media optimization.
IV. Justify how patenting contributes to the fermentation industry.
V. Infer the advantages and limitations of using membrane filtration for sterility testing.
VI. Discuss copyright as an IPR.

SECTION: C

Q4) Answer any FOUR of the following **4X2 = 8 Marks**

I. Explain the concept of altered cell permeability and its significance in strain improvement.
II. Explain the penicillin enrichment method.
III. Elaborate on effect of the Froude number on mixing efficiency in scale-up processes.
IV. Justify the principle behind centrifugation for separating components in a fermentation broth?
V. Discuss the process of patenting a fermentation process.
VI. Differentiate between recurring and non-recurring expenditures.

SECTION: D

Q5) Attempt any TWO of the following **5X2 = 10 Marks**

I. Design a comprehensive strategy for strain improvement that incorporates rDNA technology, mutagenesis, and selection techniques. How would you implement this strategy in an industrial setting?

II. Describe the principles of Newtonian and non-Newtonian fluids and their relevance in fermentation. How does broth rheology affect the design and operation of fermentation reactors?

III. Report the concept of pyrogen testing in quality assurance, detailing the different methods available and their applications.

IV. Explain the concept of validation in relation to regulatory requirements and provide examples of how it is applied in different industries.

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