Revision of Syllabus of Food Technology,2014-15 session

BRANCH : FOOD TECHNOLOGY **Semester: III**

Sl No.	Subject Code	Subject	Teaching scheme (hours/work)			Evaluation Scheme					
			L	T	P	Theory			Practical		
		Theory & Practical				End Exam	Internal Assessment		End Exam	Sessional	Total
							Class Test	Assignment			
1.	FTT301	Fruits & vegetable Technology	4	-	-	70	20	10			100
2.	FTT302	Organic Chemistry	4	-	-	70	20	10			100
3.	FTT303	Industry Stoichiometry	4	-	-	70	20	10			100
4.	FTT304	Fundamental of Microbiology	4	-	-	70	20	10			100
5.	FTT305	Food Engineering	4	-	-	70	20	10			100
		Sub-Total	**20**			**350**	**100**	**50**			
		Practical/Team Work									
6	FTP301	Fruits & vegetable Technology Lab			3				25	25	50
7	FTP302	Organic Chemistry Lab			3				25	25	50
8	FTP304	Fundamental of Microbiology Lab			3				25	25	50
9	FTP305	Food Engineering Lab			3				25	25	50
10	FTP306	Technical Seminar & Soft Skills lab-1			7				25	25	50
		Total			19				125	125	
		Grand Total	**20**		**19**	**350**	**100**	**50**	**125**	**125**	**750**

FRUITS AND VEGETABLE TECHNOLOGY

L	*T*	*P*
4	*0*	*0*

III/ FTT-301

Total Contact hrs. : 60
Theory : 60
Practical : Nil

Total Marks : 100

Theory Exam. : 3 hrs.
End Exam. : 70 Marks
I.A. : 20 Marks
Assignment : 10 Marks

Objective

As all the fruits & vegetable are seasonal, their storage, processing, preparation of fruits & vegetable products is highly essential. The students after completion of this paper is well concerned with the storage, preservation, processing & preparation of their products. They also will know details about the preparation of spice powder & condiment products.

Topic wise distribution of periods

Sl. No.	Topics	Periods	Marks
1	Physiology	05	05
2.	Storage of fresh fruits& vegetables	05	10
3.	Processing	10	15
4.	Preservation of fruits & vegetables	10	10
5.	Fermented fruits & vegetables	10	10
6.	Preparation of spices & condiments	10	10
7.	Preparation of non- alcoholic beverages	10	10
	TOTAL	**60**	**70**

Topics
1.0 Physiology 1.1 Classification & Nutritive value of fruits & vegetables. 1.2 Transpiration, respiration, ripening and their effects 1.3 Harvesting & processing of fruits & vegetables
2.0 Storage of fresh fruits and vegetables 2.1 Microbiology of fresh fruits and vegetables 2.2 Spoilage and its control 2.3 Principles and methods of storage-cold storage, atmosphere storage, gas storage, hypobaric storage, pre-cooling, radiation, waving etc
3.0 Processing 3.1 Processing of vegetables: Potato chips, French fries, frozen patties, sweet potato chips, flakes, *Tomato* -juice, puree, sauce, ketchup, chutney. *Mushroom*-freeze drying, pickles, dehydration 3.2 Processing of fruits: Jam, Jelly, squash, marmalade, pickles, vinegar 3.3 Study the effect of processing on the nutritive value of fruits and vegetables
4.0 Preservation of fruits and vegetables 4.1 Preserve fruits and vegetables by heat, chemicals, sugar, salt, fermentation, drying
5.0 Fermented fruit and vegetable products 5.1 Definition of Fermented foods 5.2 Pickling and curing of foods
6.0 Preparation of spices and condiment products 6.1 Classification 6.2 Processing of spice and condiment products 6.3 Adulteration of spices.
7.0 Preparation of non-alcoholic beverage 7.1 Processing tea, coffee, and cocoa and their products 7.2 Processing of fruit juices.

Reference Books :

1. Preservation of fruits & vegetables- Giridhari Lal, ICAR, Publication
2. Processing of fruits & vegetables- Sidappa
3. Commercial fruits & vegetables processing – Wudrufv & Luh, AVI, Publication

ORGANIC CHEMISTRY

L	*T*	*P*
4	*0*	*0*

III/FTT- 302

Theory Exam. : 3 hours
End Exam. : 70 Marks

Total Contact hrs. : 60
Theory : 60

Total Marks : 100

I.A. : 20 Marks
Assignment : 10 Marks

Rationale :

Study of organic chemistry as a separate subject is more practical and fruitful. The knowledge of structure and function of a large no. of compounds built of relatively few elements is important for future bio-technologist.

Objectives : On completion of study of Organic Chemistry, the student will be able to

1. Name organic compound in IUPAC system
2. Understand the concept of isomerisation
3. Acquaint themselves with methods preparation, properties and use of common aromatic and aliphatic compounds.
4. Acquire knowledge on carbohydrates, proteins and amino acids.

Topic wise distribution of periods

Sl. No.	Topics	Periods	Marks
1	Nomenclature	15	15
2.	Aliphatic Compounds	18	20
3.	Aromatic Compounds	07	15
4.	Carbohydrates, Proteins and fats	20	20
	TOTAL	**60**	**70**

COURSE CONTENT:

1.0

1.1 Scope of organic chemistry
1.2 Differentiate organic compound and inorganic compounds
1.3 Outline the importance of organic Chemistry in modern life
1.4 Structure of organic compound
1.5 Classify organic compound
1.6 Name aliphatic compounds as per IUPAC system
1.7 Name the aromatic compounds as per the IUPAC system
1.8 Illustrate isomerisation with examples.

2.0 ALIPHATIC COMPOUNDS:

2.1 Methods of preparations, properties and uses of methane and ethane.
2.2 Methods of preparations properties of ethylene
2.3 Methods of preparation, properties and uses of acetylene
2.4 (a) Distinguish between 1, 2, 3 alcohol
(b) Methods of preparation properties and uses of methanol and ethanol.
(c) Absolute alcohol and denatured alcoholic

3.0 AROMATIC COMPOUNDS:

3.1 Methods of preparation, properties and uses of
(a) Benzene
(b) Toluene

4.0 CARBOHYDRATES, PROTEINS AND FATS:

4.1 Introduction to Carbohydrates, Proteins & Fats.
4.2 Classification
4.3 Physical and chemical properties

TEXT BOOKS

1.0 Advanced Organic Chemistry by B.S. Bahl, Arun Bahl., Tuli & Soni

INDUSTRIAL STOICHIOMETRY

L	*T*	*P*	
4	*0*	*0*	***III/FTT- 303***

Total Contact hrs. : 60
Theory : 60

Practical : Nil

Total Marks : 100

Theory Exam. : 3 hrs.
End Exam. : 70 Marks

I.A. : 20 Marks
Assignment : 10 Marks

Rationale :

In process industries raw materials are processed to get different products. The components present in the raw material combine in a definite proportion and the percentage of product formed depend on various parameters like temperature and pressure etc.. It is highly essential to know the stoichiometry ratio and proportions and the process conditions to achieve maximum product formation and recycle of the unused materials for better economy. Therefore, knowledge of stoichiometry is the first and foremost requirement for the success of a process engineer.

Objectives :

On completion of study of industrial stoichiometry the student will be able to

1. Differentiate between different units and dimensions, dimensional analysis and solve relevant problems
2. Compare density, specific gravity, etc. of gaseous mixtures
3. Estimate quantitative requirement of materials for a chemical reaction
4. Understand the concept of equilibrium vaporization and condensation
5. Workout raw material requirement for a chemical process from material balance equation.
6. Calculate energy requirement for a chemical process from energy balance equation.

Topic wise distribution of periods

Sl. No.	**Topics**	**Periods**	**Marks**
1	Units and dimension	04	05
2.	Mole concept	10	15
3.	Stoichiometry	10	10
4.	Liquids & Vapours	06	10
5.	Material balance without chemical reaction	15	15
6.	Material Balance involving chemical reaction	15	15
	Total	**60**	**70**

COURSE CONTENT

1.0 **UNITS AND DIMENSIONS**

1.1 Name the units and dimensions of different quantities used in chemical Engg. and their conversion , use of different gases.

2.0 **GASES**

2.1 Behaviour of ideal gas, real gas, Vander waal equation for real gas

2.2 Density, specific gravity, average molecular weight of gaseous mixtures

2.3 Mole percentage, weight percentage, volumetric percentage and their conversion

3.0 **STOICHIOMETRY**

3.1 Definition of Stoichiometry

3.2 Equivalent weight, molecular weight, molecular formula, empirical formula and solve some problems on it

3.3 Solve problems on chemical reaction on mass-mass, mass-volume basis

4.0 **LIQUIDS AND VAPOURS**

4.1 Vaporization, liquification, vapour pressure

4.2 Boiling point diagram

4.3 Raoult's Law and Henry's Law, solve simple problems on it

5.0 **MATERIAL BALANCE WITHOUT CHEMICAL REACTION**

5.1 Law of conservation of mass

5.2 Material balance

5.3 Solve problems on material balance based on unit operations like mixing, evaporation, distillation, drying, humidification, extraction, absorption

6.0 **MATERIAL BALANCE INVOLVING CHEMICAL REACTION**

6.1 Limiting reactant, excess reactant, stoichiometric ratio

6.2 Solve problems based on material balance involving chemical reaction

.

Reference Books :

1. Chemical process principle, Vol.- I, Hougen and Watson
2. Stoichiometry – Bhatt & Vora
3. Solved Examples in Chemical Engg. – G. K. Roy.

FUNDAMENTALS OF MICROBIOLOGY

L	*T*	*P*
4	*0*	*0*

III/FTT- 304

Total Contact hrs. : 60
Theory : 60

Practical : Nil

Total Marks : 100

Theory Exam. : 3 hrs.
End Exam. : 70 Marks

I.A. : 20 Marks
Assignment : 10 Marks

Rationale :

There are enormous annual issues of food materials, throughout the world, which are attributable directly to spoilage by the action of “micro-organisms”. Such losses may have far reaching economic and political results as for example, the great potato blight in Ireland during the nineteenth century.

Many bacteria, fungi and viruses cause floor poisoning infections and information which may vary in severity from the very mild to the fatal. Food commodities such as bread, fermented milk and vegetables and alcoholic beverages have a significant place in the diet of today Knowledge of the organisms respon for such products is essential to improve or control the quality of such foods. Newer foods and food processes may depend on the use of micro-organisms, the production of “single cell” protein and fermented foods being typical examples. Additionally, the use of micro-organisms for the utilization of food processing waste and the greatly the food industry on economic grounds and the community at large on ecological grounds.An application of microbiology is therefore essential to food technologist if they are to control or exploit the natural metabolic to the community.

