PDEA's

Waghire College of Arts, Commerce and Science,

Saswad, Purandar, Pune

STRUCTURE AND SYLLABUS (Semester Pattern)

Under Faculty of Science

BACHELOR OF VOCATION

FOOD PROCESSING AND TECHNOLOGY

Curriculum for Bachelor of Vocational Education (B. Voc.) Food Processing and Technology

The Bachelor in Vocation program Food Processing and Technology is divided into six semester having 180 credits. Each semester will have courses based on General Education Components and Skill Development Components, out of which three subjects will be dedicated for theory based on general education and three subjects will be dedicated for practical based on skill development. Food Processing Technology courses will be devoted to Laboratory Work / Project / Industrial Training / In-plant Internship. This program offers following General Education Components which include communication skill, computer fundamental, Environment Science, Personality development, Economics & Management etc. whereas Skill Development Components includes Food chemistry, biochemistry, Microbiology, human Nutrition, Processing Technology of Fruits & Vegetables, Cereals, Legumes, oil seeds, spices and condiments , Meat, fish and poultry, milk and milk products, Bakery and confectionary technology. Food analysis, food safety, Regulations and quality management, special implant training, seminar and project etc.

PDEA's Waghire College, Saswad, Purandar, Pune is offering a three year Bachelor Program in Vocational Education (B. Voc.) in Food Processing and Technology from Academic year 2018-19. The curriculum design of this program is undertaken in the following framework,

A. This program is intended to offer practical, hands on training and skills needed to pursue an occupation. It will provide options to the students to select the courses of their choice which are directly aligned to land a job in a chosen profession or a skilled trade. The end result of this program is to enable an individual to at train self- employment.
B. This program is designed to produce a skilled manpower so that wide variety of options in different sectors of Food Processing would be available and it will improve the opportunities for the unemployed youths in the country in both the private and public sectors. This would reduce the widening gap between the supply and demand for skilled manpower across various food processing industries and R&D organizations.
C. According to recent survey of FICCI (Federation of Indian Chambers of Commerce & Industry) on skill demand in food processing industries, it has been observed that a majority percentage of organizations are dissatisfied with the skills of the available trained manpower. This programme aims to provide some solution for this problem and this would facilitate to improve:

a. Quality of training
b. High drop-out rates
c. Linkages with Universities and industry
d. Inadequacy of resources

Bachelor of Vocation (B. Voc.) is launched under the scheme of University Grants Commission for skill development based on higher education leading to Bachelor of Vocation (B. Voc.) degree with multiple exits as Diploma/Advanced Diploma under the National Skill Qualification Framework (NSQF). The B. Voc. program incorporates specific job roles and their National Occupational Standards along with broad based general education. B. Voc. program has been designed as per National Skill Qualification Framework emphasizing on skill based education.

Level of awards:

The certification levels shall lead to certificate/Diploma/Advanced Diploma/ B. Voc. Degree in Food processing and technology.

Award	**Duration**	**Corresponding NSQF level**
Certificate in Food Processing and Technology	6 Months	4
Diploma in Food Processing and Technology	1 Year	5
Advanced Diploma in Food Processing and Technology	2 Year	6
B. VOC. Degree in Food Processing and Technology	3 Year	7

The suggested credits for each of the years are as follows:

NSQF level	**Skill component credits**	**General education credits**	**Normal calendar duration**	**Exit point /awards**
6 Month	18	12	One Semester	Certification in Food and Processing Technology
Year 1	36	24	Two Semesters	Diploma in Food and Processing Technology
Year 2	36	24	Four Semesters	Advanced Diploma in Food Processing and Technology
Year 3	36	24	Six Semesters	Degree in Food Processing and Technology
Total	**108**	**72**		

Eligibility criteria for Admission:

1. A candidate will be eligible to join 1st semester of B. Voc. Food Processing and Technology course, if he/she has passed 10+2 examination (Science Stream) or 10+2 vocational stream related to Food Production/Food Processing of recognized Board/university, or any other examination recognized as equivalent thereto.
2. The course of study of B. Voc. shall be divided in to six semesters and university examination will be held at the end of every semester in the months of November/December (for semester I, III & V) and May/June (for semester II, IV & VI) or as fixed by the University.
3. Semester examination will be open to regular candidates who have been on the rolls of a college affiliated to this University and meet the attendance and other requirements.

Admission, Registration and Promotion Process:

Admission will be done on the basis of percent marks obtained by candidate in Twelfth science or common entrance test conducted by college or admission criteria as decided by the authority for first semester.

The students will have to clear / qualify at least 50% of theory papers / courses from second semester and all papers / courses (inclusive of theory and practical) from first semester for getting promoted to second year. Similarly the students will have to clear / qualify at least 50% of theory papers / courses from fourth semester and all papers / courses (inclusive of theory and practical) from third semester for getting promoted to third year.

Dropout students will be allowed to register for second or third year as and when the concerned courses are offered by the College, however he/she should not exceed more than twice the duration of the course from the date of first registration at the Centre. Therefore, for obtaining B. Voc. degree a student will have to complete all semesters successfully within 6 years/12 semesters.

Admission fees:

The admission fees for B. Voc. (Food Processing and Technology) would be as decided by the University.

Vocational Educational Program Implementation Committee (VEPIC):

The Vocational Educational Program Implementation Committee (VEPIC) will consist of the Principal as a Chairman, course coordinator and two faculty of the concern course/specialization as members. The Committee will monitor the smooth

functioning and implementation of the B. Voc. program in Food Processing and Technology.

Choice Based Credit and Grading System (CBCS):

The choice based credit and grading system has been adopted. This provides flexibility to make the system more responsive to the changing needs of our students, the professionals and society. It gives greater freedom to students to determine their own pace of study.

- Students will have to earn 30 credits for the award of Six Month Certificate in Vocation in Food Processing Technology.
- Students will have to earn 60 credits for the award of one year Diploma in Vocation (D. Voc.) in Food Processing Technology.
- Students will have to earn 120 credits for the award of two year Advance Diploma in Vocation (Adv. D. Voc.) in Food Processing Technology.
- Students will have to earn 180 credits for the award of three year Bachelor Degree in Vocation (B. Voc.) in Food Processing Technology.

Credit-to-contact hour Mapping:

- One Credit would mean equivalent of 15 periods of 60 minutes each for theory lecture.
- For laboratory course/ workshops/internship/field work/project, the credit weightage for equivalent hours shall be 50% that for lectures.
- For self-learning, based on e-content or otherwise, the credit weightage for equivalent hours of study should be 50% or less of that for lectures.

