

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI

TEACHING AND EXAMINATION SCHEME

COURSE NAME : DIPLOMA IN FOOD TECHNOLOGY

COURSE CODE : FC

DURATION OF COURSE : SIX SEMESTERS/THREE YEARS

WITH EFFECT FROM 2009-2010

SEMESTER: SIXTH

DURATION: 16 WEEKS

FULL TIME / PART TIME : FULL TIME

SCHEME - C

SR. NO	SUBJECT TITLE	SUBJECT CODE	TEACHING SCHEME			EXAMINATION SCHEME											
			TH	TU	PR	PAPER HRS	TH		TEST	TOTAL		PR		OR		TW	
							MAX	MIN		MAX	MIN	MAX	MIN	MAX	MIN		
1	Industrial Dairy Technology	9458	04	--	04	03	80	28	20	100	40	50#	20	--	--	25@	10
2	Flesh food Technology	9459	04	--	04	03	80	28	20	100	40	--	--	25@	10	--	--
3	Food Packaging	9989	03	--	02	03	80	28	20	100	40	--	--	25@	10	--	--
4	Food Plant Organization and Management	9990	04	--	--	03	80	28	20	100	40	--	--	--	--	--	--
5	Entrepreneurship Development	--	01	01	--	--	--	--	--	--	--	--	--	--	--	25@	10
6	Project	--	--	--	06	--	--	--	--	--	--	--	--	50#	20	50@	20
7	Professional Practice-II	--	--	--	02	--	--	--	--	--	--	--	--	--	--	50@	20
TOTAL			16	01	18	--	320	--	80	400	--	50	--	100	--	150	--

STUDENT CONTACT HOURS PER WEEK (FORMAL TEACHING): **35 HRS.**

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

@ - INTERNAL ASSESSMENT, # - EXTERNAL ASSESSMENT

TOTAL MARKS- 700

ABBREVIATIONS: TH – THEORY, TU- TUTORIAL, PR – PRACTICALS, OR- ORAL, TW – TERM WORK

All Practical, Oral and Term Work assessments are to be done as per the prevailing norms for implementation and assessment.

Course Name : Diploma in Food Technology

Course Code : FC

Semester : Sixth

Subject Title : Industrial Dairy Technology

Subject Code : 9458

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
04	--	04	03	80	20	50#	--	25@	175

RATIONALE:

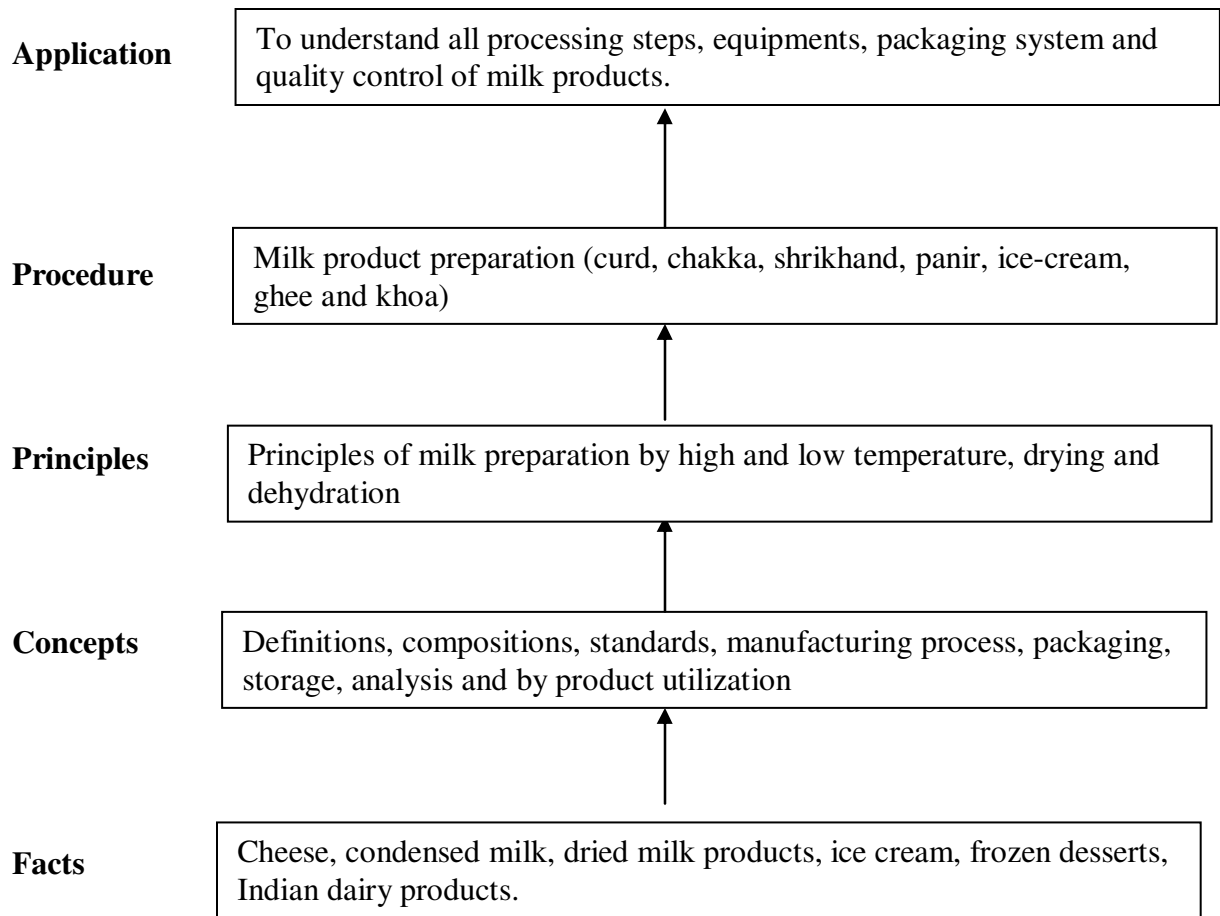
Dairy technology is an important branch of food industry involving the production of various dairy products such as cheese, evaporated milk, dried milk, dried milk products, ice cream, frozen desserts and indigenous dairy products. The food technologist is required to have the knowledge of the process technology of dairy products, types of equipments used for the processes and utilization of the by products of dairy industry. This subject covers major dairy products manufacturing processes and their quality standards.

