

Paper No- 16
SEMESTER VI
MICROBIAL BIOTECHNOLOGY

THEORY

MARKS: 100

Unit 1 Microbial Biotechnology and its Applications **No. of Lectures : 8**

- 1.1 Microbial biotechnology: Scope and its applications in human therapeutics, agriculture (Biofertilizers, PGPR, Mycorrhizae), environmental, and food technology
- 1.2 Use of prokaryotic and eukaryotic microorganisms in biotechnological applications
- 1.3 Genetically engineered microbes for industrial application: Bacteria and yeast

(Chapters 1,2,3, Microbial Biotechnology by Glazer AN & Nikaido H., 2nd Ed., Cambridge University Press, 2007, Pages: 2-10, 45-85, 90-146)

Unit 2 Therapeutic and Industrial Biotechnology **No. of Lectures : 10**

- 2.1 Recombinant microbial production processes in pharmaceutical industries - Streptokinase, recombinant vaccines (Hepatitis B vaccine)
- 2.2 Microbial polysaccharides and polyesters
- 2.3 Microbial production of bio-pesticides
- 2.4 Microbial biosensors

(Chapters 3,5,7,8,11, Microbial Biotechnology by Glazer AN & Nikaido H., 2nd Ed., Cambridge University Press, 2007, Pages: 90-146, 169-179, 256-259, 267-298, 406-428)

(Chapters 9,10 Molecular Biotechnology by Glick BR, Pasternak JJ & Patten CL, 4th Ed., ASM Press, 2010, Pages: 341-344, 399-407)

Unit 3 Applications of Microbes in Biotransformations **No. of Lectures : 8**

- 3.1 Microbial based transformation of steroids and sterols
- 3.2 Bio-catalytic processes and their industrial applications: Production of high fructose syrup and production of cocoa butter substitute

(Chapter 11, Microbial Biotechnology by Glazer AN & Nikaido H., 2nd Ed., Cambridge University Press, 2007, Pages :398-404, 418-423)

Unit 4 Microbial Products and their Recovery **No. of Lectures : 8**

- 4.1 Microbial product purification: filtration, ion exchange & affinity chromatography techniques
- 4.2 Immobilization methods and their application: Whole cell immobilization

(Chapter 10, Principles of Fermentation Technology by Stanbury PF, Whitaker A, Hall SJ, 2nd Ed., Elsevier Science,1995, Pages :301-304; Chapter 12, Page 331-346)

(Chapter 11, Biotechnology: A text Book of Industrial Microbiology by Crueger W, Crueger A, 2nd Ed., Sinauer associates, Inc.1990, Pages :210 -217)

Unit 5 Microbes for Bio-energy and Environment **No. of Lectures : 11**

- 5.1 Bio-ethanol and bio-diesel production: commercial production from lignocellulosic waste and algal biomass
- 5.2 Biogas production: Methane and hydrogen production using microbial culture
- 5.3 Microorganisms in bioremediation: Degradation of xenobiotics, mineral recovery, removal of heavy metals from aqueous effluents

(Chapters 12,13,14 *Microbial Biotechnology* by Glazer AN & Nikaido H.,Ed. II, Cambridge University Press, 2007, Pages: 430-443, 454-455, 487-540)

(Chapters 14, *Molecular Biotechnology* by Glick BR, Pasternak JJ & Patten CL, Ed. IV, ASM Press, 2010, Pages: 595-596)

Unit 6 Intellectual Property Rights

No. of lectures: 3

6.1 Patents

6.2 Copyrights

6.3 Trademarks

(Chapters 39 & 40, *Elements of Biotechnology* by Gupta P K, Ed II, Rastogi Publications, 2009,

Pages: 431-445)

PRACTICALS

MARKS: 50

1. To study yeast cell immobilization in calcium alginate gels
2. To study enzyme immobilization by sodium alginate method
3. Pigment production from fungi (*Trichoderma* / *Aspergillus* / *Penicillium*)
4. Isolation of xylanase or lipase producing bacteria
5. Study of algal Single Cell Proteins

SUGGESTED READING

1. Ratledge, C., and Kristiansen, B. (eds.) (2001). *Basic Biotechnology*, 2nd Edition, Cambridge: Cambridge University Press.
2. Demain, A. L., and Davies, J. E. (eds.) (1999). *Manual of Industrial Microbiology and Biotechnology*, 2nd Edition, ASM Press.
3. Swartz, J. R. (2001). Advances in *Escherichia coli* production of therapeutic proteins. *Current Opinion in Biotechnology*, 12, 195–201.
4. Prescott, Harley and Klein's *Microbiology* by Willey JM, Sherwood LM, Woolverton CJ (2008), 7th edition, Mc Graw Hill Publishers.

ONLINE READING MATERIAL

1. www.biomanufacturing.org/pdf/DemainMicrobialBiotechnology.pdf
2. www.advancedbiotech.in/65%20Microbial%20biotechnology.pdf
3. <http://www.mhhe.com/biosci/cellmicro/prescott/outlines/ch44.mhtml>
4. www.ifsc.usp.br/~ilanacamargo/FFI0740/1.pdf
5. <http://www.biotechnologyforums.com/thread-1802.html>