Attendance:

Students must have 75 % of attendance in each course for appearing examination otherwise he / she will not be strictly allowed for appearing the examination of each course. However, students having 65 % attendance may request Head of the concerned Institution for the condonance of attendance on medical ground.

Evaluation Methods:

The assessment will be based on Continuous Internal Assessment (CIA) and semester end examination (SEE). There will be Continuous Internal Assessment for each theory (general education component) and practical (Skill development component) paper. In each semester, for each theory paper, 40% (i.e. 40) marks will be for CIA and 60% (i.e. 60) marks for ESE. For each practical paper, 30% (i.e. 50) marks will be for CIA and 70% (i.e. 100) marks for ESE. Marks obtained by the student in all heads viz. CIA and ESE

shall be added while declaring the final result.

Continuous Internal Assessment (CIA):

The internal marks shall be assigned on the basis of tutorials/home assignment/seminar presentation and weekly tests/class test/ preliminary examination to be conducted by the concerned college. These marks shall be communicated to the University before commencement of semester end examination.

End Semester Examination (ESE):

- The end semester examination for each theory and practical paper shall be conducted by the University at the end of each semester.
- Duration of theory examination shall be of three hours for a paper of 80 marks. Practical examinations shall be of five hours duration for every semester end examinations, respectively.
- Assessment of laboratory courses and project will have 30 % internal and 70 % semester end assessment. Semester end practical examination will be of 100 marks and 50 marks will be for internal examination. Student must perform at least ten experiments from each laboratory course. The semester end practical examination will be conducted at the end of each semester along with the theory examination.
- Students without certified journal shall not be allowed to appear for the practical examination.

Examination Scheme:

- A student shall be evaluated for his/her academic performance in a course through class tests, tutorials, practicals, homework assignments, term papers, field work, seminars, quizzes, Test examinations, teachers assessments and the End-Semester Examination as applicable.
- At the end of the semester, there would be an End Semester Examination as per syllabus. For the examination of First Year, for the academic year 2018-2019, the minimum percentage for passing for each course code, practical examination and ESE is 40 %, failing which he/she will get F grade for that course code. This rule will be progressively applicable for higher classes in next consecutive years.
- The project work shall be evaluated by midterm seminar(s), quality of work carried out, project report submission and the viva-voce examinations.
- The industrial/field training shall be evaluated through the quality of work carried out, the report submission and presentation(s).

Standard of Passing:

- To pass the examination a candidate must obtain minimum 40% of Marks in each End Semester Examination & CIA taken together, however the candidate must obtain minimum 35% of Marks at the End Semester Examination.
- To pass a subject where there is no provision of class test, the candidate must obtain 40% of Marks in the End Semester Examination.
- If the candidate remains absent for CIA, his performance should be treated as "Zero" Marks.

Results Grievances / Redressal:

Grievances / redressal committee will be constituted in the college to resolve all grievances relating to the evaluation. The committee shall consist of the Principal of the college, the concerned teacher of a particular course and senior faculty member. The decision of Grievances / redressal committee will have to be approved by Competent Authority.

Earning Credits:

At the end of every semester, a letter grade will be awarded in each course for which a student had registered. A student's performance will be measured by the number of credits that he/she earned by the weighted Grade Point Average (GPA). The SGPA (Semester Grade Point Average) will be awarded after completion of respective semester and the CGPA (Cumulative Grade Point Average) will be awarded by the university at the respective exit point.

Grading System:

The grading reflects a student-own proficiency in the course. A ten point rating scale shall be used for the evaluation of the performance of the students to provide letter grade for each course and overall grade for the B. Voc. Program. Grade points are based on the total number of marks obtained by him / her in all heads of the examination of the course. The grade points and their equivalent range of marks are shown in following Table,

Table : Ten point grade and grade description

Marks Obtained (%)	Grade Point	Letter Grade	Description
90-100	9.00-10	O	Outstanding
80-89	8.00-8.90	A++	Exceptional
70-79	7.00-7.90	A+	Excellent
60-69	6.00-6.90	A	Very Good
55-59	5.50-5.90	B+	Good

50-54	5.00-5.40	B	Fair
45-49	4.50-4.90	C++	Average (Above)
41-44	4.1-4.49	C	Average
40	4.0	P	Pass
< 40	0.0	F Fail	(Unsatisfactory)
	0.0	AB	Absent

- Non-appearance in any examination / assessment shall be treated as the students have secured zero marks in that subject examination / assessment.
- Minimum P grade (4.00 grade points) shall be the limit to clear / pass the course / subject. A student with F grade will be considered as “failed” in the concerned course and he / she has to clear the course by appearing in the next successive semester examinations. There will be no revaluation or recounting under this system.
- Every student shall be awarded grade points out of maximum 10 points in each subject (based on 10 point scale). Based on the grade points obtained in each subject, Semester Grade Point Average (SGPA) and then Cumulative Grade Point Average (CGPA) shall be computed. Results will be announced at the end of each semester and CGPA will be given at respective exit point.

Computation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average):

Grade in each subject / course will be calculated based on the summation of marks obtained in all modules.

The computation of SGPA and CGPA will be as below

- Semester Grade Point Average (SGPA) is the weighted average points obtained by the students in a semester and will be computed as follows

$$\text{SGPA} = \frac{\text{Sum (Course Credits) X Number of Grade Points in concerned Course Gained by the Student}}{\text{Sum (Course Credits)}}$$

The SGPA will be mentioned on the grade card at the end of every semester.

- The Cumulative Grade Point Average (CGPA) will be used to describe the overall performance of a student in all semester of the course and will be computed as under.

$$\text{Semester SGPA) CGPA} = \frac{\text{Sum (All six}}{\text{}}$$

Total Number of Semester

The SGPA and CGPA shall be rounded off to the second place of decimal.

Grade Card:

Results will be declared and the grade card (containing the grades obtained by the student along with SGPA) will be issued by the university after completion of every semester. The grade card will be consisting of following details.

- Title of the courses along with code opted by the student
- Credits associated with the course
- Grades and grade points secured by the student
- Total credits earned by the student in a particular semester
- Total credits earned by the students till that semester
- SGPA of the student
- CGPA of the student (at respective exit point)

Cumulative Grade Card:

The grade card showing details grades secured by the student in each subject in all semesters along with overall CGPA will be issued by the University at respective exit point.