OBJECTIVES:

Students will be able to:

1. Describe process of cheese making.
2. Describe dried milk products.
3. Classify cheese and ice cream
4. Explain processes of evaporation, drying and dehydration milk.
5. Prepare and analyze Indian dairy products.
6. Utilize by product in dairy industry.

LEARNING STRUCTURE:



CONTENTS: Theory

Chapter	Name of the Topic	Hours	Marks
1	<p>CHEESE</p> <p>1.1 Introduction, definition, scientific basis of cheese making, classification, composition, food and nutritive value. (Marks-05)</p> <p>1.2 Manufacture of Cheddar cheese, curing, freezing, yield, Distribution of milk constituents in Cheddar cheese and whey. Cottage cheese, processed cheese, continuous cheese making (Marks-10)</p> <p>1.3 Packaging and storage of cheese, defects in cheese, their causes and prevention, uses of cheese. (Marks-05)</p>	15	20
2	<p>CONDENSED AND DRIED MILKS</p> <p>2.1 Introduction, definition, composition and standards, food and nutritive value, role of milk constituents. (Marks-02)</p> <p>2.2 Manufacture, packaging and storage of condensed and evaporated milk. Defects in condensed and evaporated milks, their causes and prevention, uses of condensed and evaporated milks. (Marks-08)</p> <p>2.3 Milk drying systems, drying milk by cold treatment, film, roller or drum drying system, spray drying system. Manufacture of WMP and SMP by drum process and spray process. Instantization, packaging, storage, yield, properties, keeping quality, recent developments, defects in WMP & SMP, their causes and prevention, uses. (Marks-10)</p>	15	20
3	<p>DRIED MILK PRODUCTS</p> <p>Buttermilk powder, whey powder, cream powder, butter powder, ice cream mix powder, cheese powder, malted milk powder, infant milk food, dry sodium caseinate, shrikhand powder, chhana powder, khoa powder.</p>	08	10
4	<p>ICE CREAM AND FROZEN DESSERTS</p> <p>4.1 Introduction, definition, classification, food and nutritive value, role of constituents, properties of mixture. Manufacture, packaging, hardening and storage, soft ice cream (softy). (Marks-10)</p> <p>4.2 Defects, their causes and prevention, uses of ice cream. (Marks-06)</p>	12	16
5	<p>INDIAN DAIRY PRODUCTS</p>	08	10

	5.1 Introduction, statistics of production and consumption, comparison with western dairy products. (Marks-03)		
	5.2 Flow diagram for manufacture of kheer, khoa, khurchan, kulfi, dahi, shrikhand, panir, chhana, makkhan, ghee, lassi, ghee residue. (Marks-07)		
6	BY – PRODUCTS Introduction, definition, classification, composition, Principle of utilization, methods of utilization.	06	04
Total		64	80

PRACTICAL:

Skills to be developed:

Intellectual Skills

1. Analysis of dairy products with respect to PFA standards.

Motor Skills

1. Preparation of different dairy products.
2. Preparation of simulated dairy products.

LIST OF PRACTICALS:

1. Analysis of cheese – fat, protein, lactose, salts, Total Solids (TS), Milk Solid Not Fat (MSNF).
2. Preparation of ice cream.
3. Analysis of ice cream – total solids, milk fat, acidity, standard plate count, coliform count.
4. Preparation of dahi, chakka, shrikhand, panir, kulfi, makkhan, ghee, cheese spread.
5. Preparation of soya product – soya milk, tofu.
6. Preparation of peanut butter, peanut milk

Learning Resources:

Books:

Sr. No.	Author	Title	Publisher
01	Sukumar De	Outlines of Dairy Technology	Oxford University Press, Mumbai
02	Deepak Sahai	Buffalo Milk Chemistry & Processing Technology	S. I. Publication, Haryana, India
03	Malcom Stage	Ice cream and Frozen desserts	John Wiley and Sons, INC, New York

Course Name : Diploma in Food Technology

Course Code : FC

Semester : Sixth

Subject Title : Flesh Food Technology

Subject Code : 9459

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
04	--	04	03	80	20	--	25@	--	125

RATIONALE:

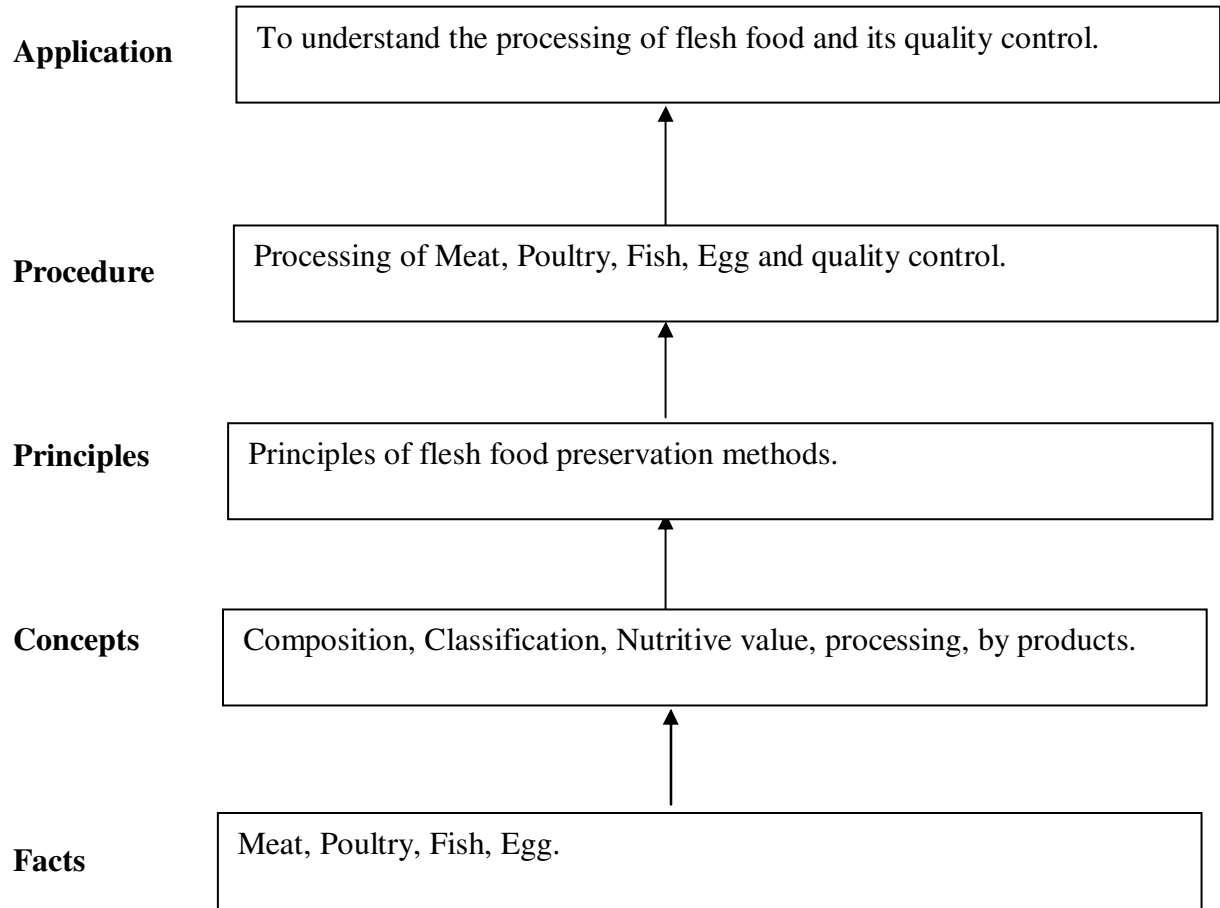
Flesh food is one of the highly perishable foods. The knowledge of process technology of flesh foods is required to cater the need of the large portion of the world population. The flesh food technology is an important branch of food industry involving the processing of foods such as meat, fish, poultry and eggs having high nutritive value. Food technologist is required to have the knowledge of the composition and processing of flesh foods as their demand is increasing rapidly.

OBJECTIVES:

Students will be able to:

1. Describe structure and chemical composition of meat, poultry, fish and egg.
2. State chemical changes during processing.
3. Prepared different value added products.
4. Describe processing of meat, poultry and fish

LEARNING STRUCTURE:



CONTENTS: Theory

Chapter	Name of the Topic	Hours	Marks
1	<p>MEAT AND MEAT PRODUCTS</p> <p>1.1 Structure and composition of meat tissues, Cuts and grades of meat, Post mortems changes, Tenderization of meat and ageing (Marks-8)</p> <p>1.2 Pre-slaughter treatment, Slaughtering and related practices, Meat processing – canning, drying, freezing, irradiation, smoking, curing, packing, Value added meat product- Burger, patties, pies (Marks-8)</p> <p>1.3 By products of meat processing (Marks-4)</p>	16	20
2	<p>POULTRY AND POULTRY PRODUCTS</p> <p>2.1 Classification, Composition, Nutritive value (Marks-5)</p> <p>2.3 Poultry processing- slaughter and bleeding, scalding, defeathering, eviscerating, chilling, packaging (Marks-10)</p> <p>2.4 Value added product –Tandoor chicken, RTE Products (Marks-5)</p>	16	20
3	<p>FISH AND FISH PRODUCTS</p> <p>3.1 Types of fish, Composition and nutritive value</p> <p>3.2 Fish spoilage, Storage of fish –freezing at sea, freezing at land</p> <p>3.3 Value added products – coated fish products, white fish products, fish cakes and burgers, fish recipe products, smoked fish, surimi technology, processing of shrimps, crabs, lobsters, scampi, molluscs</p>	16	20
4	<p>EGG PROCESSING</p> <p>4.1 Structure, composition, Nutritive value (Marks-5)</p> <p>4.2 Quality and storage (Marks-5)</p> <p>4.3 Processing – pasteurization, desugarization, freezing, dehydrated products. (Marks-10)</p>	16	20
Total		64	80

PRACTICAL:

Skills to be developed:

Intellectual Skills:

1. Microbiological testing of different flesh foods.
2. To understand the preservation techniques of flesh foods.

Motor Skills:

1. Preparation of flesh food products.
2. Observation of changes during processing.

LIST OF PRACTICALS:

1. Preparation of frozen meat and burger.
2. Dehydration of meat.
3. Roasting and mincing of poultry.
4. Preparation of salted fish and coated products.
5. Microbiological testing of meat, fish, poultry and eggs.
6. Visit to related industries.

Learning Resources

Books:

Sr. No.	Author	Title	Publisher
01	C.P.Mallett	Frozen Food Technology	-
02	Norman Potter	Food Science – 5 th Edition	CBS Publisher & Distributor, New Delhi
03	S.Manay	Food Facts and Principles	New Age International (P) Ltd., New Delhi

Course Name : Diploma in Food Technology

Course Code : FC

Semester : Sixth

Subject Title : Food Packaging

Subject Code : 9989

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
03	--	02	03	80	20	--	25@	--	125

RATIONALE:

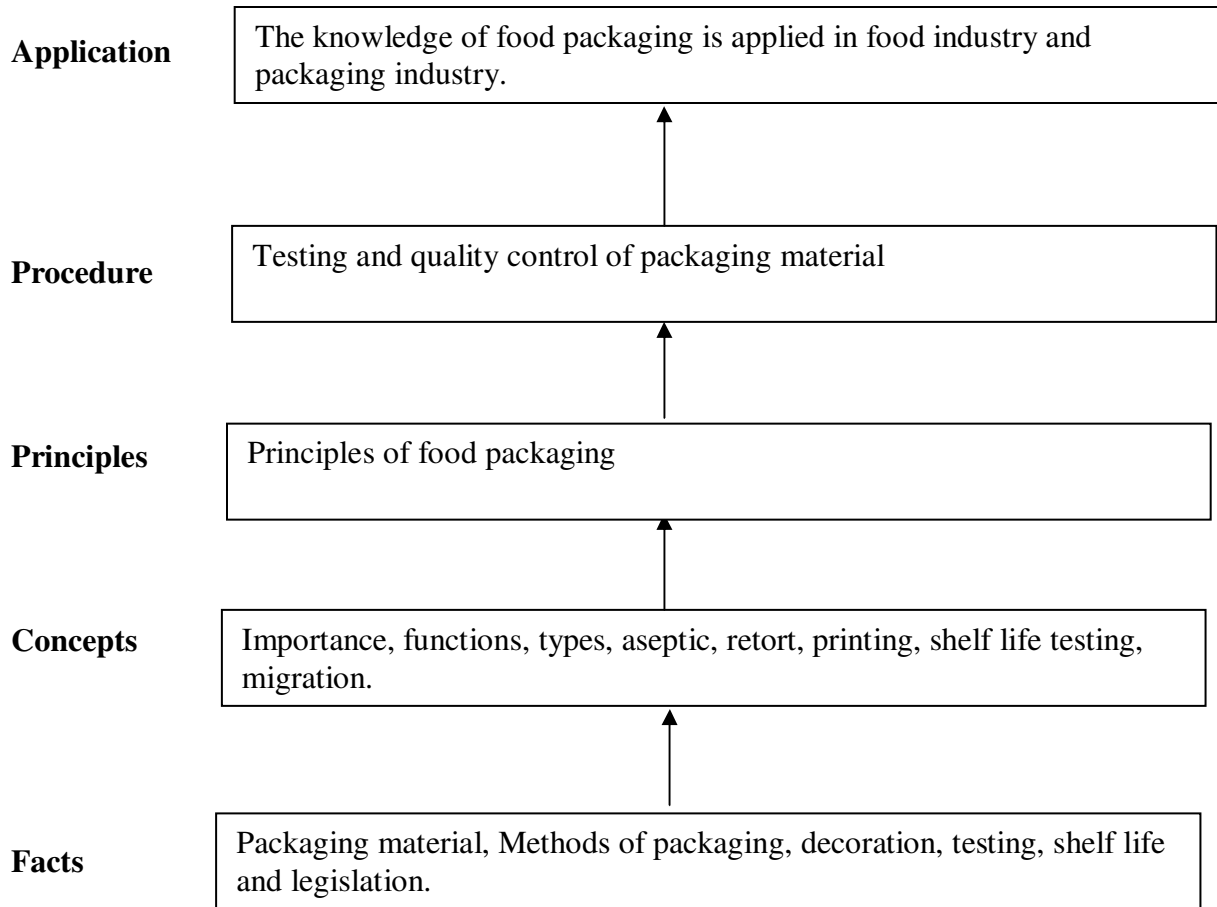
Packaging is an integral part of food processing. It performs two main functions: to advertise foods at the point of sale, and to protect foods to a pre-determined degree for the expected shelf life. In addition the package should not influence the product by migration of toxic components, by reaction between the package and the food or by the selection of harmful microorganisms in the packaged food. The food technologist is required to have the knowledge of packaging material, its function, properties, types, forms, suitability to foods, migration quality aspects and legislative aspects.

OBJECTIVES:

Students will be able to:

1. Describe material and method of food packaging.
2. State advantages and limitation of packaging material.
3. Testing of packaging material and legal aspects of food packaging.
4. Decorate the packaging material.
5. Explain functions, importance and levels of packaging material.
6. Understand the recent development in food packaging system.

LEARNING STRUCTURE:



CONTENTS: Theory

Chapter	Name of the Topic	Hours	Marks
1	PACKAGING Definition, importance, functions, various types of packaging and primary elements of packaging forms.	05	10
2	PACKAGING MATERIAL 2.1 Various packaging materials, e.g., aluminium, tinned steel, glass, paper, paper board, carton board, flexible films, laminates and others. (Marks-6) 2.2 Metal container - Can fabrication, can lacquers, types of can, advantages, disadvantages. (Marks-5) 2.3 Glass container – Manufacturing process, advantages and limitations. (Marks-5) 2.4 Plastic films – Food grade plastic films, properties and uses. (Marks-5) 2.5 Paper films – Types of paper, properties and uses. (Marks-4)	15	25
3	METHODS OF PACKAGING 3.1 Aseptic packaging – Sterilization of packaging material, sterilization of product, aseptic can system, aseptic cup system and aseptic carton system. (Marks-7) 3.2 Retort packaging – Packaging material, properties requirement and retort packaging system. (Marks-7)	10	14
4	DECORATIVE PACKAGING Decoration, different graphic designs and suitable printing methods.	03	5
5	SIZE AND SHAPE OF PACKAGING Storage, distribution and transportation shipping containers, secondary containers, boxes, crates, baskets, etc.	06	10
6	QUALITY OF PACKAGING AND ITS MATERIAL Packaging specification and control of packaging quality, testing of packaging material - glass, flexible film and corrugated board.	06	10
7	SHELF LIFE AND LEGISLATION Shelf life testing and factors affecting, Food packaging laws and food labeling.	03	6
Total		48	80

PRACTICAL:

Skills to be developed:

Intellectual Skills:

1. Collection of various packaging materials and observing the types of packaging materials used for particular food product.
2. To analyze the packaging material with respect to requirement.

