

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5291

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Unique Paper Code : 2164002001

Name of the Paper : Industrial and Environmental Microbiology

Name of the Course : **Botany**

Semester : VIII

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any FOUR questions in all.
3. Question No. 1 is compulsory.
4. All parts of a question must be answered together.
5. Draw well-labeled diagrams wherever necessary.

1. (a) Fill in the blanks: (any five)

(5x1=5)

(i) The process of using microorganisms to clean up pollutants from soil and water is called _____.

(ii) In fermentation technology _____ fermentation involves growth of microbes on moist solid substrates without free water.

(iii) The _____ enzyme is industrially produced using microorganisms and is widely applied in casein hydrolysis.

(iv) The method of _____ allows enzymes to be fixed onto a support, making them reusable in industrial processes.

(v) Presence of _____ bacteria in water is used as an indicator of fecal contamination.

(vi) Symbiotic association between leguminous plants and _____ bacteria helps in biological nitrogen fixation.

P.T.O.

5X1=5

(b) Expand the following (any five)

- i. MPN
- ii. PGA
- iii. TDS
- iv. BOD
- v. CFU
- vi. IMTECH

(5x1=5)

(c) Match the followings

Column A	Column B
A. Flocculation in sewage	1. Technique for drying microbial products into powder
B. Spray Drying	2. <i>Aspergillus niger</i>
C. Agricultural Runoff	3. Uses upward gas flow for mixing in bioreactors
D. Citric Acid Production	4. Source of water pollution from fertilizers and pesticides
E. AirLift Fermenter	5. <i>Zooglea</i>

(5x3=15)

2. Differentiate between the following (any three)

- (i) Precipitation and Ultrafiltration
- (ii) Batch Fermentation and Continuous Fermentation
- (iii) Physical and chemical methods of cell disruption
- (iv) Solid-state fermentation and Submerged fermentation

(5x3=15)

3. Write short notes on any three of the following:

- (i) Immobilization of enzymes
- (ii) Bioremediation and its applications
- (iii) Importance of microbes in environment
- (iv) Components of bioreactor

5X3=15

4. Draw a well-labelled diagram of the following (any three)

- a) An airlift fermenter.
- b) Tower fermenter
- c) A typical bacterial growth curve (clearly indicating all phases).
- d) Schematic flowchart of downstream processing

(7.5x2=15)

5. Answer any two of the following

- (i) Explain the process of sewage and wastewater treatment. Describe the role of microorganisms at each stage and highlight their importance in maintaining water quality.
- (ii) Describe the process of industrial enzyme production with reference to Amylase. Explain the microbial sources, fermentation methods, and downstream processing involved.
- (iii) Discuss the role of enzymes in biotechnology and explain their applications in different industries.

(200)