Paper Code Description:

The course offered by the university shall have an alphanumeric course code consisting of a string of seven characters. The first three characters in a course code shall be capital letters identifying the responsible general component and skill development components in Food Processing Technology (FPT) of the B. Voc. course. The next three numerical digits give the following information. The first digit specifies the serial number of the semester of first year of the UG course. Second and third digit specifies the serial number of the general and skill development component. The last character in a course code specifies the section of the component if any.

B. Voc. Food Processing and Technology Program outcomes

1. This program prepares the students for specific job role in various sectors in food processing industries and Professional food organizations.
2. It trains the students from a trade, technician or professional position in research and developments in food processing organizations.
3. It generates the skills and knowledge in food processing which the students have at each exit level/at the time of graduation. Skilled students can find work in several state and central government food organizations, non-profit groups, academic institutions and in private food sectors as well.
4. This program prepares students for occupations in food industry and for direct entry into the market.
5. After completion of this program, students will have enough competences, to get benefit from market opportunities associated with food industry.
6. This program would enable students to update their knowledge and professional skills in food technology for entering the work force executing income generating activities or occupying better positions.
7. At each exit level of this program, students will be able to apply knowledge to the conceptualization of food processing technologies.
8. This program makes students capable for designing and formulating new food products, on the basis of consumers' demands.
9. Students will be able to create and apply appropriate processing technology, resources, modern processing tools in order to improve the quality, safety and the shelf life fresh and process food.
10. After completion of this program, students will have enough knowledge to demonstrate understanding of the social, health, safety, legal and cultural issues, professional ethics and responsibilities, norms/regulation and the consequent responsibilities relevant to food processing.

Course Structure, Teaching and Examination Scheme:

F. Y. B. Voc. (Food Processing Technology)

Semester-I				**Marks**		
Paper Code	**Title**	**No. of credits**	**Hrs. /week**	**Internal (CIA)**	**External (ESE)**	**Total**
	Semester I					
	General education component					
FPT-101	Principles of Food Preservation	**4**	**4**	**20**	**80**	**100**
FPT-102	Food Microbiology I (Introduction)	**4**	**4**	**20**	**80**	**100**
FPT-103	Food Science	**4**	**4**	**20**	**80**	**100**
	Practical (Skill Component)					
FPT-111	Principles of Food Preservation (Pract)	**6**	**6**	**30**	**120**	**150**
FPT-112	Food Microbiology I (Pract)	**6**	**6**	**30**	**120**	**150**
FPT-113	Food Science (Pract)	**6**	**6**	**30**	**120**	**150**
	Total	**30**	**30**	**150**	**600**	**750**
	Semester II					
	General education component					
FPT-201	Human Nutrition	**4**	**4**	**20**	**80**	**100**
FPT-202	Food Chemistry	**4**	**4**	**20**	**80**	**100**
FPT-203	Communicative Skills and Soft Skills in English	**4**	**4**	**20**	**80**	**100**
	Practical (Skill Component)					
FPT-211	Human Nutrition and food toxicology (Pract)	**6**	**6**	**30**	**120**	**150**
FPT-212	Food Chemistry (Pract)	**6**	**6**	**30**	**120**	**150**
FPT-213	Communicative Skills and Soft Skills in English (Pract)	**6**	**6**	**30**	**120**	**150**
	Total	**30**	**30**	**150**	**600**	**750**

Course Structure, Teaching and Examination Scheme:
S. Y. B. Voc. (Food Processing Technology)

Semester-I				**Marks**		
Paper Code	**Title**	**No. of credits**	**Hrs. /week**	**Internal (CIA)**	**External (ESE)**	**Total**
	General education component					
FPT-301	Processing of fruits, vegetables, cereal, pulses and oil seeds	**4**	**4**	**40**	**60**	**100**
FPT-302	Food Microbiology II	**4**	**4**	**40**	**60**	**100**
FPT-303	Food quality and analysis	**4**	**4**	**40**	**60**	**100**
	Practical (Skill Component)					
FPT-311	Processing of fruits, vegetables, cereal, pulses and oil seeds (Pract)	**6**	**6**	**50**	**100**	**150**
FPT-312	Food Microbiology II (Pract)	**6**	**6**	**50**	**100**	**150**
FPT-313	Food quality and analysis (Pract)	**6**	**6**	**50**	**100**	**150**
	Total	**30**	**30**	**300**	**450**	**750**
Semester II						
	General education component					
FPT-401	Processing of dairy and dairy products	**4**	**4**	**40**	**60**	**100**
FPT-402	Processing of bakery, confectionary and spice products	**4**	**4**	**40**	**60**	**100**
FPT-403	Statistics, data analysis and financial accounting	**4**	**4**	**40**	**60**	**100**
	Practical (Skill Component)					
FPT-411	Processing of dairy and dairy products (Pract)	**6**	**6**	**50**	**100**	**150**
FPT-412	Processing of bakery, confectionary and spice products (Pract)	**6**	**6**	**50**	**100**	**150**
FPT-413	Industrial training (15 days)	**6**	**6**	**50**	**100**	**150**
	Total	**30**	**30**	**300**	**450**	**750**

Course Structure, Teaching and Examination Scheme:
T. Y. B. Voc. (Food Processing Technology)

Semester-I				**Marks**		
Paper Code	**Title**	**No. of credits**	**Hrs. /week**	**Internal (CIA)**	**External (ESE)**	**Total**
	General education component					
FPT-501	Technology of meat, fish, poultry and food beverages	**4**	**4**	**40**	**60**	**100**
FPT-502	Food packaging and Storage technology	**4**	**4**	**40**	**60**	**100**
FPT-503	Quality Assurance, Certification and Patent application	**4**	**4**	**40**	**60**	**100**
	Practical (Skill Component)					
FPT-511	Technology of meat, fish, poultry and food beverages (Pract)	**6**	**6**	**50**	**100**	**150**
FPT-512	Food packaging and Storage technology (Pract)	**6**	**6**	**50**	**100**	**150**
FPT-513	Internship (Pract) (3 months)	**6**	**6**	**50**	**100**	**150**
	Total	**30**	**30**	**300**	**450**	**750**
Semester II						
	General education component					
FPT-601 (a and b)	FPT-601a Human values and ethics FPT-601b Food laws and regulations	**4**	**4**	**40**	**60**	**100**
FPT-602 (a and b)	FPT-602a Disaster Management FPT-602b Agribusiness management	**4**	**4**	**40**	**60**	**100**
FPT-603	FPT-603 Food Business management	**4**	**4**	**40**	**60**	**100**
	Practical (Skill Component)					
FPT-611	FPT-611a Food plant design and layout FPT-611b Project management and Entrepreneurship (Pract)	**6**	**6**	**50**	**100**	**150**
FPT-612	FPT-612a Disaster Management FPT-612b Agribusiness management (Pract)	**6**	**6**	**50**	**100**	**150**
FPT-613	FPT-613 Food Business management (Pract)	**6**	**6**	**50**	**100**	**150**
	Total	**30**	**30**	**300**	**450**	**750**

