SRM University
School of Bioengineering
Department of Biotechnology

M. Tech. Biotechnology
I Year/I Semester
BT2002 Bioprocess Technology
Total hours: 45

Unit	Hours	Lecture Topics	Page Nos.	Reference	Learning Outcomes
I	1 -4	Enzymes- Michaelis-Menten kinetics-problems	107-117	1	The student will be provided the basic knowledge of enzymes, kinetic study and its applications in the industry.
	5-6	Inhibition- Effect of pH and temperature	128-149 75-78	1 3	
	7-8	Methods of Immobilized enzymes -kinetics	79-91 100-107	3 4	
	9-10	Mass transfer considerations and Industrial enzymes.	91-92	3	
II	11	Introduction to metabolism- Nutrient transport- Glycolysis	133-136	3	Information about the metabolism and the mass and energy balances will be taught with problems.
	12	TCA cycle and other pathways	137	3	
	13-14	Control of metabolism and Factors affecting microbial growth	137-144	3	
	15-18	Stoichiometry- mass balances and energy balances	207-215	3	
	19-20	Growth kinetics- Measurement of growth-Problems	257-288 117-120	2 5	
III	21-22	Definition of Bioreactor - Basic principle of bioreactor, Classification of Bioreactors, Configuration of Bioreactors	108-111 333-344 166-173	4 2 4	Detailed knowledge of bioreactors, design of bioreactors for different cells and the impact of temperature on the microorganisms will be taught. The instrumentation of the bioreactor will also be discussed.
	23-24	Sterilization kinetics-Problems	334-343 377-386	3 2	
	25	Bioreactor and bioprocess considerations of: plant/mammalian cells	385-417 198-207	3 2	
	26-27	Immobilized cells in the Bioreactor	245-273 175-179	3 4	
	28	Biosensors in the bioprocessing industry	283-288	4	
	29-31	Biomass removal - Biomass disruption – Membrane based techniques.	220-229	2	The unit operations in the

IV			341-342 323-333	3 4	recovery of cells and biomass will be discussed.
	32-34	Extraction –solvent and aqueous two phases methods in the downstream processing	231-242	2	
	35	Super critical Extraction used in the bioprocess industry	343-351 336-337	3 4	
	36-37	Adsorption techniques in the separation process	341-344	2	
V	38-40	Chromatography, Precipitation techniques	365 240-249 261-286	3 2 5	The modern methods of purification and separation of products will be explained
	41	Electrophoresis (capillary)	375-376	3	
	42-43	Crystallization methods of the final product	378	2	
	44-45	Drying and Freeze drying in the packaging of products	378	2	

Text Books :

1. Trevor Palmer, “Enzymes: Biochemistry, Biotechnology and clinical chemistry” First East-west Edition 2008.
2. Pauline M. Doran, "Bioprocess Engineering Principles," Academic Press Ltd, 2008.
3. Micheal L. Shuler, Fikret Kargi. Bioprocess Engineering- Basic Concepts” Prentice Hall of India Pvt. Ltd. 2008.

References

4. S.N.Mukhopadhyay, “Advanced Process Biotechnology” Sanat Printers, Kundli, 2008
5. Rajiv Dutta, “Fundamentals of Biochemical Engineering” Ane Books India, 2008

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