[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5024 **L**

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 blank **(any five)** 5X1=5

i. ..... and .....are examples of exoenzymes
ii. Secondary metabolites are produced during ..... phase of bacterial growth
iii. The enzyme responsible for the direct conversion of atmospheric nitrogen into ammonia within root nodules is known as .....
iv. The biological conversion of organic nitrogen into ammonium by soil microorganisms is referred to as .....
v. The enzymatic breakdown of starch into simpler sugars is catalysed by .....
vi. The separation technique that removes a desired product from a liquid using an organic solvent is termed ..... extraction.

(b) Match the following 5X1=5

Column A	Column B
A. Lactose fermentation	i. Louis Pasteur
B. Nitrification	ii. *Aspergillus niger*
C. Citric acid	iii. *Nitrosomonas*
D. Germ theory of fermentation	iv. *Zooglea*
E. Flocculation in sewage	v. *Escherichia coli*

P.T.O.

(c) Expand the following **(any five)** 5X1=5

i. COD
ii. EMBA
iii. HFCS
iv. ICGEB
v. PDA
vi. GRAS

2. Differentiate between the following **(any three)** 3X5=15

a. Lyophilisation and Spray drying
b. Batch fermentation and fed batch fermentation
c. Enriched media and Differential media
d. Ecto- and Endomycorrhiza

3. Draw a well-labelled diagram of the following **(any three)** (5x3=15)

a) An typical fermenter.
b) A typical bacterial growth curve (clearly indicating all phases).
c) The sequential steps of the serial dilution method.
d) Transverse section of a Leguminous root nodule

4. Write short notes on the following **(any three)** (5x3=15)

a) Bioremediation of contaminated soil
b) Bacterial symbiosis
c) Applications of Penicillin acylase
d) Centrifugation

5. Answer **any two** of the following (7.5 x 2=15)

a) What are coliform bacteria? Elaborate upon the various steps used to detect the presence of coliform bacteria in drinking water.
b) What is enzyme immobilization? What are its advantages and applications? Briefly discuss different support matrices used for enzyme immobilization.
c) Enlist any five industrially important microorganisms and briefly discuss their major applications.