Syllabus of F. Y. B. Voc. (Food Processing Technology)

FPT-101 Principles of Food Preservation (General education component)			**60**
Sr. No.	**Credit**	**Content of the Credit**	**No. of periods**
1.	**I**	Principles of food preservation a. Introduction: Sources of food, definition and principles of food preservation, scope and benefits of industrial food preservation b. Shelf life of food and food products, types of food-perishable and non-perishable foods, definition and sources of food spoilage, mechanisms of food spoilage c. Traditional methods of food preservation (ancient to modern)- curing, cooling, freezing, boiling, heating, sugaring, pickling, lye, Jellying, canning, jugging, burial and fermentation d. Multiple methods of food preservation e. Effect of preservation on food quality Test/Tutorial/Discussion/Home assignment	**3** **4** **5** **1** **1** **1**
2.	**II**	Thermal methods of food preservation a. Principles of thermal processing of food b. Effect of heat on quality and nutritional content of food, process methods for minimizing nutrient degradation c. Principle and processing of thermal methods of preservation- canning, blanching, pasteurization, sterilization and evaporation Test/Tutorial/Discussion/Home assignment	**1** **3** **10** **1**
3.	**III**	Preservation by using low heat and dehydration A. Low temperature food preservation a. Characteristics of psychotropic microorganisms, pathogens able to survive in refrigerated foods, the cold shock response of microorganisms b. Principle and processing of chilling, cold storage and freezing c. Introduction to thawing, changes during thawing and its effect on food	**3** **3** **1**

		B. Food preservation by drying, dehydration and concentration a. Factors affecting Drying- temperature, humidity, air velocity, direction of air flow, type of dryer, type and size of food b. Methods of dehydration- natural sun drying, commercial food dehydrators, microwave, vacuum drying, convection drying, bed dryers, drum drying, freeze drying (lyophilisation), spray drying, combined thermal hybrid drying, osmotic drying c. Pre-treatment of food before drying d. Packaging requirement for dehydrated food Test/Tutorial/Discussion/Home assignment	**1** **4** **1** **1** **1**
4.	**IV**	Other methods for food preservation A. Preservation by radiation a. Introduction, Measurement of radiation dose, dose distribution, effect of radiation on food and microorganisms b. Principles and methods of food irradiation, α, β, γ radiations and their mode of action B. Preservation by chemical preservatives a. Salt, sugar, acidulants, lipophilic acids, gaseous chemicals, natural acidification (fermentation), antioxidants, colour additive, flavour additives, sweeteners, emulsifiers b. General rules for chemical preservation, additives permitted and prohibited in US C. Modern methods of preservation- Pascalization, bridgemanization, high pressure processing(HPP), pulse electric field, (PEF), processing using ultrasound (ultrasonication), dielectric, ohmic and infrared heating radiofrequency heating (RF) Test/Tutorial/Discussion/Home assignment	**1** **2** **2** **1** **8** **1**

Reference Books:

1. Food Processing and Preservation- Subbulaksmi G., and Udipi S.
2. Principles of Food Science, Vol. II- G. Borgstron, Mc. Millan Co. Ltd. London.
3. Principles of food preservation Part I& II- Owen R. Fenemma.
4. Food Science- Potter, CBS publishers.
5. Technology of Food Preservation - N.W. Desroiser and N.W. Desrosier

6. Introduction to Food Science & Technology- G.P. Stewart & M.A. Amerine
7. Food Processing Operations Vol. III -M.A. Joslyn and J.J. Heild.
8. Preservation of Fruits and Vegetables- Giridhari Lal, G.S. Siddappa, and G.L. Tondon
9. Food Preservation- Prakash Triveni, Aadi Publication, Delhi.
10. Modern Food Preservation- McWillims and Paine, Surjeet Publication.
11. Food Processing and Preservation- B. Sivasankar

FPT-111 Principles of Food Preservation (Skill development component)		**90 Periods**
Sr. No.	**Content**	**No. of Practical (6 periods each)**
1	Introduction and demonstration of machineries used in food processing	1
2	To study the effect of enzymatic browning in fruits and vegetables	1
3	To study effect of blanching on quality of foods	1
4	Preservation of food by canning and bottling	1
5	Cut-out analysis of canned food	1
6	Preservation of food by high concentration of sugar (preparation of jam)	1
7	Preservation of food by high concentration of salt and acid (preparation of pickle)	1
8	Drying and preservation of foods by freeze drying	1
9	Preservation of milk by pasteurization and sterilization	1
10	Drying and preservation of green leafy vegetables or fruit slices in cabinet dryer.	1
11	Preservation by osmotic dehydration of foods (preparation of candy)	1
12	Drying and preservation of foods by spray drying process	1
13	Preservation of foods by using chemicals (preparation of tomato ketchup)	1
14	Preservation of milk by condensation or concentration	1
15	Visit to any food processing industry or unit	1

References:

1. Prakash Triveni : Food Preservation, Aadi Publication, Delhi.
2. M. Shafiur Rahman : Hand Book of Food Preservation, Marcel Dekker Inc,NewYork.
3. McWillims and Paine : Modern Food Preservation, Surjeet Publication.
4. Fellows ,P. and Eills H. 1990 Food Processing Technology: Principles and Practicals, NewYork
5. NPCS Board, Modern Technology on Food Preservation
6. Sivasankar: Food Processing and Preservation

FPT 102: Food Microbiology I (General education component)

