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- (iv) Role of microbes in sewage and waste water treatment system
- (v) Solid-state and liquid state fermentation
4. (a) Discuss the large-scale production and application of penicillin acylase. (7)
- (b) Explain in detail the industrial production of Ethanol. (5)
- (c) Write short note on bioremediation. (3)
5. (a) Explain with the help of diagram about the symbiosis between legume roots and nitrogen fixing bacteria. (8)
- (b) Write in detail about the different methods involved in culture of soil microflora.

OR

Discuss with the help of diagram about components of a typical bioreactor (7)

(500)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2999

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Unique Paper Code : 2164002001

Name of the Paper : Industrial and Environmental Microbiology

Name of the Course : **Generic Elective – Botany**

Semester : III

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 **four** questions in all.
3. Question No. 1 is compulsory.
4. Attempt all parts of question together.
5. **All** questions carry equal marks.

1. (a) Define the following (**any five**) (1×5=5)

(i) COD

(ii) Sparger

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- (iii) Fermentation
- (iv) Lyophilization
- (v) AMF
- (vi) Single cell protein

(b) True or False (1×5=5)

- (i) Amylase is an exoenzyme that hydrolyses sugars.
- (ii) Impeller is a device that introduces air into a fermenter's liquid medium.
- (iii) Polyacrylamide gels have been widely used for enzyme immobilization by entrapment.
- (iv) A faecal coliform is a facultatively anaerobic, rod-shaped, gram-negative, non-sporulating bacterium.
- (v) Bacteria secrete strigolactones, chemical signals that allow them to locate and colonize host plants.

(c) Expand (any five) (1×5=5)

- (i) PDA
- (ii) NBAIM

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- (iii) TDS
- (iv) EMB
- (v) IMTECH
- (vi) SSB

2. Differentiate between (any five) (3×5=15)

- (i) Batch and Continuous Fermentation
- (ii) Ectomycorrhiza and Endomycorrhiza
- (iii) Enzyme immobilization by adsorption and covalent bonding
- (iv) Selective medium and differential medium
- (v) Continuous stirred Bioreactor (CSTR) and Airlift Bioreactor
- (vi) Upstream and Downstream processes.

3. Write short notes on the following (any three) (3×5=15)

- (i) GRAS
- (ii) Microbial growth phases
- (iii) Scope and importance of microbes in environment

P.T.O.