SEMESTER S4

INDUSTRIAL BIOTECHNOLOGY

Course Code	PEPOT414	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. To make the students aware of fermentation and its upstream and downstream processing.
2. To make the students capable to understand production of commercially important primary and secondary metabolites.
3. To understand the biopolymers, vaccines and monoclonal antibodies.
4. To understand the modern trends in use of enzymes, biofertilizers, bioremediation techniques.

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SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Introduction to Industrial Bioprocess, Fermentation-** Solid State Fermentation and Submerged Fermentation, brief survey of organisms - bacteria, viruses, fungi, their products, fermenter, basic concepts of upstream and downstream process, process flow sheet, block diagrams.	9
2	**Primary metabolites-** production of commercially important primary metabolites like amino acids, organic acids and vitamins. Production of alcohol.	9
3	**Secondary metabolites-** production processes for various classes of secondary metabolites like antibiotics, Production of enzymes.	9

4	Biopolymer, SCP, biopesticides, biofertilizers, beer, wine, dairy products. Bio preservatives, bioremediation, production of vaccines, monoclonal antibodies, human insulin production, bioreactors**.**	**9**

Course Assessment Method

(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination-2 (Written)	Total
5	**15**	**10**	**10**	**40**

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End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	To interpret on fermentation and its upstream and downstream processing.	**K2**
CO2	Compare the production of commercially important primary and secondary metabolites.	**K4**
CO3	Illustrate biopolymers, vaccines and monoclonal antibodies.	**K2**
CO4	Explain the use of biotechnology in human life like biofertilizers, bioremediation techniques	**K2**
CO5	Discuss the modern trends in the use of enzymes and its production for industrial applications	**K6**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table:

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**										
CO2	**3**	**2**										
CO3	**3**	**2**						**1**	**1**			
CO4	**3**	**2**						**1**	**1**			
CO5	**3**	**2**						**1**				

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Bioprocess Technology	P T Kalaichelvan and I Arul Pandi	MJP Publishers	2007
2	*Biotechnology*	Satyanarayana, U	Books & Allied (P) Ltd	2005

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	A Textbook of Biotechnology	Dubey, R.C	S.Chand& Co. Ltd.,	2006
2	Comprehensive Biotechnology	Moo-Young. M	Pergamon Press (Oxford)	2004

Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1-4	https://youtu.be/dKxxerfNJts?si=rwqIdnG1knigANqd https://youtu.be/EfcEOLQDQu0?si=bIjlzmXGeh1OOUQT https://youtu.be/fpGEUn18H4E?si=rBONiwmO-4g2ugSW

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