Sankalchand Patel University

Faculty of Science

B.Sc. (Microbiology) (SEM-VI)

In Effect from Academic Year 2018-19

Subject Code: 1SC1020604	**Subject Title: Industrial Microbiology**

Course Objective: The course imparts knowledge of utilization of microbes and their products on large scale production processes. Understand the basic of industry and cost effective manufacturing techniques.

Teaching scheme (hours) per week		**Credit**			**Theory Marks**		**Practical Marks**		**Total**
Theory	**Practical**	**Theory**	**Practical**	**Total**	**Uni. Assessment**	**Cont. Assessment**	**Uni. Assessment**	**Cont. Assessment**	
3	**--**	**3**	**--**	**3**	**70**	**30**	**--**	**--**	**100**

Unit	**Content**	**Lectures**	**Weightage**
1	**Introduction to bioprocessing and strain improvement** Concept of Fermentation (definition and applications), Range of fermentation processes & component parts of fermentation process. Growth kinetics: Batch, fed-batch and continuous culture (chemostat and turbidostat) Isolation, Enrichment & screening (Primary & Secondary) of Industrial Important Microorganisms. Preservation techniques Strain Improvement: Induced mutants for primary and secondary metabolites, Application of r-DNA technology for strain improvement.	**13**	**28%**
2	**Concept of fermentation media and inoculum development** Medium formulations for industry and types (crude and synthetic) of fermentation media Raw materials used in fermentation media and criteria for selection. Sterilization of Media & Air Inoculum Development: Typical Inoculum Development program, Inocula development for Bacteria, Yeast and Fungal processes. Scale-Up	**13**	**28%**
3	**Design of fermenter and downstream processing.** Design of fermentor :Basic function of typical fermenter Design of ideal STR and various auxillary parts(aeration, agitation and body construction) Asceptic operations and Cotainments Types of fermenters: Tower, Cylindroconical, Air lift, Acetator - Cavitator,Bioreactors for animal cell cultures **Overview of downstream processing.** Removal of Solid & Microbial Cells and other solid Matter, Foam separation, Precipitation, Filtration and Centrifugation Cell disruption Concentration of extracted product: Liquid-Liquid extraction, Distillation, Purification products: Chromatography, Membrane processes and ultra filtration	**19**	**44%**

	Drying & Crystallization Quality Assurance-Bioassay		

Learning Outcome

It will enable the knowledge of the basic concepts of isolation and improvement of microbes. The basic design of fermenter. Students will have a knowledge of various isolation and purification of microbial products.

LIST OF BOOKS : REFERENCES

1. Casida LE. (1991). Industrial Microbiology. 1st edition. Wiley Eastern Limited.
2. Stanbury PF, Whitaker A and Hall SJ. (2006). Principles of Fermentation Technology. 2nd edition, Elsevier Science Ltd.
3. Patel AH. (1996). Industrial Microbiology .1st Edition. MacMillan India Limited Publishing Company Ltd. New Delhi, India
4. Tortora GJ, Funke BR, and Case CL. (2008). Microbiology: An introduction.9th Edition. Pearson Education
5. Biotechnology –The Biological Principles, M.D.Trevan ,S.Boffey,K H Goulding, P Stanbury
6. Mukhopadhyay, Process Biotechnology Fundamental. Viva book.
7. Shuler and Kargi, 1992. Bioprocess engineering, Prentice-Hall.
8. Bialy & Ollis.1986. Biochemical Eng. Fundaments. McGraw-Hill.
9. Schugerl. 1987. Bioreaction engineering, J/W.
10. Stanbury and Whitaker. Principles of fermentation technology.
11. Sikyta. Methods in Industrial microbiology. Ellis Hardwood Ltd.
12. Krysman. Product recovery in bioprocess technology.
13. T.K. Ghose. Bioprocess computation in biotechnology, Ellis Hardwood Ltd.
14. Murry Joh. 1997. Microorganisms and Biotechnology.
15. Demain efal. (ED) 1999. Manual of industrial Microbiology and Biotechnology. Asin Press.
16. Bioprocess Engineering Principles by Doran (D); Academic Press, 1998.
17. Cooney, A.E. Humphrey, Comprehensive Biotechnology : The principles and Regulation of Biotechnology in Industry, Agriculture and Medicine. Vol.2, Pergamon Press, 1985.
Edition. Panima Publishing Company, New DelhiWilley JM, Sherwood LM AND Woolverton CJ (2013)
18. Prescott, Harley and Klein's Microbiology.9th Edition. McGraw Hill Higher education
Adams MR and Moss MO. (1995). Food Microbiology. 4th edition, New Age International (P) Limited
Publishers, New Delhi, India.
19. Banwart JM. (1987). Basic Food Microbiology. 1st edition. CBS Publishers and Distributors, Delhi, India.
20. Frazier WC and Westhoff DC. (1992). Food Microbiology. 3rd edition. Tata McGraw-Hill Publishing
Company Ltd, New Delhi, India.