Topic wise distribution of periods

Sl. No.	Topics	Periods	Marks
1	Introduction	10	10
2.	Culture Method	10	15
3.	Microscopy	05	10
4.	Morphology	05	10
5.	Physiology	15	10
6.	Growth & inhibition	15	15
	Total	**60**	**70**

CONTENTS: Theory

Sl. No.	Name of the Topics
1	INTRODUCTION 1.1 History of microbiology, micro-organisms and men 1.2 Classification of micro-organisms : Bacteria, Yeast, Fungi, Algae, Protozoa, Viruses
2.	CULTURE METHODS 2.1 Methods of isolation of pure culture, Media preparation, Culture maintenance media 2.2 Techniques of culturing, asepsis
3.	MICROSCOPY 3.1 Microscope, Different types of microscopes methods of microscopic examination 3.2 Staining techniques
4.	MORPHOLOGY 4.1 Morphological and cultural characteristics of bacteria and fungi 4.2 Vegetative cells, spores, motility
5.	PHYSIOLOGY 5.1 Physiology of micro-organisms 5.2 Autotrophs & Heterotrophs, chemosynthetic, saprophytes & parasites, Aerobes & Anaerobes, microaerophilic, psychrophiles, mesophiles and thermophiles.
6.	GROWTH & INHIBITION 6.1 Factors affecting growth and death, Cell division, Budding, Sporulation, Fragmentation 6.2 Growth optima, Phases of growth 6.3 Control of Microbial spoilage by various food preservation methods(Low temperature, high temperature, irradiation, dehydration, chemicals) in fruit & vegetables.

Reference Books :

1. Food Microbilogy , W.C.Frazier & D.C.Westhoff ,TMH, New York
2. Modern Food Microbilogy , James Jay ,CBS, New Delhi
3. Basic Food Microbilogy. – G. J. Banwart.

FOOD ENGINEERING

L	*T*	*P*	
4	*0*	*0*	***III/FTT- 305***

Total Contact hrs. : 60
Theory : 60

Practical : Nil

Total Marks : 100

Theory Exam. : 3 hrs.
End Exam. : 70 Marks

I.A. : 20 Marks
Assignment : 10 Marks

Rationale :

Food technologist is concerned with the design, adaptation and successful operation of processing plant to produce a suitable stable edible product from unstable food materials. For the above purpose the students should well acquainted with canning, drying and preservation of food products for a longer period for utilisation.

Sl. No.	Name of the Topics	Hours	Marks
1	**Introduction**	5	05
2.	**Preservation and Processing by heat**	10	10
3.	**Preservation and Processing by Cold**	10	10
4.	**Dehydration and Concentration**	10	10
5.	**Fermentation**	08	10
6.	**Food irradiation**	07	10
7.	**Food Preservatives**	05	10
8	**Food packaging**	05	05

CONTENTS: Theory

Sl. No.	Name of the Topics
1	**Introduction** 1.1 General introduction to food technology 1.2 Principles of food preservation 1.3 Methods of food preservation
2.	**Preservation and Processing by heat** 2.1 Effect of Heat on Micro-organisms 2.2 Thermal Death Time (TDT) Curve 2.3 Environmental factors 2.4 Canning 2.5 Pasteurization & Sterilization

3.	**Preservation and Processing by Cold** 3.1 Effect of cold on micro-organism 3.2 Types of cold preservation 3.3 Study & construction of cold storage
4.	**Dehydration and Concentration** 4.1 Advantages of drying and drying rate 4.2 Changes during drying 4.3 Methods of drying 4.4 Intermediate moisture foods 4.5 Methods of concentration
5.	**Fermentation** 5.1 Fermentation & benefits of fermentation 5.2 Microbial activities in foods 5.3 Control of fermentation in foods
6.	**Food irradiation** 6.1 Kinds of ionising radiations 6.2 Radiations effects. 6.3 Uses of radiations
7.	**Food Preservatives** 7.1 Classification of food preservatives(class1 and 2) 7.2 Salt: Mechanism of action, food pickling and curing 7.3 Sugar: Types, uses and mechanism of action against micro- organisms 7.4 Chemical preservatives: importance and mechanism of action of benzoic acid , KMS, Sodium benzoate
8	**Food packaging** 8.1 Introduction to Food packaging 8.2 Importance and function of food packaging. 8.3 Study types of rigid and flexible packaging

Reference Books :

1. Food Science- N. N Potter, CBS Publication
2. Principles of food science II Volumes- Karel and Luno Marcel Defker
3. Principles of food science. –Fannema, CBS Publication
4. Principles of food Preservation – Moris, Chapman & Hall
5. Food Analysis – R. Lees, C. R. C. Press Inc

FRUITS AND VEGETABLE TECHNOLOGY LABORATORY

L	*T*	*P*
0	*0*	*3*

III/FTP- 301

Practical Exam. : 4 hrs.

Total Contact hrs. : 45 *Total Marks : 50* *End Exam. : 25 Marks*

Theory : Nil

Sessional : 25 Marks

Practical : 45

Sl.No.	Name of Experiment	No .of periods
1	Study of cold storage of fruits & vegetables.	03
2	Prepare and preserve of fruits & vegetables juice.	03
3	Prepare concentration of fruits & vegetables juice.	03
4	Prepare jam, jelly ,pickles, chutney, Vinegar, tomato products, marmalade	09
5	Study and demonstrate the freezing and dehydration of fruits and vegetables.	03
6	Prepare intermediate fast food.	03
7	Prepare fermented food (fruits and vegetable product)	03
8	Sensory evaluate different food characteristics (food colour, flavour,texture,shape)	03
9	Analysis different quality parameters of food.	03
10	Study and demonstrate different methods of juice & pulp extraction.	03
11	Assess the adequacy of blanching	03
12	Bottling of peas	03
13	Examination of canned Pineapple.	03

ORGANIC CHEMISTRY LABORATORY

L T P
0 0 3 ***III/FTP- 302***

Total Contact hrs. : 45 *Total Marks : 50* *Theory Exam. : 4 hrs.*
End Exam. : 25 Marks

Theory : Nil

Sessional : 25 Marks

Practical : 45

Sl.No.	Name of Experiment	No.of perids
1	Detect the following elements in the organic compound i) Nitrogen ii) Sulphur iii) Halogen	10
2	Determine different functional groups of i) Acids ii) Alcohols iii) Aldehydes iv) Ketones v) Esters vi) Phenol vii) Amines viii) Nitro ix) Amide x) Carbohydrate	20
3	Systematic qualitative analysis of organic compound	10
4	Determine boiling point and melting point of organic compound	05

FUNDAMENTALS OF MICROBIOLOGY LABORATORY

L	*T*	*P*
0	*0*	*3*

III/FTP- 304

Total Contact hrs. : 45 *Total Marks : 50*

Practical Exam. : 4 hrs.
End Exam. : 25 Marks

Theory : Nil

Sessional : 25 Marks

Practical : 45

Sr No.	Content	No of periods
1	Study of Microscope and their parts.	03
2	Straining of Bacteria and observe size , motility, metachromatic granular and spores.	05
3	Morphology of Bacteria , moulds, yeasts	05
4	Prepare nutrition growth and media with agar, gelatine and special media for culture of microbes.	05
5	Sterilisation of glassware and media.	05
6	Isolate pure culture from water, milk,. Fruit juice, fish, meat etc.	04
7	Determine bacterial species .	03
8	Determine thermal death time.	03
9	Methylene blue reduction test.	03
10	Bacteriological examination of water and milk.	03
11	Quality assessment of processed food.	03
12	Isolate the faecal coliform from sewage water and determine the MPN(most probable No.)of sample	03

FOOD ENGINEERING
LABORATORY

L	*T*	*P*
0	*0*	*3*

III/FTP- 305

Total Contact hrs. : 45 *Total Marks : 50*

Practical Exam. : 4 hrs.
End Exam. : 25 Marks

Theory : Nil

Sessional : 25 Marks

Practical : 45

Sr No	Content	No of periods
1	Study and operation of bottle washing machine.	4
2	Testing of can and study and operation of can sealing machine.	4
3	study and operation of can reformer.	4
4	Extract fruits& vegetable juice ,using pulpar and prepare tomato products and preserve.	5
5	Preserve fruits and vegetables by canning.	5
6	Prepare and preservation of different juice.	4
7	Measurement of thickness, grammage of different material.	4
8	**Process Flow sheet of** • Tomato products viz. Sauce,,chutney, tomato powder, pickles • Bakery products viz. Biscuits, cookies, wafers , bread. • Confectionary products viz. Chocolates, candies. • Fruit products viz. Jam, jelly, squash . • Vegetable products viz. Dehydrated products, pickles. • Dairy products viz. Milk, butter, paneer , ghee, cheese etc • Snack foods • Alcoholic beverages viz. Beer, wine, whisky, rum • Meat Products &Sea food Processing viz. Fish, prawn	15

TECHNICAL SEMINAR & SOFT SKILLS LAB-1

L	*T*	*P*
0	*0*	*7*

III/FTP- 306

End Exam. : 25 Marks

Sessional : 25 Marks

Total Contact hrs. : 105
Theory : Nil
Practical : 30

Rationale: Assignment of a seminar involving a selected Food engineering will give an opportunity to study individually the requirement of setting up a Food engineering starting preparation process flow diagram, plant layout, design requirement for processing equipment, process safety, provision for effluent treatment etc.

The object of the seminar is to make use of the knowledge gained by the student at various stages of the diploma course. This helps to judge the level of proficiency, originality and capacity for application of knowledge attained by the student at the end of the course. seminar work is a team work, the students may be divided into different groups. or may be in a single group depending upon the type of project work to be carried out. For the external 50 marks, the project shall be assessed by viva-voce examination to be conducted by the external examiner at the end of the year. Each student must give a seminar talk of 10 to 15 minutes duration. Each group should submit a typed copy of the seminar report. Each staff member of the Department should guide one group of students. The topics may be given by the department for the seminar .

SOFT SKILLS LAB -1

Content

1. Intellectual skills

- Skills of speaking in correct English
- Searching information
- Reporting skills

2. Motor Skills

- Use of appropriate body language.
- Use of sense organs.