Motor Skills:

1. Handle equipments / instruments.

LIST OF PRACTICALS:

1. Collection of packaging material as an album.
2. Cut-out examination of canned food.
3. To study the efficiency of packaging material for WVTR by storing in various degrees of humidity.
4. Testing of packaging material for its bursting strength and tearing strength.
5. Testing of glass container.
6. Identification of plastic films by visual methods.
7. Visit to food industry and package fabricating industry.

Learning Resources:

Books:

Sr. No.	Author	Title	Publisher
01	-	Packaging of Food Products	Indian Institute of Packaging, Andheri, Mumbai
02	-	Modern Food Packaging	Indian Institute of Packaging, Andheri, Mumbai
03	-	Tin plate in Packaging	Indian Institute of Packaging, Andheri, Mumbai
04	-	Aluminium in Packaging	Indian Institute of Packaging, Andheri, Mumbai
05	M.Mahadviah & R.V.Gowramma	Food Packaging Materials	Mata McGraw Hill Publishing Co., New Delhi

Course Name : Diploma in Food Technology

Course Code : FC

Semester : Sixth

Subject Title : Food Plant Organization & Management

Subject Code : 9990

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
04	--	--	03	80	20	--	--	--	100

RATIONALE:

Management is basically a separate branch, it is multidiscipline it means it draws knowledge, concept, various disciplines, as psychology, philosophy, economics, spastics etc.

Industry engineering is engineering approach to the detail analysis of the use of rescuers of an organization.

The main reassures are men, money, material, equipment and machinery, the industrial management carries out such analysis in order to achieve the objectives and policies of the organization.

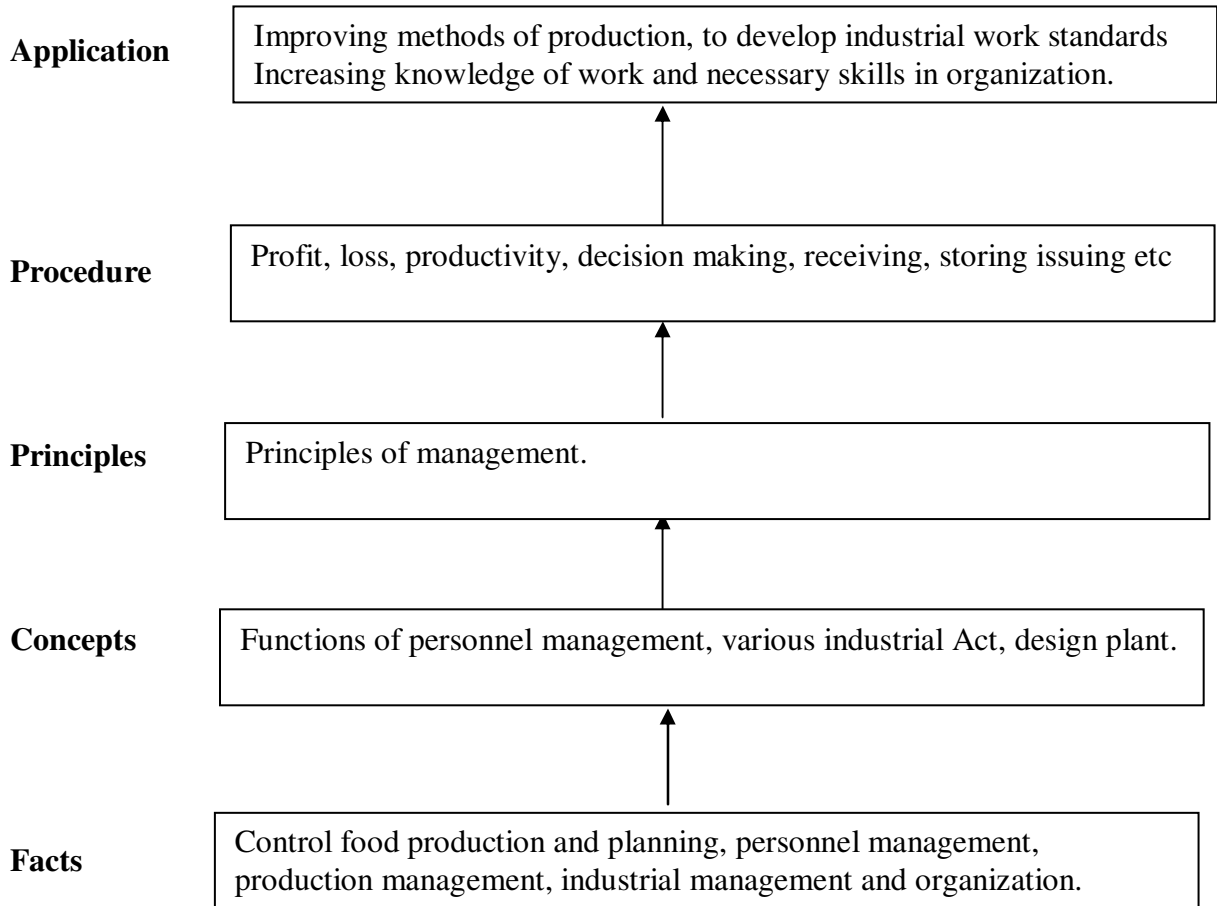
Organization has been operationalised as a collection of interacting and inter-dependent individual who would be working toward food processing.

OBJECTIVES:

Students will be able to:

1. Develop team-work sprit and sense of co-operation among the employees..
2. Achieve predetermined goals and objectives.
3. Increasing self-confidence to work in organization.
4. Describe inventory techniques, purchasing, storing ect
5. State advantages and limitation PERT and CPM techniques.