Sr.No.	Topic	No. Of Lectures
I	**History and Scope of Microbiology** • Important contributions of various scientists, • Scope of food microbiology, • Introduction to microorganisms - bacteria, algae, fungi, protozoa and viruses. • Importance of bacteria ,yeast , and moulds in foods **Stains and staining techniques** • Types of stains- acidic, basic & neutral • Principles, Procedures, mechanisms & applications of staining procedures: a) Simple staining b) Negative staining c) Gram staining d) Differential staining	7 8
II	**General Characteristics of Microorganisms** • Comparative account of prokaryotes and eukaryotes • Morphology of bacteria: Size, Shape and Arrangements • Cytology of bacteria - structure & functions of cell wall, cell membrane, Capsules & slime layer, flagella, Pilli, nuclear material, mesosome, ribosome and spores.	15
III	**Cultivation of Micro-organisms** • Microbial Nutrition: Nutritional requirements of microorganisms	15

	Nutritional types of microorganism based on carbon and energy sources • Culture media : Common components of media and their functions •Methods of isolation and cultivation •Enumeration of Microorganisms- qualitative and quantitative	
IV	**Control of Microorganisms** • Definitions of Sterilization, Disinfection, Antiseptic, Germicide, Microbiostasis, Antisepsis, Sanitization. • Mode of action, application and advantages of: Physical agents, Chemical Agents , Gaseous Agents	15

Recommended Readings

1.Adams M.R. and Moss M.O. “Food Microbiology” Second edition

2.PurohitS.S.“Microbiologyfundamentalsandapplications”Edition,6.Publisher,Agrobios,2003.

4.Frazier,W.C.,andWesthoff,D.C.1988.FoodMicrobiology,4thed.McGraw-Hill,NewYork.

5.Jay,J.M.2000.ModernFoodMicrobiology.6thed.Chapman&Hall.NewYork,N.Y.

7.Fundamental principles of bacteriology by A. J.Salle, Tata Mcgraw hill.

FPT 112 Food Microbiology I (Skill development component)

Sr.No.	Topic	No.of Practical (6 periods each)
1	Preparation of Standard Operating Procedures (SOPs) for common microbiology laboratory instruments e.g. Incubator, Hot Air Oven, Autoclave, Colorimeter, pH Meter, Distillation Unit, Chemical Balance, Laminar air flow hood, Clinical Centrifuge	1
2	Structure and working of light microscope	1
3	Study cell morphology with simple Staining - Monochrome, Negative	2

4	Differential staining : Gram staining	1
5	Special Staining: Capsule, Spore	2
6	Observation of motility in bacterial by Hanging drop method	1
7	Observation of motility in bacterial by Hanging drop method	1
8	Enumeration of yeast cells using a counting chamber	1
9	Preparation of culture media.	1
10	To sterilize the media and equipment.	1
11	Aseptic transfer techniques – types –Tube to tube, Tube to plate	1
12	Isolation of bacteria by streak plate, Observation of cultural characters	1
13	Culturing the bacteria on a solid media by using serial dilution method and determining the number of viable cells in the culture (standard plate count).	1

FPT 103 Food Science (General education component)

Credit-01

Unit I - Introduction to food science **7 lectures**

-Basic concept of food, food science, nutrientsand nutrition
- Classification and Functions of food
-Historical development of food science and technology
-Introduction to various branches of Food Science and Technology
- Objectives of food science
-Food constituents, definition occurrence, properties and metabolism of proteins, carbohydrates and lipids

Unit – II -Cereals **8lectures**

- Structure, composition and Importance of cereal grains
- Types of cereals used in cooking
  - Wheat- structure and composition, types (hard, soft/ strong, weak).
  - Rice- Composition of rice obtained by different de-husking methods, parboiling of rice-advantages and disadvantages.
  - Millets -Varieties, composition and uses of maize, sorghum, barley, rye, oats, triticale, pearl millet and finger millet.

Credit-02

Unit – III - Pulses and Legumes **8 lectures**

- Definition, Introduction, common names and scientific names of different pulses, composition and structure of pulses
-Chemical composition of pulses
-Cooking of Legumes and Factors Affecting cooking time of pulses and legumes
-Uses of legumes in cookery

Unit- IV-Fats and Oils **7 lectures**

-Classification of lipids, types of fatty acids - saturated fatty acids, unsaturated fatty acids,essential fatty acids, trans fatty acids.
-Rancidity - hydrolytic and oxidative rancidity and its prevention.
-Definition margarine, butter, hydrogenated vegetable oil, lard.
-Condiments and spices: Composition and importance of spices.

Credit -03 **15 L**

Unit – V - Fruits and Vegetables Cookery **08 lectures**

- Classification of Fruits and vegetables
-General composition, enzymatic browning, names and sources of pigments.
- Color pigments in Fruits and vegetables
- Effect of heat, acids and alkali on Fruits and vegetables
-Post harvest changes in fruits and vegetables
-Climacteric rise, horticultural maturity, physiological maturity, physiological changes, physical changes, chemical changes during the storage of fruits and vegetables

Unit- VI-Flesh Foods - Meat, Fish, Poultry **7 lectures**

-Meat - Definition of carcass, composition of meat, concept of red meat and white meat.
-Fish - Classification of fish (fresh water and marine), composition of fish, characteristics of fresh fish, spoilage of fish.
-Poultry - Structure of hen's egg, composition and nutritive value, egg proteins, characteristics of fresh egg, deterioration of egg quality.

Credit 04 **15 L**

Unit-VII—Milk and Milk Products8 lectures

Definition of milk, typical chemical composition of milk of different species i.e. buffalo, cow, goat.
-Composition of milk, its constituents
-An overview of types of market milk and milk products-cheese, paneer, ice cream, ghee, butter, flavored milk and imitation milk.

Unit- VIII-Sensory evaluation of food **7 lectures**

Objectives, type of food panels, characteristics of panel member, layout ofSensory evaluation laboratory, sensitivity tests, threshold value, paired comparison test, duo-trio test, triangle test, hedonic scale, chemical dimension of basic tastes.