3. List of Assignments :

i) Building of vocabulary:

- 25 words for each assignment for the glossary given in the text books at the end of each chapter.
- Technical jargons.

Identify 10 technical words from the respective branches.

ii. Grammar :

- Insert correct parts of speech in the sentences given by teachers.
- Punctuate the sentences given by the teacher.

III. Conversational skills (Role Play)

- Students have to perform the role on any 6 situation by the teacher.
- Dialogue writing for the given situations.

iv. Write paragraphs on given topics :

v. News paper report writing.

- Write any two events from the news paper as it is.
- Write any two events on the situation given by teacher.

vi. Errors in English.

- Find out the errors and rewrite the sentence given by the teacher.

Note :

1) Contemporary English grammar, structure and composition, Macmillan
2) English grammar and composition, Macmillan
3) Dictionary, Oxford University.

BRANCH : FOOD TECHNOLOGY
Semester: IV

Sl No.	Subject Code	Subject	Teaching scheme (hours/work)			Evaluation Scheme					
			L	T	P	Theory			Practical		Total Mark
		Theory				End Exam	Internal Assessment		End Exam	Sessional	
							Class Test	Assignment			
1.	FTT401	Food Chemistry	4	0		70	20	10			100
2.	FTT402	Physical chemistry	4	0		70	20	10			100
3.	FTT403	Cereal Technology	4	0		70	20	10			100
4.	FTT404	Food and Nutrition	4	0		70	20	10			100
5	FTT405	Fermentation Technology	4	0		70	20	10			100
		Total	20			350	100	50			
		Practical & Team Work									
6	FTP401	Food Chemistry Lab			3				25	25	50
7	FTP402	Physical Chemistery Lab			3				25	25	50
8	FTP403	Cereal Technology Lab	-	-	3				25	25	50
9	FTP404	Food & Nutrition	-	-	3				25	25	50
10	FTP406	Technical Seminar &Soft skill lab -2	-	-	7					50	50
		Total	20	-	19				100	150	
		Grand Total	**20**	**-**	**19**	**350**	**100**	**50**	**100**	**150**	**750**

FOOD CHEMISTRY

L	*T*	*P*
4	*0*	*0*

IV/FTT401

Total Contact hrs. : 60
Theory : 60
Practical : Nil

Total Marks : 100

Theory Exam. : 3 hrs.
End Exam. : 70 Marks
I.A. : 20 Marks
Assignment : 10 Marks

Rationale :

Foodchemisty has its roots in fermentation, Nutrition , Agriculture , Medicine and Natural products. Today, it is principally concerned with the chemistry of molecules found in and associated with living system especially the chemistry of the interaction of this molecule. Developing this understanding has required the careful application of physical & chemical laws and methods in combination with the careful biological manipulation of the system under study. Several modern biochemical approaches take advantage of technology advances to study intact system.

Topic wise distribution of periods

Topics	Hours	Marks
1.0 Carbohydrate	10	10
2.0 Proteins	10	10
3.0 Lipids	10	10
4.0 Vitamins	05	10
5.0 Enzymes	05	05
6.0 Metabolism of Carbohydrates	05	10
7.0 Metabolism of lipids	05	05
8.0 Metabolism of proteins	05	05
9.0 Minerals	05	05

Topics	
10.0	**Carbohydrate** 10.1 Introduction 10.2 Structure 10.3 Classification and general properties of sugar(physical and chemical) 10.4 Physiological functions of carbohydrates
11.0	**Proteins** 11.1 Introduction 11.2 Amino Acid sequence in proteins 11.3 Physical and Chemical Properties of amino acids and proteins 11.4 Food protein and their characteristics
12.0	**Lipids** 12.1 Introduction 12.2 Classification of Lipids. 12.3 Acid number, iodine value, acetyl value, Reichert-Meissl number 12.4 Hydrolytic and oxidative rancidity, preservation of rancidity, reversion
13.0	**Vitamins** 13.1 Occurrence, Chemistry, Classification 13.2 Deficiency diseases and high intakes
14.0	**Enzymes** 14.1 Classification and nomenclature, 14.2 mechanism of enzyme action 14.3 Effect of temperature, PH, enzyme concentration and substrate concentration on the rate of enzyme reaction. 14.4 Specificity of enzyme, enzyme inhibition, kinetics of enzyme action, activation of enzymes 14.5 Functions of enzymes involved in digestion.
15.0	**Metabolism of Carbohydrates** 15.1 Embolden Meyer Hoff pathway 15.2 Kerb's Cycle 15.3 Glycogenesis, Glycogenolysis, Gluconeogenesis
16.0	**Metabolism of lipids** 16.1 Digestion and absorption of lipids
17.0	**Metabolism of proteins** 17.1 Nitrogen pool, nitrogen balance 17.2 Evaluate quality of proteins 17.3 Metabolism of proteins and amino acids.
18.0	**Minerals** 18.1 Macronutrients 18.2 Micronutrients

Reference Books :

1. Hand Book of Biochemistry- M.A.Siddiqi & A.Q. Siddiqi, Unique offset Press, Patna

2. Text Book of Biochemistry- A.Lehninger
3. Outlines of Biochemistry- Eric E. Con

PHYSICAL CHEMISTRY

L	*T*	*P*	
4	*0*	*0*	***IV/FTT402***

Total Contact hrs. : 60
Theory : 60

Total Marks : 100

Theory Exam. : 3 hrs.
End Exam. : 70 Marks

I.A. : 20 Marks
Assignment : 10 Marks

Rationale :

The phenomenal progress of technology in the 21st century has brought dramatic changes in human life style. The technology, which has thus enhanced the quality of human life, is evolved based on scientific research, primarily physical, inorganic and organic Chemistry. Use of various organic and inorganic compounds and their physical phenomenon are very much essential for any process industry. Therefore the knowledge of Chemistry is necessary for the success of Biotechnologists.

Topic wise distribution of periods

Sl. No.	Topics	Periods	Marks
1	Physical Properties of Liquids	10	15
2.	Solutions	10	12
3.	Osmosis and Osmotic Pressure	10	09
4.	Thermodynamics	10	10
5.	The Colloids	10	12
6.	Adsorption	10	12
	TOTAL	**60**	**70**

COURSE CONTENT:

1.0 PHYSICAL PROPERTIES OF LIQUIDS

1.1 Outline the kinetic molecular description and intermolecular forces in liquid.
1.2 Vapour pressure and its application
1.3 Surface tension and surface tension by capillary-rise method and drop formation method.
1.4 Concept of Viscosity and measurement of viscosity by Oswald method.
1.5 Refractive index, specific refraction.
1.6 Optical activity and measurement of optical activity.
1.7 Solve simple problems based on physical properties of liquid.

2.0 SOLUTION:

2.1 Solution and concentration of solution
2.2 Classify solutions
2.3 Solve numerical related to concentration
2.4 Solubility of partially miscible liquids
2.5 State Roult's Law and explain the lowering of vapour pressure and its measurement.

3.0 OSMOSIS AND OSMOTIC PRESSURE

3.1 Osmosis and osmotic pressure with example
3.2 Function of semi permeable membrane.
3.3 Osmotic pressure & theories of Osmosis
3.4 Reverse osmosis

4.0 THERMODYNAMICS

4.1 Introduction
4.2 Concept of state
4.3 Units of energy & gas
4.4 Phase diagram & thermodynamic properties
4.5 First Law of Thermodynamics
4.6 Relation among Enthalpy, heat, heat capacity
4.7 Second law of Thermodynamics

5.0 COLLOIDS:

5.1 Define colloids
5.2 Types of colloidal systems
5.3 Characteristics and properties of sols
5.4 Methods of preparation of sols
5.5 Methods of purification of sols
5.6 Optical, kinetic and electrical properties of sols.
5.7 Emulsion and types of emulsion.

6.0 ADSORPTION:

6.1 Adsorption
6.2 Compare absorption and adsorption
6.3 Types of adsorption
6.4 Compare physical adsorption and Chemisorption
6.5 Longmuir adsorption isotherm.

TEXT BOOK :

1.0 B.S.Bahi, H.D. Tuli, A.Bahl, "Essentials of Physical Chemistry" S.Chand & Co.

REFERENCE BOOKS:

1. K.K.Sharma, L.K.Sharma: Physical Chemistry.
2. Puri, Sharma, Pathania: Principle of Physical Chemistry.

CEREAL TECHNOLOGY

L	*T*	*P*
4	*0*	*0*

IV/FTT403

Total Contact hrs. :60
Theory : 60
Practical : Nil

Total Marks : 100

Theory Exam. : 3 hrs.
End Exam. : 70 Marks
I.A. : 20 Marks
Assignment : 10 Marks

Objective

India is a most populated country with rich in production of cereal grains. The processing of cereal grains is necessary to reach the needy. The student after completion of know details of the technology of milling , processing, production of bakery and confectionary products.

Topic wise distribution of periods

Sl. No.	Topics	Periods	Marks
1	Introduction	05	10
2.	Structure	10	10
3.	Milling of cereal grains	10	15
4.	Technology of bakery products	15	15
5.	Technology of confectionary products	10	10
6.	Snack food processing	10	10
	TOTAL	**60**	**70**

Content

1.0 Introduction
- 1.1 Major cereals in India
- 1.2 Nutritive value of cereals

2.0 Structure
- 2.1 Study of structure, varieties and classification of cereal grain such as rice, wheat, sorghum, ragi, corn, barley, bajra etc

3.0 Milling of cereal grains
- 3.1 Milling process such as cleaning, dehusking, polishing, grading, glazing, rice parboiling of rice milling
- 3.2 Wheat milling
- 3.3 Dry milling of corn into grits, coarse mill & flour
- 3.4 Wet milling of corn into starch, gluten, germ oil, cake, corn steep liquor, yellow & white dextrin, corn syrup, dextrose powder and high fructose corn syrup.
- 3.5 Milling of barley, malting, production of syrup, alcohol, beer etc.