LEARNING STRUCTURE:



CONTENTS: Theory

Chapter	Name of the Topic	Hours	Marks
1	PRODUCTION MANAGEMENT 1.1 Basic principles of management, importance and need of production management (Marks-6) 1.2 Difference between production and productivity, improvement in productivity, best utilization of inputs and maximum outputs (Marks-4) 1.3 Quantitative techniques- Inventory techniques, work study, CPM / PERT, investment theory, decision making (Marks-10)	16	20
2	FOOD PRODUCTION, PLANNING AND CONTROL 2.1 Introduction to food production, planning and control, differences between production, planning and control (Marks-5) 2.2 Cycle of operation viz. Purchasing (types and methods), Receiving, Storing, Issuing, etc. (Marks-10) 2.3 Meaning and importance of production, planning and control, relations of production, planning and control with other departments (Marks-5)	16	20
3	PERSONNEL MANAGEMENT 3.1 Definitions of personnel management, Meaning, importance and role of personnel management in Indian industries (Marks-6) 3.2 Functions of personnel management- Recruitment, Education and training programme, Industrial relations, Welfare, Placement problems, transfer, promotion and retirement, Salary and wage administration, Health, working conditions and safety, Employees-Employer relations, etc. (Marks-14)	16	20
4	INTRODUCTION TO INDUSTRIAL MANAGEMENT 4.1 Introduction to industrial management, Motivation- Introduction, importance and theories of motivation (Marks-6) 4.2 Trade unions- Types, structure and rights, Various acts of industrial management- Industrial dispute act, Factories act, Trade union act (Marks-9)	10	15

5	PLANT ORGANIZATION MANAGEMENT		
	Introduction, Plant layout, Plan and Design, Methods of plant and factory layout, plant layout procedure	06	5
Total		64	80

Learning Resources:

Books:

Sr. No.	Author	Title	Publisher
01	C.B.Mamoria	Personnel Management	Himalaya Publishing House
02	O.P.Khanna	Industrial Engineering & Management	Dhanpat Rai & Sons, Delhi

Course Name : Diploma in Food Technology

Course Code : FC

Semester : Sixth

Subject Title : Entrepreneurship Development

Subject Code :

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
01	01	--	--	--	--	--	--	25@	25

RATIONALE:

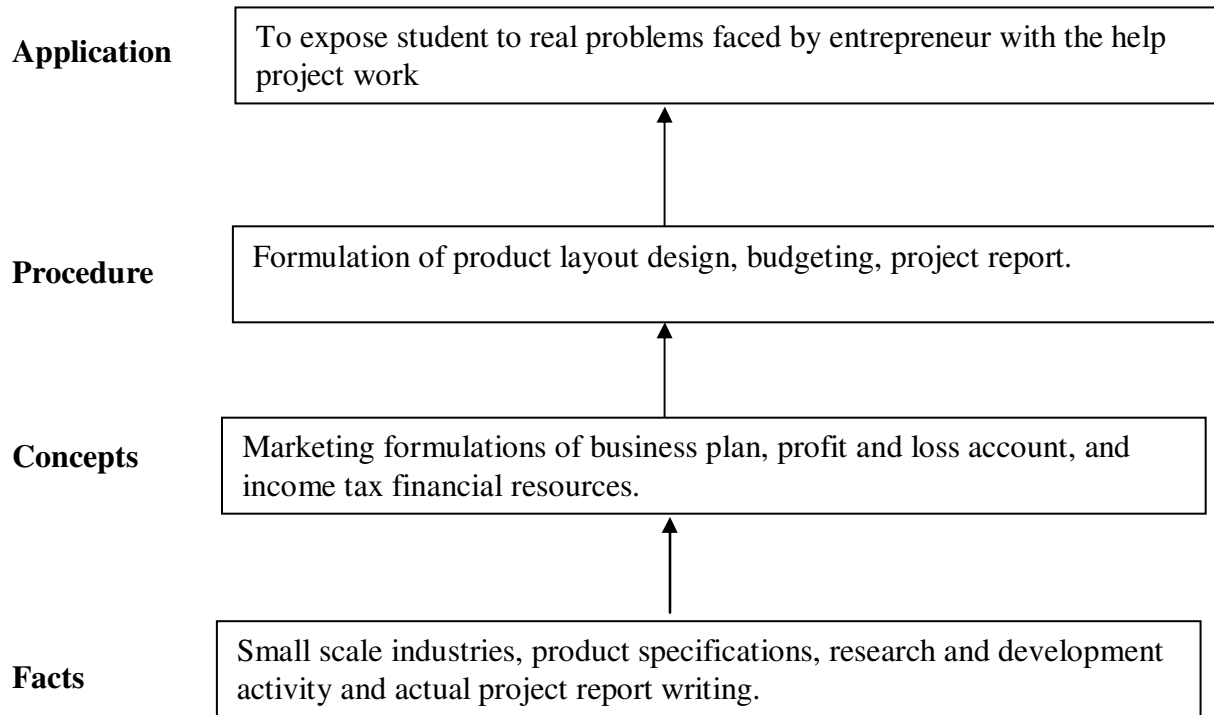
The entrepreneurship development part of the subject consists of topics related to the development of entrepreneurship skills and other details such as selection of product line, site selection, financial aspects, management and quality control. The subject includes case studies in the related field. The subject emphasizes the development of enterprising qualities among young engineers.

OBJECTIVES:

Students will be able to:

1. Attitude for personal development.
2. Research and development of new project.
3. Establishing and running enterprise
4. Report writing for getting approval from financial agencies
5. Information collection and utilization for entrepreneurship.