Reference Books:

1. An Introduction to Food Science, Technology & Quality Management, Devendrakuma Bhatt & Priyanka Tomar :Kalyani Publishers.
2. Advanced text book on Food and Nutrition, Vol.I and II, Second Edition. Dr. M. Swaminathan (2006), BAPPCO Publication
3. Biochemistry of Foods:- N.A.M. Eskin, H.M. Henderson, R. J. Townsend.
4. Biochemistry, 2nd edition, by R.H. Garrett and C.M. Grisham (1999). Saunders college publishing, N. Y. Sons, NY.
5. Biochemistry (2004) by J. David Rawn, Panima, Publishing Corporation, New Delhi.
6. Basic Food Microbiology by G.J. Banwart
7. Commercial Rabit meat production, Portsmouth.J.I,
8. Chemistry and Technology of Oils and Fats, Chakrabarty MM. 2003.. Prentice Hall.
9. Cereal and Cereal Products Dendy , DAV & Dobraszczyk BJ. 2001.. Aspen.
10. Dairy Microbiology by E .M. Foster.
11. Dairy Processing – Improving Quality.Smit G. 2003. CRC-Woodhead Publ.
12. Dairy Technology – Principles of Milk Properties and Processes. Walstra P, Geurts TJ, Noomen A, Jellema A & Van Boekel MAJS. 1999. Marcel Dekker.
13. Egg Science & Technology Stadelmen w. J. Cotterill O. j,
14. Enzymes in Food Technology, Whitehurst and Law, CRC Press, Canada, 2002

FPT 113 Food Science (Skill development component)

1. To study the gelatinization temperature range and % sag of various cereal starches.
2. Detection of gluten in various foods.
3. To study factors affecting gelatinization of cereals starches
4. Study of germination of whole pulses and legumes.
5. To detect the adulteration of fats and oils by qualitative test.
6. To detect the presence adulterants in milk.
7. To perform the recognition test for four basic tastes
8. To recognize few odors and to learn to memorize them.
9. Identification pigments in fruits and vegetables and influence of PH on them.
10. Qualitative test for carbohydrates, proteins and lipids.
11. Qualitative identification of proteins/amino acids.
12. Determination of crude lipids.
13. Demonstration of presence of bacteria from soil/water/air/milk
14. Microscopic examination of bacteria from milk product (Curd).
15. Demonstration of food laboratory instruments: Autoclave, Hot air oven, Incubator, Ph-meter, Centrifuge, Calorimeter/ spectrophotometer, laminar air flow,
16. Demonstration of cereals, pulses and oil crops.
17. Demonstration of Fruits and vegetables.
18. Demonstration of dairy products.
19. Demonstration of condiments and Spices.
20. Food industry visit and report.

Practical Number-20 is compulsory and takes any 14 practicals from practical No-1-19

Reference Books:

1. Biochemistry of Foods:- N.A.M. Eskin, H.M. Henderson, R. J. Townsend.
2. Biochemistry, 2nd edition, by R.H. Garrett and C.M. Grisham (1999). Saunders college publishing, N. Y. Sons, NY.
3. Biochemistry (2004) by J. David Rawn, Panima, Publishing Corporation, New Delhi.
4. Basic Food Microbiology by G.J. Banwart
5. Dairy Technology – Principles of Milk Properties and Processes. Walstra P, Geurts TJ, Noomen A, Jellema A & Van Boekel MAJS. 1999. Marcel Dekker.
6. Food Science by N.N. Potter, CBS publishing.
7. Food Science by Srilakshmi, New Age International Publishing Ltd.
8. Food Science by Manay, New Age International Publishing Ltd
9. Food Processing Principles and Applications Ramaswamy H and Marcott M, CRCPress, 2006
10. Fats and Oils - Chemistry and Technology.Hamilton RJ & Bhati A. 1980. App. Sci. Publ.
11. Fundamentals of Food and Nutrition, Muddambi S.R. and Rajgopal M. V., Wiley Eastern Ltd., New Delhi.
12. Fundamentals of Biochemistry, 2nded, by Donald Voet, Judith G, Voet and
13. Principles of Cereal Science and Technology. Hoseney RS. 1994. 2nd Ed. AACC

FPT 201 Human Nutrition (General education component)

Course Content **04 Credits (60 Lectures)**

Unit I: Nutrition **(10 lectures)**

- Introduction human nutrition : Definition, optimum nutrition, nutritional status, good nutritional status, poor nutritional status, malnutrition, under nutrition, signs of good nutritional status, signs of poor nutritional status, definition and functions of nutrients
- Macronutrients and micronutrients- Classification and functions
- Fundamentals of the nutrition & nutritional properties
- Importance of carbohydrates, proteins, fats, vitamins & minerals

Unit II : Food and our body **(06 Lectures)**

- Food and its functions.
- Digestion: Buccal digestion, gastric digestion and intestinal digestion, factors that affect digestion
- Absorption and metabolism of food.

Unit II: Energy value **(10 lectures)**

- Introduction
- Recommended dietary allowance
- Energy value of food
- Daily BMR activities
- Biological value of food

UNIT III: Carbohydrates, Proteins and Fats (15 Lectures)

- Carbohydrates- Types, functions, sources, requirement, storage, Effect of deficiency and excess.
- Proteins- Types, functions, sources, requirement, storage, Effect of deficiency and excess.
- Fat- Types, functions, sources, requirement, storage, Effect of deficiency and excess.

UNIT V: Vitamins and Minerals (06 Lectures)

- Vitamin- Types, functions, sources, requirement, storage, Effect of deficiency and excess.
- Minerals- Types, functions, sources, requirement, storage, Effect of deficiency and excess.
- Water and electrolytes- Concept, Introduction, functions of water, daily intake of water, daily loss of water, body water, water balance, deficiency of water, retention of water and importance,

Unit VI: Nutritional aspects & composition of cereal & pulses (06 Lectures)

- Nutritional aspects & composition of fruits & vegetables
- Nutritional aspects & composition of milk & milk products
- Nutritional aspects & composition fish, meat &poultry
- Nutritional aspects & composition sugar & sugar products

Unit VII: Balanced diet & interrelationship between nutrients (07 lectures)

- Balanced diet- introduction, menu planning, planning of balanced meal
- Special nutritional requirements,
- Effect of cooking & processing on nutrients
- Inter- relationship between vitamin & nutrients
- Effect of carbohydrate, fat & protein on vitamin requirement

Recommended References:

1. Dr. M. Swaminathan (2006), Food Science and Nutrition II Edition, Sunetra Roday, Oxford publication Advanced text book on Food and Nutrition, Vol.I and II, Second Edition. BAPPCO Publication
2. Jim Mann and A. Stewart Truswell (2010), Essentials of Human Nutrition, Third Edition:, Oxford publication
3. Michel J. Gibney, Hester H. Vorster and Frans J. Kok (2002), Introduction to Human Nutrition , First Indian Reprint., Blackwell Publishing.
4. Begum, R. A text book of foods, Nutrition and Dietetics. Second revised edition, Sterling Publishers (P) Ltd, New Delhi, 1991.
5. Chaddha R. Text boolk of nutrition : A life cycle approach.
6. Joshi, S. A Nutrition and dietetics. Third edition, Tata McGraw Hill education pvt ltd, New Delhi, 2010
7. Mudambi, S. R., Rajagopal M. V., Fundamentals of food and Nutritions, 2nd edition,
8. Wiley Eastern Ltd, New Delhi 1990.
9. Roday, S., food science and nutrition. Third edition, Oxford University Press, New Delhi, 2008.