4.0 Technology of bakery products
- 4.1 Function of different ingredients for production of bread, cake, biscuits
- 4.2 Mixing, dough development, sheeting, rounding, proofing, fermentation, baking of bread
- 4.3 Mixing and baking of cake
- 4.4 Mixing, sheeting, baking of biscuit

5.0 Technology of confectionery products 5.1 Production of confectionery products
6.0 Snacks food processing 6.1 Recent trends in snack food processing 6.2 Production of extruded cereal foods 6.3 Production of break fast cereal foods 6.4 Production of cereal based baby foods 6.5 processed foods, convenience foods

BOOKS RECOMMENDED

Sl No	Author	Title	Publication
1	Kent	Tech. of cereals and cereal products	
2	Matz	Bakery technology and Engg	AVI
3	W. J. Fance	Bread making and flour confectionery	AVI

FOOD AND NUTRITION

L	*T*	*P*
4	*0*	*0*

IV/FTT404

Total Contact hrs. : 60
Theory : 60
Practical : Nil

Total Marks : 100

Theory Exam. : 3 hrs.
End Exam. : 70 Marks
I.A. : 20 Marks
Assignment : 10 Marks

Objective

The students after completion of study should be concerned with the storage life of food products to ensure the consumer receives them in optimum condition. To this end, it is essential to understand the nature and limitations of packaging material and their use. This paper will explain everything to the students about canning and packaging.

Topic wise Period distribution

Content	Hours	Marks
1.0 Food & our Body	15	10
2.0. Menu Planning & Meal Preparation	15	15
3.0. Balanced diet and Nutrition during normal life cycle	10	20
4.0. Assessment of Nutritional status	10	15
5.0. Malnutrition and Nutrition programmes.	10	10

Content
1.0 Food & our Body 1.1. Introduction to food and nutrients 1.2. Functions of foods. 1.3. Basic food groups. 1.4. Energy metabolism 1.5. Specific Dynamic action. 1.6. Nutritive value of foods 1.7. Calorific value of foods. 1.8. Recommended dietary allowances for Indians.
2.0. Menu Planning & Meal Preparation 2.1. Developing good eating habits. 2.2. Food misinformation. 2.3. Menu planning for the family. 2.4. Menu planning for hospital settings.

3.0. Balanced diet and Nutrition during normal life cycle 3.1. Balanced diet. 3.2. Diets during a normal life cycle. 3.3. Nutrition during pregnancy. 3.4. Nutrition during lactation. 3.5. Nutrition from infancy to adolescence. 3.6. Ways of measuring growth.
4.0. Assessment of Nutritional status 4.1. Nutritional assessment of a community. 4.2. Methods of assessment of nutritional status. 4.3. Nutrition surveys. 4.4. Diet surveys.
5.0. Malnutrition and Nutrition programmes. 5.1. Causes and consequences of malnutrition in India. 5.2. Protein Energy Malnutrition. 5.3. Vitamin Deficiency. 5.4. Deficiency of minerals. 5.5. Current Nutrition programme in India. 5.6. Food fortification, food enrichment, food restoration.

BOOKS RECOMMENDED

Sl No	Author	Title	Publication
1	R.M begum	A text book of food, nutrition, deitics	Sterling publishers pvt.ltd
2	Annie Fredrick	A text book of food, nutrition	Lotus press
3	Subhangini A Joshi	Nutrition & dietics	Tata Mc graw hill

FERMENTATION TECHNOLOGY

L	*T*	*P*	
4	*0*	*0*	***IV/FTT405***

Total Contact hrs. : 60
Theory : 60
Practical : Nil

Total Marks : 100

Theory Exam. : 3 hrs.
End Exam. : 70 Marks
I.A. : 20 Marks
Assignment : 10 Marks

Topic wise Period distribution

Content	Hours	Marks
1.0 Introduction to Fermentation :	10	10
2.0. Fermentation operation :	10	10
3.0 Principle and use of fermentation :	10	15
4.0. Impact of fermentation on food quality	10	15
5.0. Fermented foods :	10	10
6.0 Fermentation in waste utilization or management :	10	10

Content

1. Introduction to Fermentation :

1.1 Modern methods of cell culture : synchronous and co-cell culture, continuous cell culture in liquid and solid media.
1.2 Pre and probiotics culture.

2. Fermentation operation :
2.1 Fermenter design and operation
2.2 Types of fermentation : sub-merged and solid state. Batch and continuous fermentation.

3. Principle and use of fermentation :
3.1 Production of vitamins, amino acids, organic acids, enzymes(amylase, pectinase, proteaces), antibiotics, alcohols etc.
3.2 Health benefits of fermented foods.
3.3 Nutritional importance of fermented foods.
3.4 Lactic acid bacteria.

4. Impact of fermentation on food quality :
4.1 Effect of fermentation on flavour, texture, nutritional and shelf-life of food.

5. Fermented foods :
5.1 Processing of fermented foods : Beer, Wine, Vinegar, bread, sauerkraut, meat, fish, cultural dairy products.

6. Fermentation in waste utilization or management :
6.1 Cassava Industry
6.2 Fish Industry
6.3 Fruits & Vegetables processing industry.

Reference Books :

1.Stanburry P.P and Whitaker A.1984, Principles of Fermentation Technology, Pergamon Press, Oxfod U.K
2. Steinkraus, K.H.1983, Handbook of Indigenous fermented foods, Marcel Dekker, Newyork.
3.Food fermentation edited by Rob Naut, William de Vos and Marcel Zwietering.
4.Fermented Beverage Production edited by A.G.H. Lea.
5.Handbook of fermented functional foods, second edition edited by Edward R.Farnworth C.H.I.P.S

FOOD CHEMISTRY
LABORATORY

L	*T*	*P*
0	*0*	*3*

IV/FTP 401

Total Contact hrs. : 45 *Total Marks : 50* *Practical Exam. : 4 hrs.*
End Exam. : 25 Marks

Theory : Nil

Sessional : 25 Marks

Practical : 45

Sl.No.	Name of Experiment	No. of periods
1	Determination of moisture content.	03
2	Detection of reducing sugar by Fehling and Benedict test.	03
3	Quantitative determination of reducing sugar by Lane and Eynon method.	03
4	Determination of fibre content of different food material and compare them.	03
5	Detection of amino acid, protein and peptides by Ninhydrin test.	06
6	Determination of protein quantity by Kjeldahl method.	06
7	Determination of acid test.	03
8	Extraction of fat by Soxhelet apparatus.	06
9	Determination of Ash content.	03
10	Detection of presence of starch by Iodine test.	03
11	Determination of water activity of different food materials.	03
12.	To distinguish between mono-saccharides and di-saccharides of Barfoed test.	03

PHYSICAL CHEMISTRY LABORATORY

L T P
0 0 3

IV/FTP402

Total Contact hrs. 45 *Total Marks : 50*

Theory Exam. : 4 hrs.
End Exam. : 25 Marks

Theory : Nil

Sessional : 25 Marks

Practical : 45

Sl.No.	Name of Experiment	No.of perids
1	Determine the viscosity of a liquid by Red wood viscometer at different temperatures and plotting graph between viscosity and temperature	05
2	Determine the refractive index of different liquids and hence specific and molar refraction	03
3	To determine the percentage of two optically active substances in a given solution polar metrically	05
4	To determine the value of rate constant(k) for the hydrolysis of ethyl acetate catalyzed by hydrochloric acid.	05
5	To determine the partition coefficient of iodine between water and carbon tetrachloride	05
6	To determine the partition coefficient of benzole acid between water and benzene at rood temperature and molecular state of Benzoic acid in benzene as compared to its slolution in water	05
7	To prepare colloidal solution of starch and eff albumin	05
8	To study the dialysis of starch sol containing sodium chloride through a cell phone of parchment paper	03
9	To determine the adsorption isotherm of acetic acid by activated charcoal	02
10	To investigate the adsorption of oxalic acid from aqueous solution of activated charcoal and examines the validity of Freundlich and Langmuir's adsorption isotherm.	05
11	Find the rate of first order reation	02

REFERENCWE BOOKS:

1. Physical Chemistry by Dr. Sudharani.
2. Advanced Practical Physical Chemistry by J.B.Yadav.

CEREAL TECHNOLOGY LAB

L T P
0 0 3 ***IV/FTP403***

Total Contact hrs. : 45 *Total Marks : 50* *Practical Exam. : 4 hrs.*
End Exam. : 25 Marks

Theory : Nil

Sessional : 25 Marks

Practical : 45

Sr No	Content	No of period
1	Determination of physical properties of different cereal grains.	03
2	Determine moisture content of different grains.	03
3	Determination of sedimentation value of the Maida.	03
4	Determination of alcoholic acidity of the sample of the wheat flour/Maida.	03
5	To determine the water absorption capacity of the Maida.	03
6	Determination of adulterant (NaHCO3) in wheat flour/Maida	03
7	Estimation of Protein content of different Cereals and Legumes.	03
8	Assessment of market samples of wheat, nice, and pulses for conforming to some PFA specifications.	03
9	Storage studies of cereal and legume grains having different moisture levels.	03
10	Determination of Gluten content in wheat flour samples.	03
11	Determination Polenske value of wheat flours.	03
12	Visit to wheat flour mill and rice mill	03
13	Visit to baking industries and corn processing plant	03
14	Preparation of expanded & puffed rice from raw and parboiled materials and assessment of quality of products including expansion in volume.	03
15	Preparation of Bread, cake, biscuits & cereal based baby & infant foods.	03

FOOD AND NUTRITION PRACTICAL

L T P
0 0 3 ***IV/FTP404***

Total Contact hrs. : 45 *Total Marks : 50* *Practical Exam. : 4 hrs.*
End Exam. : 25 Marks
Theory : Nil

Sessional : 25 Marks

Practical : 45

Content	No of periods
1.0 Calculate the nutritive value of common prepared foods.	06
2.0 Determine calorific value of food.	06
3.0. Determine nutritive value of foods through analysis or proximate principles.	06
4.0. Determine vitamins and minerals from food samples.	06
a) Ascorbic Acid, b) Thiamine, c) Riboflavin, d) Vitamin A, e) Carotene	09
5.0. Anthropometric measurement of infant- Length, Weight, circumference of chest, mid-upper arm circumference, precaution to be taken.	06
6.0 Comparison with norms and interpretation of the Nutritional assessment data and its significance- Weight for age, height for age, weight of height, Z score, body mass index(BMI), waist-Hip Ratio(WHR)	06
7.0 Growth Charts- Plotting of growth charts, growth monitoring and promotion.	06

TECHNICAL SEMINAR & SOFT SKILLS LAB 2

L	T	P
0	0	7

IV/FTP-6

End Exam. : 25 Marks

Sessional : 25 Marks

Total Contact hrs. 105
Theory : 30

Practical : Nil

Rationale: Assignment of a seminar involving a selected Food engineering will give an opportunity to study individually the requirement of setting up a Food engineering starting preparation process flow diagram, plant layout, design requirement for processing equipment, process safety, provision for effluent treatment etc.

