

St. Aloysius College (Autonomous), Jabalpur, M.P.

Department of Microbiology

Department of Higher Education, Govt. of M.P.

Under Graduate Annual Pattern Syllabus

Session 2022-2023

As recommended by Central Board of Studies and approved by the Governor of M.P.

Class: B.Sc. Year: III

Subject: Industrial Microbiology

Paper: 1 - Fermentation Technology & Biostatistics

Max. Marks: 40(TH.)+10 (CCE) = 50

Course outcome: Learners are equipped to become an entrepreneur in the field of Industrial production of microbial products like antibiotics, vitamins and enzymes. Awareness regarding bio safety measures enables student to serve the microbial industry in future. Students get acquainted with techniques of agriculture and microbiology, production of biofertilizer and quality testing of edibles. They will develop an understanding of different types of reactors or fermenters which are used for laboratory, pilot and industrial scale fermentations and their processes parameters.

UNIT -I PRINCIPLE OF FERMENTATION:-

Primary and secondary screening of industrially important microorganisms; Strain improvement mutation, recombination and protoplasmic fusion; development of inoculum for industrial fermentation; types of fermentation media - saccharine materials, starchy materials, cellulosic materials, nitrogenous materials, enhancers and precursors.

UNIT -II - DESIGN AND TYPES OF FERMENTOR :-

Structure of a batch fermentor; Types of fermentor; Batch; Continuous; Stirred tank; Fluidized bed and Solid State fermenter; computer control of fermentation process.

UNIT - III:- RECOVERY PROCESS :-

Downstream Processing - intracellular and extracellular product recovery (Physical and Chemical methods); Cell disruption method, solvent extraction and purification; Product recovery by whole broth processing.

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UNIT-IV :- BIOSAFETY MEASURES :-

Government regulations of recombinant DNA Research; Quality control regulations; Hazardous industrial waste; mycotoxin hazards; Regulation for disposal of bio-hazardous materials; Bioprocess industries; Biosafety in laboratories and industries (Dairy and Food, Pharmaceutical, Agricultural, Beverages).

UNIT -V- BIOSTATISTICS AND BIOINFORMATICS :-

- A. Biostatistics : Principle of Biostatistics; Classification of Data; Tabulation and Graphical representation; Measures of Central Tendency- Mean, Mode, Median- merits and demerits; Measures of Dispersion Range; Mean Deviation variance and Standard Deviation.
- B. Bioinformatics: Basic Organization of computer; Computer Hardware; Software, Bit, Byte, Computer Memory, Binary Code, Binary System; Introduction to Bioinformatics, Database and application of Bioinformatics.

Text & Reference Books:

1. Whitaker. A. Stanbury, P.F. and Hall, S.J. 2009. Principles of fermentation techniques. Elsevier
2. Prescott, S.C., Dunn, C.G., and Reed, G. 1982, Prescott and Dunn's Industrial Microbiology, 4th Edition. AVI Publ. Co., Westport, Conn.,
3. Hui. Y. H., Meunier-goddik, L., Hansen, A.L., Josephsen, J., Nip, W.K., Stanfield, P.S. and Toldra, F. 2004, Handbook of Food and Beverage Fermentation Technology, New York: Marcel Dekker Incorporated.
4. Casida L. E., 1968, Industrial Microbiology, Wiley New York.
5. Shrivastava M. 2008, Fermentation Technology, Alpha science International
6. Agrawal B.L., Basic Statistics.
7. Mishra and Mishra Statistics
8. Glover and Mitchell: Biostatistics.

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