

**G-3/384/22**

Roll No. ....

**III Semester Examination, January, 2022**

**M.Sc.**

**MICROBIOLOGY**

**Paper IV**

**(Industrial Microbiology and Fermentation Technology)**

Time : 3 Hours ]

[ Max. Marks : 80

**Note :** *All questions are compulsory. Question Paper comprises of 3 Sections. Section A is objective type/multiple choice questions with no internal choice. Section B is short answer type with internal choice. Section C is long answer type with internal choice.*

**SECTION A**

**1×8=8**

**(Objective Type/Multiple Choice Questions)**

Choose the correct answer :

- 1.** In which of the following phase secondary metabolites are produced during growth ?  
(a) Lag phase              (b) Exponential phase  
(c) Stationary phase (d) Death phase
- 2.** Agitation system in fermenter consists of :  
(a) Impellers              (b) Baffle  
(c) Both (a) and (b)      (d) None of these

P.T.O.

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- 3.** In fermentation processes downstream processing includes :  
(a) Cell harvesting  
(b) Cell disruption  
(c) Product purification  
(d) All of the above
- 4.** Which of the following is not a nitrogen source ?  
(a) Corn steep              (b) Waste liquor  
(c) Yeast extract          (d) Peptones
- 5.** Subtilisins are well known ..... produced by *Bacillus* spp.  
(a) Protease                  (b) Cellulase  
(c) Pectinase                (d) All of these
- 6.** Citric acid is used as :  
(a) Flavouring agent in food  
(b) As an antioxidant  
(c) As preservative  
(d) All of the above
- 7.** Commercial production of streptomycin is carried out by :  
(a) *S. pyogenes*              (b) *S. griseus*  
(c) *S. aureus*                  (d) *P. chrysogenum*

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8. The crushed grapes used for wine manufacturing are also known as :

- (a) Wort                      (b) Must  
(c) hop                        (d) none of these

**SECTION B                      6×4=24**

**(Short Answer Type Questions)**

**Note :** Answer the following questions in **250** words.

**Unit-I**

1. Write a note on scaling up process in fermentations.

*Or*

What is the difference between batch and continuous fermentation ?

**Unit-II**

2. Describe downstream processing.

*Or*

Write short note on submerged fermentation.

**Unit-III**

3. Describe industrial production of citric acid.

*Or*

Describe fermentative production of Vitamin B12.

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**Unit-IV**

4. Write short note on industrial production of beer.

*Or*

Describe fermentative production of amino acids.

**SECTION C                      12×4=48**

**(Long Answer Type Questions)**

**Note :** Answer the following questions in **500** words.

**Unit-I**

1. Discuss historical account of industrial microbiology.

*Or*

What are the basic functions of the fermenter ?  
Explain different parts of the fermenter and their uses with the help of diagram.

**Unit-II**

2. Give a detailed account on strain improvement process.

*Or*

Explain computer control of fermentation process.

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**Unit-III**

- 3.** Describe the industrial production of Glutamic acid and Lactic acid.

*Or*

What are amylase enzymes ? Describe the fermentation process for the production of  $\alpha$ -amylase.

**Unit-IV**

- 4.** What are Antibiotics ? Explain the industrial process for the production of penicillin.

*Or*

Describe industrial production of wine.

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