The object of the seminar is to make use of the knowledge gained by the student at various stages of the diploma course. This helps to judge the level of proficiency, originality and capacity for application of knowledge attained by the student at the end of the course. seminar work is a team work, the students may be divided into different groups. or may be in a single group depending upon the type of project work to be carried out. For the external 50 marks, the project shall be assessed by viva-voce examination to be conducted by the external examiner at the end of the year. Each student must give a seminar talk of 10 to 15 minutes duration. Each group should submit a typed copy of the seminar report. Each staff member of the Department should guide one group of students. The topics may be given by the department for the seminar .

SOFT SKILLS LAB 2

1. SWOT Analysis- Analyse yourself with respect your strength and weakness opportunities and threats. Following points will be useful for doing-SWOT.

a) Your past experience
b) Achievements
c) Failures
d) Feedback from others etc.

2. Undergo a test on reading skill/memory skill administered by your teacher.
3. Solve the puzzles.
4. Form a grouyp of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slum area, social activities like giving cloths to poors etc.
5. Deliver a seminar for 10-12 minutes using presentation aids on the topic given by your teacher.
6. Watch/listen an informative session on social activities. Make a report on topic of your interest using audio/visual aids. Make a report on the programme.
7. Conduct a interview of a personality and write a report on it.
8. Discuss a topic in group and prepare minutes of discussion. Write thorough description of the topic discussed.
9. Arrange an exhibition displaying flow-charts, posters, paper-cuttings, photographs etc. on the topic given by your teacher.

BRANCH : FOOD TECHNOLOGY
Semester: V

Sl No	Subject Code	Subject	Teaching scheme (hours/work)			Evaluation Scheme					
			L	T	P	Theory			Practical		
		Theory				End Exam	Internal Assessment		End Exam	Sessional	Total marks
							Class Test	Assignment			
1.	FTT501	Fluid mechanics & Heat Transfer	4	0		70	20	10			100
2.	FTT502	Food processing Engineering	4	0		70	20	10			100
3.	FTT503	Dairy Technology	4	0		70	20	10			100
4.	FTT504	Meat & Poultry Technology	4	0		70	20	10			100
5	FTT505	Fish Processing Techology	4	0		70	20	10			100
	Total		20			350	100	50			
		Practical									
6	FTP501	Fluid mechanics & Heat Transfer Lab			3				25	25	50
7	FTP502	Food processing Engg. Lab			3				25	25	50
8	FTP503	Dairy Technology Lab			3				25	25	50
9	FTP504	Meat & Poultry Tech. Lab			3				25	25	50
10	FTP506	Technical seminar & Soft skill lab -3			5				25		25
11	FTP507	Project Work 1& Industrial Training			2				25		25
		Total	20	0	19				150	100	
		Grand Total				**350**	**100**	**50**	**150**	**100**	**750**

FLUID MECHANICS & HEAT TRANSFER

L	*T*	*P*
4	*0*	*0*

V/FTT 501

Total Contact hrs. : 60
Theory : 60

Practical : Nil

Total Marks : 100

Theory Exam. : 3 hrs.
End Exam. : 70 Marks

I.A. : 20 Marks

Assignment : 10 Marks

Rationale :

Fluid statics, fluid flow phenomena, flow measurement, fluid flow through pipe lines, fluidized bed etc. in an industry are essentially important. There are many unit processes particularly in chemical, petrochemical, pharmaceutical, hydro-metallurgical etc. plants in which fluid flow phenomena are of fundamental importance in design consideration. It is therefore, necessary for an engineer planning career in chemical, petrochemical etc. industries to study fluid flow phenomena, selection of the characteristics of different fluid transportation and flow control devices.

Objectives: On completion of studies of fluid mechanics the student will be able to

(i) Distinguish the fundamental and derived units, derived dimensional formula of various physical quantities
(ii) Understand and explain between fluid statics and fluid dynamics
(iii) Solve problems on flow measurement, Bernoulli's equation etc.
(iv) Acquaint themselves with various kinds of pumps, blowers & fans
(v) Understand various fluid properties like density, viscosity and critical velocity,Reynolds number etc.
(vi) Acquire problem solving skill and improvisation of the process.

Topic wise distribution of periods

Sl. No.	Topics	Periods	Marks
1	INTRODUCTION TO FLUID STATICS	10	10
2.	FLUID FLOW PHENOMENA AND FLUIDISATION	10	10
3.	FLOW MEASUREMENT AND TRANSPORTATION OF FLUID	10	15
4.	CONDUCTION	10	10
5.	CONVECTION	10	10
6.	HEAT EXCHANGERS AND EVAPORATORS	10	15
	TOTAL	**60**	**70**

Contents:

6.0 HEAT EXCHANGERS AND EVAPORATORS

6.1 Classify heat exchanger.
6.2 Construction and working of single pass, and multipass, shell and tube heat exchangers.
6.3 Energy balance for shell and tube heat exchanger and solve problems.
6.4 Classify evaporator
6.5 Construction and operation of different types of evaporators
6.6 Solve simple material balance and energy balance problems

Reference Books :

1. 'Unit operation for Chemical Engineers' – Macable & J.M.Smith (McGraw-Hill)
2. Introduction to Chemical Engineering by Badgero and Banchero (McGraw-Hill)
3. Introduction of Chemical Engg. by Ghosh, Sanyal and Dutta (Tata McGraw-Hill)
4. Chemical Engineering Vol.II – Richardson & Coulson.

FOOD PROCESSING ENGINEERING

L	*T*	*P*
4	*0*	*0*

V/FTT 502

Theory Exam. : 3 hrs.

Total Contact hrs. : 60 *Total Marks : 100* *End Exam. : 70 Marks*

Theory : 60

I.A. : 20 Marks

Practical : Nil

Assignment : 10 Marks

Objective

The food technologist who will work in a food processing plant must have the knowledge of the filtration, mixing, extraction, distillation, crystallization etc. The details of all these found in the syllabus so that they will not face any major problem while working as engineer.

Topic wise distribution of periods

Sl. No.	Topics	Periods	Marks
1	Size reduction & separation	10	10
2.	Filteration & mixing	10	10
3.	Extration	10	10
4.	Distillation & crystalization	10	10
5.	Drying	05	10
6.	Evaporaor	10	10
7	Canning & Freezing	05	10
	TOTAL	**60**	**70**

Content

1.0 Size reduction & separation

1.1 Objects of size reduction
1.2 Screening, Air filter, Air separation , membrane separation .
1.3 Study sedimentation equipments(froth flotation)
1.4 Study of classifiers, separators.
1.5 Study the equipments used for grading & sizing in food industry.
1.6 State and Explain Kick's law and Rittinger's law
1.7 Explain grinding(wet and dry)

2.0 Filtration & Mixing 2.1 Theory of filtration 2.2 Types of filtration 2.3 Different types of Filters used in industry 2.4 Object of mixing, Different types of mixers used in food industry(centrifuge, batch and continuous)
3.0 Extraction 3.1 Principles of extraction 3.2 Types of Extraction(solid-liquid extraction, liquid extraction) 3.3 Study the types of equipments for extraction
4.0 Distillation &Crystallization 4.1Principles of Distillation, types of distillation(flash, steam and differential) 4.2Principles of Crystallization, types of Crystallization(batch, continuous)
5.0 Drying 5.1 Study the engineering aspects of Drying(Roller drier, spray drier, fluidised bed drier, freeze drier, solar dryer)
6.0 Evaporator 6.1 Different types of evaporators used in food industries.
7.0 Canning & Freezing 7.1 Principles of canning, study of canning machine & other accessories used in canning industry. 7.2. Principles of freezing, study of different types of freezer(plate freezer, blast freezer, cryogenic freezer, vacuum freezer, refrigerator vans & wagons. 7.3 Study of different equipments used for processing of food.

BOOKS RECOMMENDED

1. Introduction to Chemical Engg Badger & Banchero
2. Unit operation in Chemical Engg Mccabe & Smith

DAIRY TECHNOLOGY

L	*T*	*P*
4	*0*	*0*

V/FTT 503

Total Contact hrs. : 60
Theory : 60
Practical : Nil

Total Marks : 100

Theory Exam. : 3 hrs.
End Exam. : 70 Marks
I.A. : 20 Marks
Assignment : 10 Marks

Objective

Dairy technology is also known as the milk and milk products technology. Milk is the vital element, which contains a lot of vitamins. Some people do not like to drink milk but like milk products. The students of food technology after completion of study have the basic idea of milk and the production of milk products, to help those people who do not like milk. They also study the fermented milk products and infant milk food for the babies.

Content	**Hours**	**Marks**
1.0 Introduction	04	05
2.0 Secretion	08	10
3.0 Constitution and composition of milk	08	10
4.0 Processing, distribution and storage of liquid milk	15	15
5.0 Technology of indigenous milk products	15	10
6.0 Fermented milk products	05	10
7.0 Production of infant milk food	05	10

Content
1.0 **Introduction** 1.1Objective and development of milk processing industries in india 1.1 Present status and future scope
2.0 Secretion 2.1 Theories of milk secretion 2.2 Function of hormones and their influence on milk secretion 2.3 Hygenic milk production
3.0 Constitution and composition of milk 3.1 Major and minor constituents of milk 3.2 Phisico-chemical properties of liquid milk 3.3 Factors effecting the composition of milk 3.4 Nutritive value milk and milk products 3.5 Microbiology of milk
4.0 Processing, distribution and storage of liquid milk

4.1 Processing of milk-Straining, filtration, clarification, cream separation 4.2 Heat treatment of milk- boiling, pasteurization, homogenization 4.3 Standardization of milk 4.4 Preparation of butter, ghee, condensed milk, evaporated milk, dried milk, ice-cream
5.0 Technology of indigenous milk products 5.1 khoa, rabri, kheer, lassie, pannier, channa, dahi,cheese
6.0 Fermented milk products 6.1 Preparation of different method of cheese(cheddar, cottage, processed Swiss, Roquefort, camembert) 6.2 Physical, chemical and microbiological changes 6.3 Fortification of milk products
7.0 Production of infant milk food

BOOKS RECOMMENDED

Sl No	Author	Title	Publication
1	Eckles, Combs	Milk & Milk Products	THM
2	DE	Out lines of Dairy Tech	Oxford
3	Atherton & Newlander	Chemistry & testing of diary products	CBS