10. Srilakshmi, B, Nutrition Science, New age international (P) Ltd publishers, NewDelhi, 2006.
11. Swaminathan, M., Hand book of Food & Nutrition, Bappco Ltd, Bangalore, 1978.
12. Swaminathan, M. Essential of food and Nutrition, Vol.I. Bangalore Printing and Publishing Co. Ltd Bangalore.

FPT-211 Human Nutrition and Food Toxicology
(Skill development component)

Course Content (Any 15 practicals) **06 Credits**

1. Qualitative identification of lipids.
2. Qualitative & quantitative determination of vitamins.
3. Calculation of BMR and body surface area
4. Enrichment and fortification of daily diet.
5. Preparation of list of nutrient rich food sources (Carbohydrates, proteins, fats)
6. Calculation of nutritive value of foods
7. Preparation of high carbohydrate product from cereals with calculation of nutritive value
8. Preparation of high fibre product with calculation of nutritive value
9. Preparation of high protein product from plant source with calculation of nutritive value
10. Preparation of high protein product from animal source with calculation of nutritive value
11. Preparation of high fat product with calculation of nutritive value
12. Preparation of low fat product with calculation of nutritive value.
13. Detection of adulterants in foods such as milk, honey etc.
14. Estimation of SO2 in fruit products.
15. Estimation of purity of potassium metabisulphite
16. Qualitative determination of benzoic acid
17. Introduction to equipments and glassware used in microbiology
18. Sterilization techniques: Dry heat and moist heat
19. Dehydration of fruits in sugar syrup
20. Determination of Moisture in food sample.
21. Determination of Protein in food sample.
22. Determination of Crude Fat in food sample.
23. Determination of Acidity & pH in food sample/beverages.
24. Determination of total, non-reducing and reducing sugars.
25. Determination of Vitamin C in food sample.
26. Effect of adding salt, vinegar and oils in cooking quality of whole and split pulses

FPT-202 Food Chemistry (General education copmponent)	4 Credits	100 Marks

Chapter 1	**Introduction to Food Chemistry**	**(06 Lecture)**
	• Overview of Food Chemistry • Definition of food chemistry • Significance of food chemistry • Major and minor constituents of food • Water in food systems • Physical properties of water and ice; water structure	
Chapter 2	**Carbohydrates**	**(09 Lectures)**
	• Definition and nomenclature • Classification • Structure of carbohydrates • Physical properties of carbohydrates • Monosaccharides (glucose, fructose and galactose) • Disaccharides (Sucrose, cellobiose, maltose and lactose) • Polysaccharides (Starch, cellulose and glycogen) • Chemical reactions of carbohydrates **:** oxidation, reduction, osazone and ester formation, isomerisation, • Browning Reactions, Enzymatic and non-enzymatic browning reaction	
Chapter 3	**Lipids**	**(07 Lectures)**
	• Definition and nomenclature • Classification • Fatty acids, Triacylglycerols, Glycerophospholipids • Chemical properties of fats and oil (hydrolysis, saponification value, acid value, iodine value, rancidity) • Biological significance of fats.	
Chapter 4	**Proteins**	**(08 lectures)**
	• Definition and nomenclature • Classification of amino acids • Physical and chemical properties of amino acids • Plant proteins and animal proteins • Formation of Peptide linkage, α-helical conformation, β-plated structure, primary, secondary, tertiary and quaternary structure of proteins.	
Chapter 5	**Vitamins**	**(08 Lectures)**

	• Introduction • Classification • Structure • Water soluble vitamins (Vit B-1, B-2, B-3, C) structure and functions • Fat soluble vitamins (Vit A, D, E, K) structure and functions • Effect of processing on vitamins	
Chapter 6	**Enzymes**	**(07 Lectures)**
	• Introduction • Classification • Properties of enzymes • Coenzymes enzyme inhibition, isozymes • Enzymes in food processing • Enzyme applications in food industry	
Chapter 7	**Minerals**	**(07 Lectures)**
	• Major Minerals: Calcium, Iron, Phosphurus etc. • Minor Minerals: Zinc, Magnesium, Manganese etc. • Effect of processing on minerals	
Chapter 8	**Food Colours and Food Flavours**	**(08 lectures)**
	• **Food Colours** Types, Structure, Effect of processing on colour • **Food Flavour** Natural flavour- Types, Structure Artificial flavour- Types, Structure Effect of processing on flavour	

FP-212 Food Chemistry (Skill development component)	**6 Credits**	**150 Marks**

1Preparation of primary and secondary solutions

2. Determination of gelatinization temperature range (GTR) of different starches

3. Determination of refractive index and specific gravity of fats and oils

. 4. Determination of smoke point and percent fat absorption for different fat and oils.

5. Determination of percent free fatty acids. 6. Estimation of saponification value of fat or oil.

7. Estimation of reducing and non-reducing sugars.

8. Phenol sulphuric acid test for carbohydrates.

9. Estimation of starch by anthrone reagent. 10. Estimation of total ash from food sample.

11. Estimation of minerals.

12. Estimation of iodine value of Oil.

13. Estimation of peroxide value of fat or oil.

14. Determination of carotenoids with respect to flour pigments.

15. Estimation of Moisture from food sample.

16. Determination of protein by Biuret method.

17. Estimation of Fiber from food sample.

Recommended Readings

1. Fennema, O.R. Ed. 1976. Principles of Food Science

2 Part-I Food Chemistry. Marcel Dekker, New York.

3. Potter, N.N. 1978. Food Science. 3rd Ed. AVI, Westport.

4. Branen A.L. and Davidson, P.M. 1983. Antimicrobials in Foods. Marcel Dekker, New York.

4. Furia, T.E. 1980. Handbook of food additives. Vol I and Vol II

FPT-203, FPT-213	**Communicative Skills and Soft Skills in English (General education and Skill development components)**

Unit I: An Introduction to Communication Skills: (Theory 1 Credit and Practical 1.5 Credits)

Theory

Defining Communication
The Process of Communication
Verbal and Non-verbal Communication
Oral communication
Tips for Effective Communication
KISS (Keep it short and sweet) in communication – Composing effective messages.

