

- (b) Explain the concept of saccharification in the context of industrial biotechnology. Discuss the chemical and biological mechanisms through which starch is converted into fermentable sugars during large-scale processing.
- (c) Discuss the various approaches used for isolating and screening microorganisms with potential industrial applications. How do these methods differ, and what factors are considered important when selecting strains for commercial use? 6+6+6=18
5. (a) Discuss the scope and importance of industrial microbiology in modern biotechnology.
- (b) Discuss the composition of industrial fermentation media and the importance of nutrient selection.
- (c) Describe the industrial production of antibiotics using microbial fermentation. 6+6+6=18
6. (a) Explain the role of microorganisms in wastewater treatment. 6+6+6=18
- (b) Explain the role of microorganisms in bioremediation and pollution control.
- (c) Describe the importance of low-cost substrates in large-scale microbial fermentation.

[This question paper contains 4 printed pages]

Your Roll No. :**Sl. No. of Q. Paper** : **1829 I**

Unique Paper Code : 3183012005

Name of the Paper : Industrial Microbiology
Discipline specific
Elective (DSE)Name of the Course : **B.Sc. (H) Biomedical
Sciences (NEP-UGCF-
2022)**

Semester : IV

Time : 3 Hours **Maximum Marks : 90****Instructions for Candidates :**

- (a) Write your Roll No. on the top immediately on receipt of this question paper.
- (b) Attempt any **five** questions in **all**. Question **NO.1** is compulsory.
- (c) Subparts of the questions should be attempted together.
- (d) Give illustrations and examples wherever required.
1. (a) Give one word answer of the following (**Any six**). 1×6=6
- (i) What is the large-scale cultivation of microorganisms for industrial purposes called?

- (ii) What is the term for microbial processes carried out under controlled conditions to produce useful products?
- (iii) What is the process of converting sugars into alcohol using microorganisms?
- (iv) What device measures dissolved oxygen in fermenters?
- (v) Which bacterium is responsible for yogurt production?
- (vi) Which fungus is used in production of soy sauce fermentation?
- (vii) What organic acid is produced by *Aspergillus niger* in large-scale fermentation?
- (b) Mention major contribution of scientists given below **(Any three)**: $2 \times 3 = 6$
 - (i) Eduard Buchner
 - (ii) Selman Waksman
 - (iii) Robert Koch
 - (iv) Elmer L. Gaden
 - (v) Justus von Liebig
- (c) Give full form of following abbreviations. $1 \times 6 = 6$
 - (i) STP (ii) COD
 - (iii) TSB (vi) STR
 - (v) YPD (vi) GMP

- 2. Write short notes on the following topics **(Any four)**: $4.5 \times 4 = 18$
 - (a) Anaerobic digestion of industrial waste
 - (b) Bioremediation in industrial waste management
 - (c) Industrial production of citric acid
 - (d) Structure and working of a stirred tank fermenter
 - (e) Use of molasses and corn steep liquor in industrial fermentation.
- 3. Differentiate between the following **(Any four)**: $4.5 \times 4 = 18$
 - (a) Primary fermentation products vs secondary fermentation products
 - (b) Mutation vs genetic engineering in strain improvement
 - (c) Synthetic media vs complex media
 - (d) Upstream processing vs downstream processing
 - (e) Bread fermentation vs alcohol fermentation
- 4. (a) Discuss the structural features and operational principles of a typical industrial fermenter. In what ways do these design elements contribute to optimal microbial growth and efficient synthesis of desired biochemical products?