MEAT AND POULTRY TECHNOLOGY

L	*T*	*P*
4	*0*	*0*

V/FTT 504

Total Contact hrs. : 60
Theory : 60
Practical : Nil

Total Marks : 100

Theory Exam. : 3 hrs.
End Exam. : 70 Marks
I.A. : 20 Marks
Assignment : 10 Marks

Topic Wise period distribution

Content	**Hours**	**Marks**
1.0 **Introduction**	05	10
2.0 Plant layout and slaughtering	15	10
3.0 Quality of fresh meat	15	10
4.0 Egg	10	15
5.0 Poultry	08	15
6.0 Spoilage and preservation	07	10

Content
1.0 **Introduction** 1.1 Study the development of meat and poultry industries in india 1.2 Study their role in national economy
2.0 **Plant layout and slaughtering** 2.1 location, layout and structure of a slaughter house and poultry processing plant 2.2 Pre-slaughter care, anti and post martem inspection and kinds of animal/poultry slaughter 2.3 Slaughtering and dressing of animal/poultry meats 2.4 Classify meat(wholesale, retail, special cuts)
3.0 **Quality of fresh meat** 3.1 Factors affecting quality 3.2 Criteria to assess quality 3.3 Food value and chemical composition of meat 3.4 Bio-chemical changes in meat after slaughter leading to rigor mortis, aging, and tenderisation of meat 3.5 Meat additives and adulterants 3.6 Meat Products
4.0 **Egg** 4.1 Structure and composition 4.2 Egg quality

4.3 Egg Processing 4.4 Effect of heat on egg proteins 4.5 Egg foams 4.6 Egg Products
5.0 **Poultry** 5.1 Classification 5.2 Poultry Processing 5.3 Composition and nutritive value 5.4 Poultry cooking
6.0 **Spoilage and preservation** 6.1 Contamination, spoilage in general 6.2 Method of preservation of meat and poultry products (low temp, high temp, curing, smoking, antibiotics, radiation etc)

BOOKS RECOMMENDED

1. Mauntney-Poultry Products Tech, AVI
2. Lavie –Meat hand book,AVI

FISH PROCESSING TECHNOLOGY

L	*T*	*P*
4	*0*	*0*

V/FTT 505

Total Contact hrs. : 60
Theory : 60
Practical : Nil

Total Marks : 100

Theory Exam. : 3 hrs.
End Exam. : 70 Marks
I.A. : 20 Marks
Assignment : 10 Marks

Topic wise period distribution

Content	**Hours**	**Marks**
1.0 **Introduction**	15	10
2.0 **Quality of fresh fish** :	15	25
3.0 **Spoilage & Preservation** :	15	20
4.0 **Fish Products**:	15	15

Content
2.0 Introduction 1.1. Study the development of fisheries in India. 1.2 Structure of fish 1.3 Fish quality 1.4 Fish processing 1.5 Composition & Nutritive value
2.0 **Quality of fresh fish** : 2.1 Factors affecting quality. 2.2 Criteria to access quality. 2.3 Bio-chemical changes in fish after catching.
3.0 **Spoilage & Preservation** : 3.1 Contamination & spoilage in general 3.2 Method of preservation of fish by different method.
4.0 **Fish Products**: 4.1 Manufacture of fish protein, concentrates, fish sauces, and fish sausage. 4.2. Quality aspects of processed fish

FLUID MECHANICS AND HEAT TRANSFER LABORATORY

L	*T*	*P*
0	*0*	*3*

V/FTP 501

Total Contact hrs. : 45 *Total Marks : 50*

Theory Exam. : 4 hrs.
End Exam. : 25 Marks

Theory : Nil

Sessional : 25 Marks

Practical :45

List of experiments :

Sr. No.	Name of experiment	No of Periods
1	Demonstrate operation of Reynolds's apparatus and find out critical velocity	05
2	Verify Bernoulli's equation	05
3	Demonstrate operation of venturi meter and determine the venturi co-efficient	05
4	Demonstrate operation of Orifice meter and determine the Orifice co-efficient	05
5	Demonstrate operation of a Rotameter and determine rate of flow through Rotameter	05
6	Demonstrate operation of a centrifugal pump	03
7	Demonstrate operation of a fluidized bed column packed bed column	05
8	Demonstrate heat transfer through composite wall and find the resistance of wall	04
9	Demonstrate operation of multi pass, horizontal hear exchanger and determine H & U	03
10	Demonstrate heat transfer in forced convection	03
11	Study of valves & pipe fittings	02

FOOD PROCESSING ENGINEERING PRACTICAL

L *T* *P*
0 *0* *3*

V/FTLP502

Total Contact hrs. : 45

Total Marks : 50

Theory Exam. : 4 hrs.
End Exam. : 25 Marks

Theory : Nil

Sessional : 25 Marks

Practical : 45

Sr No	Content	No of periods
1	Study and operation of a mechanically/manually operated sieve-shaker; Particle size measurement by screen analysis of a ground product	04
2	Study and operation of a cyclone separator and electrostatic separator	04
3	Study and operation of a tray dryer; determination of drying rate under constant drying condition and plotting graph of falling rate period	05
4	Study and operation of different types of canning machines.	05
5	Study and operation of a refrigerator deep freezer.	04
6	Study and operation of a plate and frame filter press; determination of rate of filtration under different pressures	04
7	Study and operation of a centrifuge	04
8	Study and operation of different types of food processing equipments used in food industry.	08
09	Study and operation of thickener & crystallizer	04
10	Study and operation of a humidifier; determination of humidity by dry and wet bulb thermometer from psychometric chart	03

DAIRY TECHNOLOGY LAB

L	*T*	*P*
0	*0*	*3*

V/FTP 503

Total Contact hrs. : 45

Total Marks : 50

Theory Exam. : 4 hrs.
End Exam. : 25 Marks

Theory : Nil

Sessional : 25 Marks

Practical : 45

Sr No.	Content	No of periods
1	Physical Examination of milk and sampling	5
2	Analysis of milk for water, fat, solids, acidity, specific gravity, freezing point, viscosity and electrical conductivity (a) Methylene blue reductase test (b) Gerber's fat test (c) Solid non-fat test	6
3	Pasteurization of milk	6
4	Homogenization of milk	6
5	Production of following milk products (a) Condensed milk (b) Evaporated milk (c) Dried milk (d) Cream (e) Butter (f) Ghee (g) Ice-cream (h) Flavored and chocolate milk	10
6	Preparation of indigenous milk products	6
7	Visit to milk supply scheme and milk processing industry.	6

MEAT AND POULTRY TECHNOLOGY PRACTICAL

L	*T*	*P*
0	*0*	*3*

V/FTP 504

Total Contact hrs. : 45

Theory : Nil

Practical : 45

Total Marks : 50

Theory Exam. : 4 hrs.
End Exam. : 25 Marks

Sessional : 25 Marks

Sr No	Content	No of periods
1	Visit city slaughterhouse and city market.	4
2	slaughtering and dressing of meat poultry bud.	6
3	Identify the parts of meat / poultry	5
4	Study of processing of meat (curing)	5
5	Prepare sausage and ham	5
6	Microbial Examination and chemical composition of meat.	10
7	Asses egg quality	5
8	Prepare meat products	5

TECHNICAL SEMINAR & SOFT SKILL LAB 3

L	*T*	*P*
0	*0*	*5*

V/FTP 506

End Exam. : 25 Marks
Sessional : 25 Marks

Total Contact hrs. :75

Practical : Nil

Rationale: Assignment of a seminar involving a selected Food engineering will give an opportunity to study individually the requirement of setting up a Food engineering starting preparation process flow diagram, plant layout, design requirement for processing equipment, process safety, provision for effluent treatment etc.

The object of the seminar is to make use of the knowledge gained by the student at various stages of the diploma course. This helps to judge the level of proficiency, originality and capacity for application of knowledge attained by the student at the end of the course. seminar work is a team work, the students may be divided into different groups. or may be in a single group depending upon the type of project work to be carried out. For the external 50 marks, the project shall be assessed by viva-voce examination to be conducted by the external examiner at the end of the year. Each student must give a seminar talk of 10 to 15 minutes duration. Each group should submit a typed copy of the seminar report. Each staff member of the Department should guide one group of students. The topics may be given by the department for the seminar .

SOFT SKILLS LAB -3

Content
1. Presentation skills * Body Language * Dress like the audience. * Postures, gestures, eye contact and facial experience. 2. Stage fright * Voice and language-volume, pitch, inflection, speed, pause Pronunciation, articulation language. Practice of speech Use of aids-LCD Projector white board

3.	Group discussion and interview technique. Way to carry out group discussion Parameters-contact body language analytical and logical thinking, decision making.
4.	Interview techniques : Necessity Tips for handling common questions. Visit city slaughterhouse and city market.

PROJECT WORK & INDUSTRIAL TRAINING

L	*T*	*P*
0	*0*	*2*

V/FTP 507

End Exam. : 25 Marks
Sessional : 25 Marks

Total Contact hrs. :30

Practical : Nil

Rationale: Assignment of a seminar involving a selected Food engineering will give an opportunity to study individually the requirement of setting up a Food engineering starting preparation process flow diagram, plant layout, design requirement for processing equipment, process safety, provision for effluent treatment etc.

The object of the seminar is to make use of the knowledge gained by the student at various stages of the diploma course. This helps to judge the level of proficiency, originality and capacity for application of knowledge attained by the student at the end of the course. seminar work is a team work, the students may be divided into different groups. or may be in a single group depending upon the type of project work to be carried out. For the external 50 marks, the project shall be assessed by viva-voce examination to be conducted by the external examiner at the end of the year. Each student must give a seminar talk of 10 to 15 minutes duration. Each group should submit a typed copy of the seminar report. Each staff member of the Department should guide one group of students. The topics may be given by the department for the seminar .