LEARNING STRUCTURE:



CONTENTS: Theory

Chapter	Name of the Topic	Hours
1	INTRODUCTION Entrepreneur Entrepreneurship Entrepreneurial process Information gathering techniques	02
2	PRODUCT AND SERVICE THEORY Product specification Market research, survey Functions of marketing Research and development activity	04
3	PROCEDURE FOR ESTIMATION OF RESOURCES REQUIRED FOR ESTABLISHMENT ENTREPRISE OR STARTING SERVICE BUSINESS Space Human resource Equipment Financial resources	04
4	BUDGETING Concept of budgeting Budget preparation Different types of budgets	03
5	PROCEDURE OF REPORT WRITING FOR GETTING APPROVAL FROM FINANCIAL AGENCIES Financial resources Financial corporation	03
Total		16

Term work of ED shall consist of Project Report for establishing SSI Unit

Course Name : Diploma in Food Technology

Course Code : FC

Semester : Sixth

Subject Title : Project

Subject Code :--

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
--	--	06	--	--	--	--	50#	50@	100

Rationale:

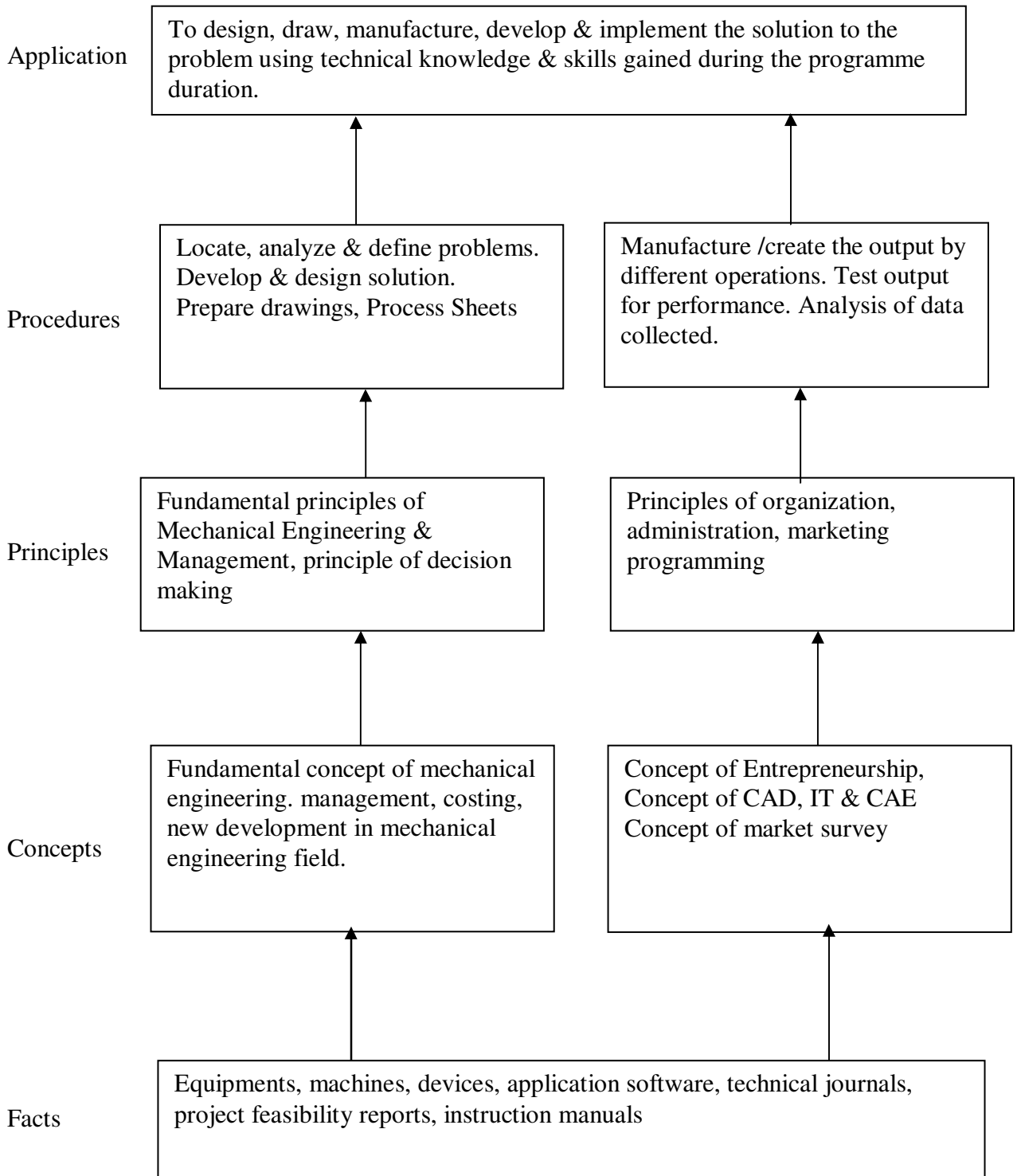
The project should enable students to combine the theoretical and practical concepts studied into useful applications. The work should enable the students to exhibit their ability to work in a team, develop planning, execution skills and perform analyzing and trouble shooting of their respective projects. The project work should be neatly documented without errors and should provide information related to the principle, working process, lay out design, formulation, analysis, costing, application and scope for future development.

Objectives:

The student will be able to-

1. Identify, analysis & define the problem.
2. Generate alternative solutions to the problem identified.
3. Compare & select feasible solutions from alternatives generated.
4. Design, develop , manufacture & operate equipment/Program.
5. Acquire higher-level technical knowledge by studying recent development in mechanical engineering field.
6. Compare machines/devices/apparatus for performance practices.
7. Work effectively in team.

Learning Structure:



THE APPROACH

Project selection

The department head / in charge should make sure that the project groups are formed with in one week of the beginning of the semester and assign a faculty as a project guide.

The project group should interact with the guides, who in turn will advice the group in selecting a project based on the group-potential.

The project should be selected with in two weeks of the group formation and brief synopsis of the project should be submitted to the HOD and guide. The synopsis should include project title, aims, objectives, methodology and proposed activities.

The group should work every week in the project duration and appraise the guide about their work progress. Guide should closely monitor the work and help the students from time to time. The guide should also maintain a record of continuous assignment of project work progress on weekly basis.

Course Name : Diploma in Food Technology

Course Code : FC

Semester : Sixth

Subject Title : Professional Practices - II

Subject Code : --

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
--	--	02	--	--	--	--	--	50@	50

Rationale:

Most of the diploma holders work in industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts.

