

SRM UNIVERSITY
DEPARTMENT OF BIOTECHNOLOGY
SCHOOL OF BIOENGINEERING

Subject: Bioprocess Principles
Subject code: BT 0204

Semester: IV
Year: 2013

LESSON PLAN

No.	Lecture hours	Topic / Content	Book	Learning outcomes
UNIT I				
INTRODUCTION TO BIOPROCESS				
1	1	Historical development of bioprocess technologies	1&7	Students will be introduced about the concept of bioprocess, the role of bioprocess engineer in the development of bioproducts and the various economical aspects of industrial biotechnology
2	1	Role of Bioprocess engineer in the biotechnology industry - Concept of bioprocess	1&7	
3	1	Outline of integrated bioprocess	1&7	
4	1	Various upstream and downstream unit operations involved in bioprocess - generalized process flow sheets	1&7	
5	1	Survey of organisms, processes, products	1&7	
6	1	Market economics relating to industrial biotechnology	1&7	
UNIT II				
FERMENTATION PROCESS				
7	1	General requirements of fermentation processes	1	Students will be able to know about the requirements of fermentation process; Design and construction of fermenter and also about various types of fermentations
8	1	Isolation , preservation and improvement of industrially important micro-organisms	1&8	
9	1	Development of inocula for industrial fermentations	5	
10	1	Different types of fermentations	1&4	
11	2	Basic design and construction of fermenter and ancillaries	1,2,4&8	
12	1	Overview of aerobic and anaerobic fermentation processes and their application in the biotechnology industry	1,5&7	
13	1	Solid – substrate fermentation and its applications	1,5&7	

UNIT III				
METABOLIC STOICHIOMETRY AND ENERGETICS				
14	1	Stoichiometry of cell growth	2&3	The Learners will be revealed the basics of stoichiometry of cell growth and product formation by using elemental and electron balances with the help of numerical problems
15	1	Stoichiometry of product formation	2&3	
16	1	Elemental balances	3	
17	1	Degrees of reduction of substrate and biomass	3	
18	1	Available electron balances	3	
20	1	Yield coefficients of biomass and product formation,	2&3	
21	1	Maintenance coefficients, energetic analysis of microbial growth	2,3&6	
22	1	Energetic analysis of product formation,	2,3&6	
23	1	Oxygen consumption evolution in aerobic cultures	2&3	
24	1	Heat evolution in aerobic cultures	2&3	
25	1	Thermodynamic efficiency of growth	3&6	
26	4	Numerical problems	2&3	
UNIT IV				
MEDIA DESIGN AND STERILIZATION FOR FERMENTATION PROCESS				
27	1	Designing of media for fermentation processes	1&4	The students will be known about media design and impart knowledge on sterilization kinetics and also about types of sterilization and their design aspects
28	1	Types of media	1&4	
29	1	Design and usage of various commercial media for industrial fermentations	1&4	
30	1	Thermal death kinetics of microorganisms	1,3&4	
31	1	Batch and continuous heat sterilization of liquid media,	1,3&4	
32	1	Filter sterilization of liquid media	1&4	
33	1	Air sterilization	1&4	
34	1	Design of sterilization equipment -Batch	1,3&4	
35	1	Design of sterilization equipment - Continuous.	1,3&4	
36	1	Numerical problems	3	

UNIT V KINETICS OF MICROBIAL GROWTH AND PRODUCT FORMATION				
37	1	Phases of cell growth in batch cultures	1,2&4	The students will be known to analyze the various phases of cell growth and their kinetic expressions with the help of monod and leudeking – piret model and study about substrate and product inhibition on cell growth and product formation
38	1	Monod model	2,3&4	
39	1	Growth of filamentous organisms	2&4	
40	1	Product formation kinetics	3&4	
41	2	Leudeking-piret models	3	
42	1	Substrate inhibition on cell growth	2&4	
43	1	product inhibition on cell growth	2&4	
44	1	Substrate inhibition on product formation	2&4	
45	1	product inhibition on product formation	2&4	
46	1	Numerical problems	3	

TEXT BOOKS

1	Principles of Fermentation Technology	Peter F. Stanbury, Allan Whitaker
2	Bioprocess Engineering Basic Concepts	Michael L. Shuler, Fikret Kargi
3	Bioprocess Engineering Principles	Pauline M.Doran
4	Introduction to Biochemical Engineering	D.G.Rao
5	Fermentation Technology	M.L. Srivastava
6	Biochemical Engineering Fundamentals	Bailey and Ollis
7	Course Materials	
8	Fermentation Microbiology and Biotechnology	E.M.T. El-Mansi, C.F.A. Bryce, A.L. Demain, A.R..Allman

STAFFS ALLOTTED FOR THIS SUBJECT

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