BRANCH : FOOD TECHNOLOGY
Semester: VI

Sl No	Subject Code	Subject	Teaching scheme (hours/work)			Evaluation Scheme					
			L	T	P	Theory			Practical		
		Theory				End Exam	Internal Assessment		End Exam	Sessional	Total marks
							Class Test	Assignment			
1.	FTT601	Entrepreneurship Industrial Management	3	1	-	70	20	10	-	-	100
2.	FTT602	Environmental Engg. & Pollution Control	3	1	-	70	20	10	-	-	100
3.	FTT603	Instrumentation & Process Control	3	1	-	70	20	10	-	-	100
4.	FTT604	Food Safety, Hygiene, Sanitation	3	1	-	70	20	10	-	-	100
5	FTT605	Food Packaging & Quality Control	3	0	-	70	20	10	-	-	100
	Total		15	4	-	350	100	50			
		Practical									
6	FTP602	Environmental Engg. & Pollution Control	-	-	5	-	-	-	25	25	50
7	FTP603	Instrumentation & Process Control	-	-	5	-	-	-	25	25	50
5.	FTP606	Project work -2 & Industrial Food Safety lab	-	-	10	-	-	-	100	50	50
		Total	15	4	20	350	100	50	150	100	
		Grand Total				**350**	**100**	**50**	**150**	**100**	**750**

Entrepreneurship & Industrial Management

L	*T*	*P*		
3	*1*	*0*		**VI/FTT 601**
				Theory Exam. : 3 hrs.
Total Contact hrs. : 45			***Total Marks : 100***	***End Exam. : 70 Marks***
Theory : 45				***I.A. : 20 Marks***
Practical : Nil				***Assignment : 10 Marks***

Rationale:

The course intends to provide the fundamental aspects of entrepreneurship as a means for self employment. Management functions, in an organization, coordinate various resources to allow the manufacturing activities to continue on a sustained basis. It is essential that the diploma engineers are given an exposure to such management principles, so that they are capable to manage various industrial activities.

Various statutory rules acts and regulations have been instituted in India by Central/State Govt. to ensure that the workmen are not exploited and they can earn their livelihood with respect. As a supervisor/manager has to work in an industry under binding of such rules and acts, they should have a fair idea of such rules/acts/regulations.

Objectives:

On completion of course the students will able to

1. Understand the concept of different forms of organization & Management function.
2. Explain the role of an entrepreneur in industrial environment & detailed idea on SSI and various related aspects.
3. Learn about financial accounting and cost control.
4. Know the different area of management relating the stores & finance,production,sales & marketing and human resource in the organization.
5. Understand about the industrial sickness & its remedies.
6. Have a comprehensive idea on some important legislations relating to factory, workmen’s compensation, payment of wages, industrial disputes and trade union.

TOPICWISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods	Marks
1	CONCEPTOFORGANISATION&ENTERPRISE MANAGEMENT	10	05
2	ENTREPRENEURSHIP & MANAGEMENT OF S.S.I.s	10	10
3	FINANCIAL ACCOUNTING AND COST CONTROL	05	10
4	STORES & FINANCIAL MANAGEMENT	05	05
5	PRODUCTION MANAGEMENT	05	05
6	SALES & MARKETING MANAGEMENT	05	05
7	HUMAN RESOURCE MANAGEMENT	05	05
8	INDUSTRIAL SICKNESS	05	05
9	THE FACTORIES Act.	05	05
10	WORKMAN'S COMPENSATION & PAYMENT OF WAGES Act.	05	05
11	INDUSTRIAL DISPUTE ACT	03	05
12	TRADE UNION ACT	02	05
	Total	**45**	**70**

COURSE CONTENT

1.0 CONCEPT OF ORGANISATION & ENTERPRISE MANAGEMENT

1.1 Define & state the features of Business.
1.2 Components of Business.
1.3 Feature of different forms of Business organization.
1.4 Management & different Management with Administration.
1.5 Functions of Management.
1.6 Principles of 'Scientific Management'

2.0 ENTREPRENEURSHIP & MANAGEMENT OF S.S.I.s

2.1 Meaning of 'Entrepreneurship'.
2.2 Entrepreneurial characteristics.
2.3 Role of an entrepreneur in industrial development.
2.4 Define S.S.I , Ancillary , Tiny , Cottage , Medium ,& large Scale Industries.
2.5 Features of SSI.
2.6 Criteria for selection of SSI.
2.7 Discuss the institutional support to SSI at State and National level. (OSFC, OSIC, IPICOL, IDCO, SIDBI, IDBI, ICICI & Commercial Banks)

3.0 FINANCIAL ACCOUNTING AND COST CONTROL

3.0 State the different types of Accounts & explain the double entry system of book keeping.
3.1 Journal, Ledger, Trial Balance & Cash Book.
3.2 Components of Final Account and Balance-Sheet.
3.3 Cost and its elements.
3.4 Prepare a simple cost sheet.

4.0 STORES & FINANCIAL MANAGEMENT

4.1 Procedures involved in purchasing.
4.2. Centralized & decentralized purchasing.
4.3 Different stores records-Bin Card, Stores Ledger & Goods Received Note etc.
4.4 Types of capital-Fixed &Working.
4.5 Components of Working Capital Management.

5.0 PRODUCTION MANAGEMENT

5.1 Importance of production, planning and control.
5.2 Steps involved in production, planning and control.

6.0 SALES & MARKETING MANAGEMENT

6.1 Importance of sales & marketing management.
6.2 Different selling methods.
6.3 Product policy briefly
(Types of products, Packaging, Branding, Pricing, Cost plus pricing, Variable pricing policy, Price strategy)
6.4 Enumerate the techniques of sales promotion.
6.5 Advertising & its media

7.0 HUMAN RESOURCE MANAGEMENT

7.1 Different sources of requirement.
7.2 Different methods of selection.
7.3 Different training methods.

8.0 INDUSTRIAL SICKNESS

8.1 Meaning of Industrial sickness.
8.2 Causes of sickness.
8.3 Remedial measures to avoid Industrial Sickness.

9.0 THE FACTORIES Act.

9.1 Meaning & objectives of factories act.
9.2 Outline the various provisions related to Health , Safety, Welfare, Hours of Work, Holidays, Wage, Employment of Women, Accidents, Diseases, Penalties & Procedures.
9.3 Duties of Factory Inspector.

10.0 WORKMAN'S COMPENSATION & PAYMENT OF WAGES Act.

10.1 Rules regarding Workmen's Compensation.
10.2 Employees' liability for compensation
10.3 Obligation and rights of Employer
10.4 Meaning of Payment of wages Act
10.5 Different rules for payment of minimum wages.
10.6 The provisions of E.P.F. and E.S.I.

11. INDUSTRIAL DISPUTE ACT

11.1 Outline the objects and meaning of Industrial Dispute

12. TRADE UNION ACT

12.1 Meaning and function of Trade Union

BOOKS RECOMMENDED:

1. O.P. Khanna- Industrial Engineering & Management
2. Gupta & Srivastava- Entrepreneurial Development
3. Vasant Desai – Small Scale Industry
4. Sharma & Gupta – Business Organization
5. L. M. Prasad – Principles & Practice of Management
6. B. Bhadhei - Entrepreneurship for Engineers
7. N.D.Kapoor- Industrial Law

ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL

L	*T*	*P*
3	*1*	*0*

VI/FTT 602

Total Contact hrs. : 45 ***Total Marks : 100***

Theory Exam. : 3 hrs.
End Exam. : 70 Marks

Theory :45

Practical : Nil

I.A. : 20 Marks

Assignment : 10 Marks

Rationale:

Due to various aspects of human developments including the demands of Different kinds of technological innovations most people have been forgetting that the Environment in which they are living is to be maintained under various living standard for the preservation of better health. The degradation of environment due to industrial growth is very much alarming due to environmental pollution beyond permissible Limits in respect of air, water, industrial waste, noise etc. Therefore, the subject of Environmental engineering and pollution control is to be learned by every chemical Engineering students in order to control the environment as best as possible.

Objective:

After completion of study of environmental engineering and pollution control, the student will be able to

1. Aware air, water, noise, solid waste management and hazardous waste and their effects.
2. Understand methods of pollution control and their standards.

TOPICWISE DISTRIBUTION OF PERIODS

Sl. No.	Topic	Periods	Marks
1	Introduction	05	05
2	Air Pollution	10	20
3	Water pollution	10	20
4	Solid waste management	10	15
5	Noise Pollution	05	05
6	Hazardous waste management	05	05
	Total	45	70

1.0 INTRODUCTION

1.1 Importance of environment for mankind
1.2 Environmental damages causes due to pollution
1.3 Environmental portion acts
1.4 Functions of state & central pollution control board

2.0 AIR POLLUTION

2.1 Composition of air
2.2 Classify pollutants and their nature
2.3. Sources of air pollutants & their affects on man kinds, plants, animal life, material

2.4 Estimation of pollutants presents in air
2.5 Classify air pollution control equipment for particulate emission and gaseous pollutants.
2.6 Specify air pollution problems of typical chemical industries like thermal power plant, cement plants.
2.7 Air quality criteria and standards

3.0 WATER POLLUTION

3.1 Types, sources and effects of water pollution (Recap)
3.2 Water pollution by industrial wastes
3.3 Industrial waster water treatment methods
3.4 Describe Preliminary, primary, secondary, tertiary, advance treatment
3.5 Sludge treatment and disposal
3.6 Water quality criteria and standards

4.0 SOLID WASTE MANAGEMENT

4.1 Composition of solid waste
4.2 Solid waste disposal methods

5.0 NOISE POLLUTION

5.1 Noise & sources of noise
5.2 Determine noise pollution level
5.4 Different methods of noise pollution control

6.0 HAZARDOUS WASTE

6.1 Different types of hazardous waste, effect and their disposal methods

BOOKS

1 Water supply waste disposal and Env. Pollution Engg. By A. K. Chatergee
2 Air Pollution by M.N. Rao
3 Env. Engg. by Raw & Pearvy
4 Environmental Chemistry by A.K. De
5 Environmental pollution and control in chemical process industry by S.C. Bhatia.

INSTRUMENTATION AND PROCESS CONTROL

L	*T*	*P*
3	*1*	*0*

VI/FTT 603

Total Contact hrs. : 45 ***Total Marks : 100***

Theory : 45

Practical : Nil

Theory Exam. : 3 hrs.
End Exam. : 70 Marks

I.A. : 20 Marks

Assignment : 10 Marks

Rationale:

Number of control equipment and measuring devices are used in the operation of chemical engineering unit operation equipment to control of process variable, these variables like temperature, pressure, level, viscosity, density, refractive index etc. affect the processing equipment and ultimately affect the product quality. It is necessary to study the principle of operation of process variables measuring devices, so that they may be used either on-line or off line for this purpose.

Objectives:

After completion of study of Instrumentation and Process Control, the student will be able to:

1. Understand working principle, construction, repair and maintenance of measuring instrument and their used to control chemical engineering unit operations and processes.

