

**SHRI SHIVAJI SCIENCE AND ARTS COLLEGE, CHIKHLI (DIST. BULDANA)**  
**DEPARTMENT OF MICROBIOLOGY**  
**B.SC. FINAL (SEMESTER-VI)**  
**6 S. MICROBIOLOGY**

The examination shall comprise of two theory papers, one in each semester and one practical in each Semester. Each theory paper will be of 3 hours duration and carry 80 marks. The internal assessment will carry 20 marks. The following syllabi are prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question on each unit, will internal choice and for each of 12 marks and one compulsory question covering all the syllabus of semester VI (8 marks).

**(Industrial Fermentation, Food Microbiology and Metabolism)**

**Unit- I : Fermentation in General.**

- a) Definition and scope of Industrial microbiology and biotechnology.
- b) Important classes of industrial microorganisms.
- c) Fermentation: - Definition and types ( batch and continuous, aerobic and anaerobic, surface and submerged fermentations )
- d) Production strains
- e) Screening: - Definition, Primary screening ( crowded plate technique, auxonography, enrichment culture technique, use of indicator dyes ), secondary screening.
- f) Scale up process :- Definition and significance.
- g) Inoculum buildup : Spore and vegetative inoculum.
- h) General layout of fermentation plant :- Fermentation equipment and its uses.
- i) Raw materials: - Composition and uses. Saccharine, starchy, cellulose raw materials, hydrocarbon and vegetable oils, nitrogenous material ( corn steep liquor).
- j) Antifoam agents.
- k) Sterilization of media: - Batch and continuous sterilization.
- l) Detection and assay of fermentation products.

**Unit- II: Industrial Productions I:**

Microorganisms, raw material, inoculums buildup, fermentation conditions, recovery,

uses and mechanism of the following products.

- a) Ethyl-alcohol: From molasses and waste sulphite liquor.
- b) Beer.
- c) Wine (Red table wine and White table wine)
- d) Acetone- Butanol from corn.
- e) Citric acid
- f) Vinegar- Fring's process

**Unit- III: Industrial Productions II:**

- a) Baker's yeast: From molasses, Definition of compressed and active dry yeast.

- b) Single cell protein: From bacteria.
- c) Penicillin.
- d) Amylase: Bacterial and fungal.
- e) Vitamin B12.

#### **Unit-IV: Microbiology of Milk**

- a) Definition
- b) Composition and types of milk.
- c) Sources of microorganisms in Milk.
- d) Types of microorganisms in milk.
- e) Pasteurization of milk : LHT, HTST, UHT.
- f) Grades of milk.
- g) Concentrated milk and milk powder.
- h) Preparation of fermented milk products, butter and cheese.

#### **Unit-V: Food Microbiology**

- a) Sources of contamination of fresh food.
- b) Microbial spoilage of foods.
- c) Preservation of foods: - Low and high temperature, dehydration, high osmotic pressure, chemical preservation, radiations and canning.
- d) Fermented foods: Idli, pickles and sauerkraut.
- e) Food poisoning: Food infection and food intoxication.
- f) Indicators of food contamination as per WHO.

#### **Unit VI : Enzymology and Metabolism**

##### **A Enzymology:**

- a) Nature and Definition.
- b) Classification and nomenclature of enzymes.
- c) Terminologies used in enzymology: - Enzyme, active site, substrate, co-enzyme, Cofactors, prosthetic group, holoenzyme, apoenzyme, activation energy, isoenzyme, allosteric enzyme, inhibitors, immobilised enzymes.

##### **B Metabolism:**

- a) General strategies of metabolism.
- b) EMP pathway, TCA cycle.
- c) Oxidative phosphorylation and Electron transport chain.

## **Microbiology Practical's**

### **6 S. MICROBIOLOGY**

#### **1. A) Microbiological Examination of milk:**

- a) Plate count
- b) Methylene blue reduction test (MBRT)
- c) Phosphates test
- d) Test for coliform bacteria
- e) Estimation of fats in milk
- f) Milk testing for Adulteration

#### **B) Demonstration of microbes in Curd.**

#### **2. A) Laboratory scale production, recovery and quantitative estimation of following**

- Products:** a) Ethyl alcohol. b) Citric Acid c) Amylase
- B) Immobilisation of Yeast.
  - C) Production of Curd/ Pickle/ Cheese by microorganisms
  - D) Production of wine from grapes/ other raw material

#### **4. Microbiological Examination of Vegetables, fruits and Fast Foods by**

- a) Plate Count
- b) Test for Coliform bacteria.
- c) Yeast & Molds.

#### **Distribution of marks for Microbiology Practical Examination:**

- |                       |          |
|-----------------------|----------|
| 1. Major Experiment - | 15 marks |
| 2. Minor Experiment - | 10 Marks |
| 3. Viva Voce -        | 10 marks |

4. Spotting -	10 marks
5. Laboratory Journals -	05 Marks

---

Total -	50 marks.
---------	-----------