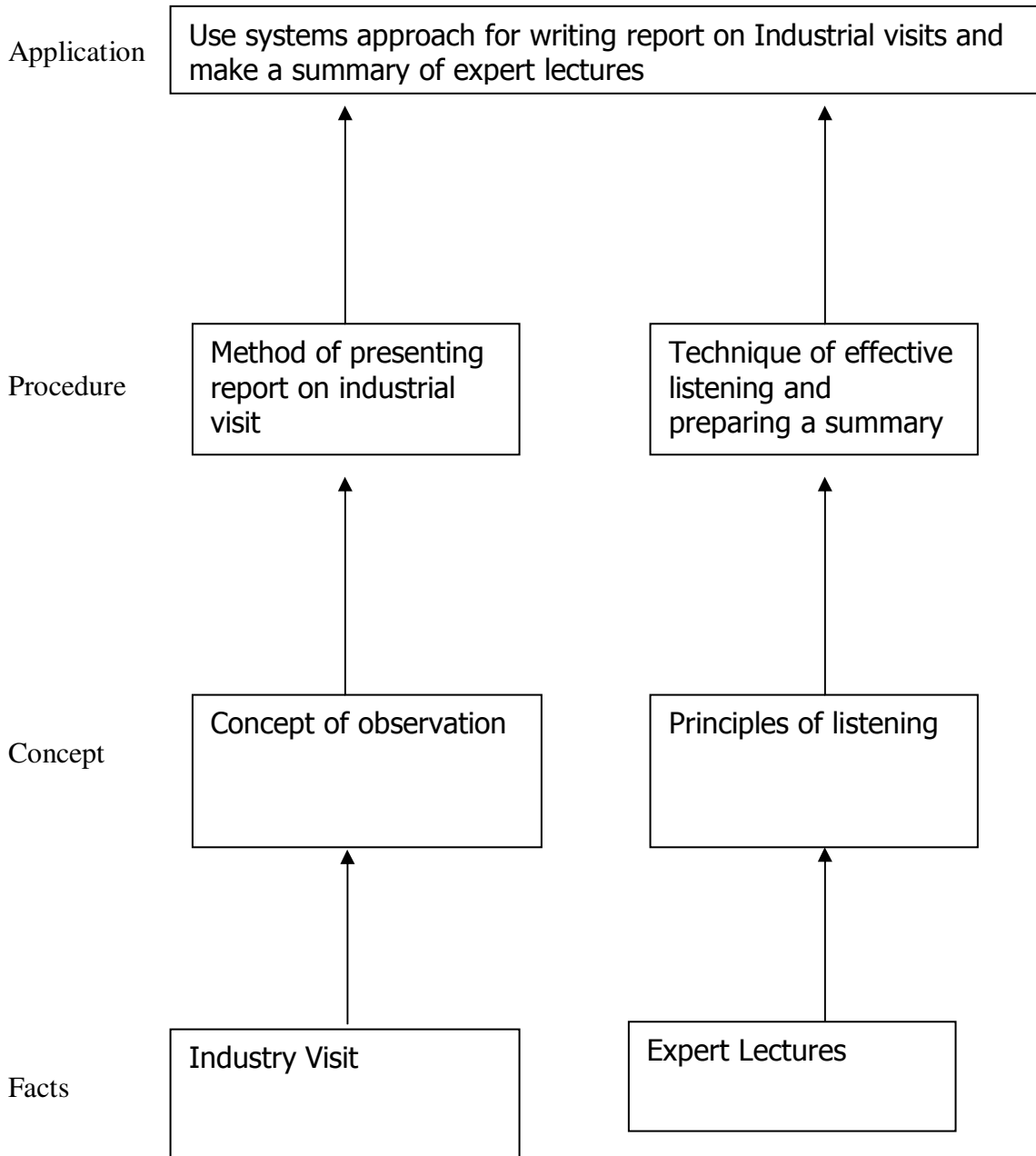
The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

Objectives:

The Student will be able to:

1. Acquire information from different sources
2. Prepare notes for given topic
3. Present given topic in a seminar
4. Interact with peers to share thoughts
5. Prepare a report on industrial visit, expert lecture

Learning Structure:



Sr. No.	Activities
01	<p>Industrial Visits Structured industrial visits be arranged and report of the same shall be submitted by the individual student, to form a part of the term work. (2 visits) Following are the suggested types of Industries/ Fields -</p> <ol style="list-style-type: none"> 1) Cashew nut Processing unit. 2) Fish processing unit. 3) Dairy processing unit. 4) Mango processing unit. 5) Packaging industry 6) Kokum processing unit.
02	<p>Information Search :</p> <p>Information search can be done through manufacturer's catalogue, websites, magazines, books etc. and submit a report any one topic.</p> <p>Following topics are suggested :</p> <ol style="list-style-type: none"> 1) CFTRI Mysore. Information search on food project. 2) NCL Pune Information search on NCL work. 3) FDA .Information search on FDA work. 4) NIN. Information search on NIN work. 5) WHO . .Information search on WHO. 6) Industrial address and information
03	<p>Seminar: (any 2 topics)</p> <p>Seminar topic should be related to the subjects of fifth semester / topics from guest lectures. Students shall submit a report of at least 4 to 6 pages and deliver a seminar (Presentation time – 15 minutes for Individual students)</p>
04	<p>Mini Projects : (in a group of 2-3 students)</p> <p>Prepare mini project and submit report as part of Term work.</p> <ol style="list-style-type: none"> 1) Prepare different recipes of food product (Fruits product, confectionary, dairy and bakery product.) 2) Factory layout on food processing.

05	<p>Student Activities:</p> <p>The students in a group of 3 to 4 will perform any one of the following activities (others similar activities may be considered) and submit any two report on the activity as part of Term work.</p> <p>Activity:</p> <ol style="list-style-type: none">1. Collection of data regarding loan facilities or other facilities available through different organizations / banks to budding entrepreneurs2. Survey and interviews of successful entrepreneurs in near by areas3. Survey of opportunities available in thrust areas identified by Government.4. Building of Biodata5. Interview techniques.6. Forms of application.
-----------	---