TOPIC WISE DISTRIBUTION OF PERIODS

SL. No.	Topic	Periods	Marks
1	Instrument	10	05
2	Measurement	05	10
3	Liquid level measurement	10	10
4	PH measurement	05	05
5	Temperature measurement	05	10
6	Pressure measurement	05	10
7	Automatic control	05	10
	Total	45	70

1.0 INSTRUMENT

1.1 Define instruments & the functions of instruments
1.2 The functional elements of instruments
1.3 Characteristics of an instruments

2.0 MEASUREMENTS OF CHARACTERISTICS

2.1 Measurement of density by liquid level method displacement meter and hydrometer
2.2 Measurement of viscosity by Red Wood Viscometer, Falling Sphere Viscometer, Continuous Viscometer
2.3 Measurement of humidity by hydrometer and psychomotor method
2.4 Measurement of moisture in paper and textile
2.5 Measurement of refractive index by refractometer and polarimeter
2.6 Measurement of Spectrophotometry & colorimetry .

3.0 LIQUID LEVEL MEASURMENT

3.1 Direct and indirect measurement liquid level both in open and closed pressure vessels.

4.0 PH & CONDUCTIVITY MEASUREMENT

4.1 Measurement of PH& the measurement of electrical conductivity.

5.0 TEMPERATURE MEASURMENT

5.1 Name different temperature scales.
5.2 List the names of different methods of temperature measurement.
5.3 Temperature measurement by liquid in glass thermometer and gas pressure thermometer.
5.4 Temperature measurement on electrical phenomena – like thermocouple, resistance thermometer, optical pyrometer, radiation pyrometer, photo electric pyrometer.

6.0 PRESSURE MEASUREMENT

6.1 Name different methods of measurement of pressure.
6.2 Pressure measurement by Bourdon tube, Bellows, and Diaphragm
6.3 Pressure measurement by pirani gauge, McLeod Gauge, ionization gauge.

7.0 AUTOMATIC CONTROL

7.1 Automatic control system and explain the application with example.
7.2 Elementary idea about transfer function for a first order system and time constant.
7.3 Different idea about different types of automatic controllers.

BOOKS

1. Industrial Instrumentation – D.P. Eckman
2. Instrumentation – S.K. Singh
3. Process System Analysis and control – Koppel and Conghnaur
4. Fundamentals of Automatic Process control – A. S. Narayan

FOOD SAFETY,HYGINE, SANITATION

L	*T*	*P*
3	*1*	*0*

VI/FTT 604

Total Contact hrs. :45 ***Total Marks : 100***

Theory :45

Practical : Nil

Theory Exam. : 3 hrs.
End Exam. : 70 Marks

I.A. : 20 Marks

Assignment : 10 Marks

Rationale :

On completion of the course a student should have the knowledge of importance of food hygiene and sanitation and their effects on the community. They also know the various quality control methods so that any deterioration to any food products can be detected and steps to be taken to neutralise it.

Sl. No.	Topics	Period	Marks
1	Introduction	05	10
2	General principles of food hygiene	15	20
3	Sanitation	05	10
4	Plant sanitation	10	15
5	Legal aspect of food hygiene and sanitation	10	05
	Total	45	70

Chapter-1

1) Introduction

1.1 Importance of Food Hygiene.
1.2 Importance of Food Sanitation.
1.3 Importance of food safety.

Chapter-2

General principles of food hygiene

2.1 Aseptic processing packaging and storage
2.2 Evaluate personal hygiene .
2.3 Health checkups, cleanliness measures and their implementation.
2.4 Food handling habits.

Chapter-3

Sanitation

3.1 Sanitation and terminology related to sanitation viz. sanitary processes, sanitary food etc..
3.2 Sanitary aspect of water supply, source and quality of water in use for industry..
3.3 Purification and disinfections of water.
3.4 Preventing contamination of portable water supply..

Chapter-4

4 Plant sanitation

4.1 Importance of cleaning, physical, chemical factors in cleaning, washing sanitation..
4.2 Sanitizers commonly used and their properties.
4.3 Sanitization of equipments.
4.4 Steam sanitization for closed system.

Chapter-5

Legal aspect of food hygiene and sanitation

5. Study planning ,layout and sanitation in fruits and vegetable processing industry, dairy, meat & poultry, cereal and bakery industry.

Sl. No.	Authors	Title	Publishers
1	Jacob	Food Analysis & Quality control	AVI
2	Guthrie	Food Sanitation	AVI
3	Marriot	Principles of Food Sanitation	AVI

FOOD PACKAGING & QUALITY CONTROL

L	*T*	*P*
3	*1*	*0*

VI/FTT 605

Total Contact hrs. :45
Theory :45

Practical : Nil

Total Marks : 100

Theory Exam. : 3 hrs.
End Exam. : 70 Marks

I.A. : 20 Marks

Assignment : 10 Marks

Rationale :

On completion of the course a student should have the knowledge of importance of food hygiene and sanitation and their effects on the community. They also know the various quality control methods so that any deterioration to any food products can be detected and steps to be taken to neutralise it.

Sl. No.	Topics	Period	Marks
1	Introduction	05	10
2	General principles of food hygiene	15	20
3	Sanitation	05	10
4	Plant sanitation	10	15
5	Legal aspect of food hygiene and sanitation	10	05
	Total	45	70

Contents:

1.0 Introduction

1.0 Concept and functions of packaging.
1.2 Food Protection

2.0 Types of packaging material

2.1 Packaging materials and manufacturing
2.0 Packaging materials testing materials.
2.3 Types of failures in food packaging.
2.4 Forms of packaging system

3.0 Importance of packaging material

3.1Packaging and application.
3.2Packaging equipment

4.0 packaging laws

4.1 Laws and regulation on food packaging.
4.2 Current and future development in food packaging.

5.0 Quality Control

5.1 Quality and quality related terminology.
5.2 Importance of quality control.
5.3 Nutritional quality (composition of foods), microbial quality, sensory quality.
5.4 Evaluate sensory quality of foods, texture of foods, colour of foods and microbial quality.
5.5 Food laws, standards, regulations and specifications, HACCP regulations (Hazard analysis critical control point)
5.6 Food adulteration.
5.7 Prevention of food adulteration.
5.8 Study about misbranding.
5.9 Study the executive agencies (ISI,AGMARK (1937),FPO (1955),PFA (1954) , MPO (1974),BIS(1952),CONSUMERS PROTECTION ACT(1986),VANASAPTI CONTROL ORDER(1978),EXPORT QUALITY CONTROL AND INSPECTION ACT(1963).

Sl. No.	Authors	Title
1	Jacob	Food Analysis & Quality control
2	Gorden. L Robertson	Food packaging (principles & practice)
3	Blackie academic & professional an imprint of Chaffman & Hall	Food Packaging, 2nd edition
4	Jarious.R.D.David,R.H. Graves	Handbook of Aseptic processing & packaging (2nd edition)

ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL LAB

L	*T*	*P*	
0	*0*	*5*	**VI/FTP602**

Sessional : 25 Marks

Total Contact hrs. 75 ***Total Marks: 100*** ***End Exam. : 25 Marks***

Theory : Nil

Practical: 75

SL. No.	Topic	Periods
1	Collection of sample of waste water	05
2	Analyze a given sample of waste water for estimation of dissolved chloride	10
3	Determine the dissolved oxygen content of water by Winkler's method	10
4	Determine the chemical oxygen demand (BOD) exerted by a given sample of waste water	10
5	Determine the chemical oxygen demand (COD) of a given sample of waste water`	10
6	Determine the turbidity of a given sample of waste water	10
7	Determine the total dissolved solid in a given sample of waste water	10
8	Determine the optimum amount of coagulant required to treat to turbid water	05
9	Determine the amount of sulphate in a given sample of water.	05

INSTRUMENTATION AND PROCESS CONTROL LAB

L	*T*	*P*
0	*0*	*5*

VI/FTP 603

Total Contact hrs. : 75 *Total Marks: 100*

Sessional : 25 Marks
End Exam. : 25 Marks

Theory : Nil

Practical: 75

Sl. No.	Topic	Periods
1	Demonstrate different types of pressure gauges and temperature measuring devices	10
2	Determine pH of a given solution by pH-meter	10
3	Determine the concentration of sugar in sugar solution by Polarimeter	10
4	Find out the neutralpoint an acid-base system with Conductometric Titration	10
5	Demonstrate operation of a Calorimeter	10
6	Demonstrate control of a liquid flow system	10
7	Demonstrate function of digital multi-meter	10
8	Demonstrate the use of Spectrophotometer	05

PROJECT WORK 2 & INDUSTRIAL FOOD SAFETY LAB

L	*T*	*P*	
0	*0*	*10*	**VI/FTP606**

Sessional : 50Marks
Total Contact hrs. 150 ***End Exam. : 100 Marks***
Theory : Nil

Practical: 75

Rationale: Assignment of a project involving a selected chemical engineering operation will give an opportunity to study individually the requirement of setting up a chemical engineering Unit Operation, starting preparation process flow diagram, plant layout, design requirement for processing equipment, process safety, provision for effluent treatment etc.

The object of the project is to make use of the knowledge gained by the student at various stages of the diploma course. This helps to judge the level of proficiency, originality and capacity for application of knowledge attained by the student at the end of the course. Project work is a team work, the students may be divided into different groups. or may be in a single group depending upon the type of project work to be carried out. For the external 50 marks, the project shall be assessed by viva-voce examination to be conducted by the external examiner at the end of the year. Each student must give a seminar talk of 10 to 15 minutes duration. Each group should submit a typed copy of the project report. Each staff member of the Department should guide one group of students. The topics may be given by the department for the project work.

INDUSTRIAL SAFETY LAB

Content

1. **Personal protective equipment**

- Need for personal protective Equipment, use , care, maintaince of respiratory & non respiratory personal protective equipment.
- Selection of respirators, instruction & hints in use of breathing apparatus.

2.0 **Electrical Hazards :**

* Hazards of electrial energy, safe limits of amperages, safe distance from lines.
* Types of protection for electrical equipments in hazardous atmosphere.
* Criteria in their selection, maintenance and use.

3. **Fire Safety :**

- Chemistry of fire and fire triangle, common causes of industrial fisco, fire resitance building material, prevention of fire, portable fire extinguishers, water system, Co2 system from extinguisher system, Dry chemical extinguisher system, Industrial fire, detection and alaram.