SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology

Bachelor of Technology (B.Tech)

B.Tech. Semester V

Subject Name: Processing in Agricultural Chemicals and Food Industries **Subject Code:** BTCH14501

Type of course: Professional Elective Course

Prerequisite: Process calculation, Unit processes and operations, Chemical technology.

Rationale: To understand various synthesis process of pesticides and insecticides, the important processes in food industry, application of engineering principles in agrochemical and food industry..

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	100
3	0	0	3	60	25	15	00	00	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1.	**Pesticides** History, Development of Pesticides, Brief introduction to classes of pesticides, structures, chemical names, physical and chemical properties, synthesis, degradation, metabolism, formulations, mode of action, uses, toxicity, methods of analysis.	4	10
2.	**Insecticides** History, Development, classes of insecticides (Chemical class, targets), structures, chemical names, physical and chemical properties, synthesis, degradation, metabolism, formulations, mode of action, uses, toxicity (acute and chronic toxicity in mammals, birds, aquatic species etc.), methods of analysis.	4	10
3	**Synthesis of selected agrochemicals** Trifluralin (Treflam), DDT, BHC (Benzene Hexachloride), 2,4-D, Parathion. Major engineering problems, special considerations with respect to manufacturing facilities.	5	12
4.	**Parameters of Formulations** Particle size, bulk density, flow-ability, electrostatic charge, sorptivity, compatibility, and their effects on stability, rain fastness and shelf life of formulation, Rheological properties.	4	10
5	**Quality Control** Specifications of Pesticide technical and formulations (WHO/FAO/BIS) Methods of analysis of Physical properties of formulations- Suspensibility, Wettability, Emulsion stability, wet sieve test, acidity, alkalinity, moisture content, Flash Point, Specific gravity, Persistent foaming, water runoff test, dry sieve test etc. and their significance during field application.	4	10

6.	**Food industries** Introduction, General aspect, world food demand and Indian scenario, constituents of food, quality and nutritive aspects, Food additives, standards, deteriorative factors and their control, preliminary processing methods, conversion and preservation operation.	4	9
7.	**Energy management and Packaging** Fuel Utilization, Process Controls in Food Processing, Systems for Heating and Cooling Food Products, Thermal Properties of Foods, Preservation by heat and cold dehydration, concentration, frying, irradiation, microwave heating, sterilization and pasteurization, treatment and disposal of food processing wastes, Food Protection, Product Containment, Innovations in Food Packaging, Food Packaging and Product Shelf-life.	4	9
8.	**Introduction to Microbial Growth Kinetics and Enzyme kinetics**: Phases of cell growth in batch cultures, Monod model, Cell growth and product formation. Factors affecting microbial growth. Enzyme and its classification, Mechanisms of enzyme action concept of active sites. Inhibiter-types of inhibition mechanism, Enzyme Immobilization-types. Enzyme deactivation.	8	15
9.	**Bioreactors** Principle, Design and Operation, Fluidized bed, Regime analysis of Biochemical reactors processes, Measurement of physical and chemical parameters in bioreactors, Separation, isolation and purification of Biomolecule.	8	15

Suggested Specification table with Marks (Theory/Practical):

% Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
20	30	30	20	00	00

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels **(Revised Bloom's Taxonomy)**

Note: This specification table shall be treated as a general guideline for students andteachers. The actual distribution of marks in the question paper may vary slightly from above table.

Text Books:

Sr. No	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1.	Pesticide Synthesis Handbook	Thomas A. Unger	Prochrom Industrias Quimicas S/A Elsevier	1996	-
2.	Chemistry of Insecticides and Fungicides	U. S. Shree Ramulu	Oxford & IBH Pub., 2nd,	1995	-
3	Shreve's Chemical Process Industries	Austin G. T	McGraw-Hill	1994	5th
4	Dryden's Outlines of Chemical Technology	Gopalarao. M. & Sitting M.	East-West Pub., New Delhi,	1997	2nd

Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Understand various aspects in synthesis process of pesticides and insecticides.	30
CO-2	To learn to apply engineering principles and concepts related to storing, , packaging of food products	25
CO-3	To provide an understanding of the chemical, biochemical, microbiological, and physical characteristics of foods.	15
CO-4	Develop understanding about biochemistry and bio chemical processes.	15
CO-5	Develop understanding about application of engineering principles in agrochemical and food industry.	15

Mapping with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4
CO-1	3	3	2	3	3	2	3	3	2	2	2	3	2	3	3	3
CO-2	3	3	2	1	1	3	3	3	3	2	2	3	2	3	3	3
CO-3	3	3	3	3	2	2	3	2	2	2	2	3	1	3	3	3
CO-4	2	2	1	3	3	3	2	3	2	3	3	3	3	2	2	2
CO-5	2	1	2	1	1	3	3	3	2	2	2	2	3	2	1	2
Rationale*	13	12	10	11	10	13	14	14	11	11	11	14	11	13	12	13

Rationale*: Explaining why it is matching this particular program outcome

ReferenceBooks:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1.	The Agrochemical Handbook	Hartley, D., Kidd, H	Royal Society, England,	1984	-
2.	Biochemical Reaction Engineering in Chemical Engineering, Vol. III	R.Lovitt and M.Jones Edited by J. F. Richardson and Peacock	Pergamon, London,	1994	3rd
3	Biochemical Engineering Fundamentals	J. E. Bailey and D. F. Ollis	McGraw Hill, New York,	1986	-

List of Open Source/learning website:

- https://nptel.ac.in/courses/103105054
- https://nptel.ac.in/courses/102105058