TOTAL	42

Books: -

S. No.	Name of Books/ Author/Publisher
1	Lehninger's Principle of Biochemistry by DL Nelson, MM Cox. Publisher: WH Freeman
2	Biochemistry by D Voet, JG Voet. Publisher: Wiley
3	Biochemistry by CK Mathews, KE Van Holde, KG Ahern. Publisher: Benjamin/Cummings
4	Biochemistry by L Stryer. Publisher: WH Freeman and Company

Technological applications in Food technology

Details of course: -

Course Title	Course Structure			Pre-Requisite
	L	T	P	
Technological applications in Food technology (BT322)	3	1	0	NIL

Course Objective:
Introduction to Biotechnology integrates the fundamental concepts of life and physical sciences together with the basic laboratory skills necessary in the biological sciences. It provides foundational concepts in a broad spectrum of disciplines such as biochemistry, genetic engineering, biophysics, microbiology, molecular and cell biology.

Course Outcome:

1. Compare and contrast material science by learning its properties, classification, crystal geome Structure determination by X-ray Diffraction- Crystalline and Non-crystalline.
2. Gain in depth knowledge of food technology and its various aspects.
3. Analyze different types of chromatography, learning their principles and applying diffe techniques of chromatography in food analysis.
4. Distinguish different methods of manufacture of various foods, fruits and vegetables also learning basics of preservation treatments of food.
5. Design food packaging in detail by learning testing of packaging, effect of environmental factor packaging and Vacuum Packaging

S. No.	Content	Contact Hours
1.	**Material science and food technology** -Properties of Crystals and Solids : Classification of Engineering materials –Crystal geometry– Structure determination by X-ray Diffraction- Crystalline and Non-crystalline states – Inorganic solids – Metals and Alloys - Imperfection in Crystals and Phase diagram – Iron-Iron carbide systems and applications – Fick's second law of diffusion and its importance in alloy manufacture – Phase transformations and its applications –Manufacture and properties of different types of steel – Basics of SS Fabrication – Deformations – Creep, Fatigue, and Fracture – Oxidation and Corrosion and methods of protection	8
2.	**Agitation and mixing agitated vessels**- mixing and blending of miscible liquids, mixing index and effectiveness of mixing. Types of evaporators, single and multiple effect evaporators. Evaporator capacity, multiple effect evaporator – methods of feeding. Moisture and its measurements. Drying rate – Mechanical Drying. Types fixed – and Fluidized Bed. Filtration – types of filtration, constant pressure filtration and constant volume filtration and filtration aids. Principles of comminution. Energy and power requirements. Size reduction equipments.	8
3.	**Chromatography principles**. High performance liquid chromatography, Gas chromatograph - column efficiency, types of detectors – FID, TCD, ECD, MSD. FTIR Spectroscopy. Atomic Absorption Spectroscopy and Atomic Emission Spectrometry (AES). ICP – Mass spectrometry - Atomic Fluorescence Spectrometry (AFS). The NMR Phenomenon – Types of information provided by NMR spectra – Instrumental and Experimental Considerations – Solid state NMR – application of NMR to Food analysis. Application of GC/MS, LC/MS / FAB/MS / MS/MS and linked scan techniques for food analyze.	8
4.	**Technology of Rice, Pulse milling and Wheat Milling-**Oil extraction-Methods of manufacture of bread-Fruits and vegetable processing - Preservation treatments-Basics of Canning, Minimal processing and	9

	Hurdle technology. Processing of fruit juices. Dairy processing- manufacture of milk and milk products - Meat, poultry and fish processing and their products- Processing of Plantation products - Processing of Tea, Coffee and Cocoa and chocolate Processing of spices-. Pepper, cardamom, ginger, vanilla and turmeric.	
5.	**Introduction to Food packaging**, Effect of environmental factors in packaging, testing of packaging materials, Shelf-Life Estimation, Vacuum Packaging, Manufacturing of Metal cans, glass containers, plastic containers and pouches, paper and paperboard. Properties of plastics, Filling and sealing of Flexible plastic containers, Form fill Seal equipment: Printing on packages, Bar codes, Nutrition labeling and legislative requirements Extrusion – Retort pouch packaging, Active packaging, Moisture control, CO2 and Oxygen scavenging, Modified atmosphere packaging – principles, applications	9
	TOTAL	42

Books: -

S. No.	Name of Books/ Author/Publisher
1	Rajput R.K., Fundamentals of Materials Science, S.K. Kataria and Sons, Mittemeijer, Eric J., Fundamentals of Materials Science,
2	Singh and Heldman, “Introduction to Food Engineering” Academic Press,
3	Coles, R., Dowell, D.M., Kirwan, J. “Food Packaging Technology”, Wiley-Blackwell Publishing Ltd,
4	The History and Future of the World Trade Organization, WTO Publications, Craig Van Grasstek, 2..
5	Guide to the Food Safety and Standards Act. Tax-mann allied Services Pvt. Ltd., ISBN –