Practical

Report writing,, types, formats & methods
Technology based communication -email –web-mobile- telephones
Internet, Netiquettes, Social networks Net behavior
Professional correspondence various drafts of letters, applications & requests
Oral communication speech seminar, group discussion,
Public communication, speech, presentation, video-conferencing

Practice on Oral and spoken communication skill & testing – voice & accent, voice clarity, voice modulation & intonation, word stress etc
Written Communication Skill Practice for:
Correction of errors
Making of Sentences
Paragraph Writing
Leave Application and simple letter writing

Unit II: Presentation skills: **(Theory 1 Credit and Practical 1.5 Credits)**
Theory
Kinds of Presentations
Structuring Content
Visual Aids
The Language of Presentations
Making a Presentation
Practical
PPT
Debate
GD
Micro-presentation on given topic

Unit III: Introduction to Soft Skills I: (Theory 1 Credit and Practical 1.5 Credits)
Leadership Skills
Self Management
Self Evaluation
Self Discipline
Self Criticism
Recognition of one's own limits and deficiencies
Independency
Thoughtful & Responsible
Self Awareness Self Management
Identifying one's strengths and weaknesses
Planning & Goal setting
Managing self – emotions, ego, pride

Unit IV: Introduction to Soft Skills II : **(Theory 1 Credit and Practical 1.5 Credits)**

Teamwork Skills
Team Building / Coordination Skills
Team Building Practices through group exercises , team task / role play
Ability to mixing & accommodation
Ability to work together
Concept of Group
Group Dynamics
Team building
Team Management Technique
Practice by game play & other learning methodology for achieving targets and getting of right first time
Time Management

Time Management concept
Attendance, Discipline & Punctuality
Act in time on commitment
Quality/ Productive Time
Goal Setting
Stress Management
Positive Attitude

(4) Suggestions for Teachers:
Many students opting for this course have professional career in mind. The present course is designed to acquaint them with the basic skills of English language and to equip them with necessary abilities to become competent professionals or businessman or entrepreneur in life. The teachers are expected to make the students aware that behind every teaching activity there is some principle at work. Students learn best by doing things on their own; hence their active involvement should be ensured through seminars, group discussions, presentations, etc. This is basically application-oriented, practical course and hence the teacher should carry out a variety of application based activities/tasks in the classroom. Student involvement could be ensured through student activities like doing practical exercises. The teacher should play the role of a facilitator and monitor the activities of the students.

(5) Select Bibliography:

Brumfit, C. and K. Johnson (1979), *The Communicative Approach to Language Teaching* (OUP)
Corder, S. Pit (1973), *Introduction to Applied Linguistics* (Penguin)
Durodula Sahrolyn P. *Learn Reading* Anmol Publications Pvt. Ltd., New Delhi.
Hutchinson, T. And A. Waters (1989), *English for Specific Purposes: A Learning Centered Approach* (CUP, Cambridge)
Kumar Keval. J, *Mass Communication In India*, Jaico Publishing House, Mumbai.
Information and Communication Technology by Abdul Mannan Himalaya Publishing House
Krishnaswamy, N. and T. Sriraman (1994), *English Teaching in India*, (T. R. Publications, Madras)
Narula Uma, *Business Communication Practices- Modern Trends*, Atlantic Publishing House, Mumbai.
Nagaraj, G. (1996), *English Language Teaching: Approaches, Methods and Techniques* (Orient Longman)
Nolasco, R. And L. Arthur (1988), *Large Classes*, (Macmillan)
Nunan, D. (1988), *Syllabus Design* (OUP)
Prabhu, N. S. (1987), *Second Language Pedagogy* (OUP)
Richards, J. C. And T. S. Rodgers (1986), *Approaches and Methods in Language Teaching* (CUP)
Richards, J. C. (Ed.) (1974), *Error Analysis* (Longman, London)
Sarasvati, V. (2004), *English Language Teaching: Principles and Practice* (O.L.)
Austin, J. L. (1962), *How to do things with words*, Oxford: Clarendon Press
Halliday, M.A.K. et al, (2004), *An Introduction to Functional Grammar*,3rd edition,London,
Krishnaswamy, N., S. K. Verma and N. Nagarajan (1992), *Modern Applied Linguistics*, Madras: Macmillan

Syllabus of S. Y. B. Voc. (Food Processing Technology)

FPT-301 Processing of fruits, vegetables, cereal, pulses and oil seeds (General education component)			**60**
Sr. No.	**Credit**	**Content of the Credit**	**No. of periods**
1.	**I**	**Fruits and vegetables processing**	**15**
		Classification of fruits and vegetables, compositional and nutritional aspects of fruits and vegetables	**1**
		Post harvesting of fruits and vegetables: post harvest physiology, handling, losses and conservation of fruits and vegetables, postharvest commodity treatments: precooling, waxing, sprout inhibition, disinfection, fungicide application, hot water treatment, vapour heat treatment, irradiation, ripening and degreening, delaying ripening, curing of roots and tubers, drying of root crops	**4**
		Permeation properties of edible coatings, wettability and coating effectiveness	**1**
		Preparation and preservation of crystallised fruits and preserves, preparation and preservation of chutney, pickles, sauce, puree, paste, ketchup, toffee, wafers and papads, soup powders	**4**
		Preparation and preservation of juices, squashes, syrups, sherbets, nectars, cordials, etc.	**4**
		Test/Tutorial/Discussion/Home assignment	**1**
2.	**II**	**Cereal processing**	**15**
		Chemical composition and nutritive value of cereals, food grain storage structure, problems in bag and bulk storage and their control, fumigation, aeration and drying during storage, quality changes of grains during storage and remedial measures	**2**
		Composition and nutritional value of rice, paddy processing and rice milling, quality characteristics influencing final milled products, nutritional and storage qualities of raw and parboiled rice, processed foods from rice: breakfast cereals, flakes, expanded and puffed rice, instant rice, by-products of rice-husk and rice bran	**4**
		Composition and nutritive value of wheat, cleaning, conditioning and milling processes of wheat, flour grades and their suitability for baking, milling products of wheat: dalia, atta and semolina, wheat starch processing, cereal foods for infants	**4**
		Composition and nutritive value of corn, corn milling: dry and wet	

FPT 311- Processing of fruits, vegetables, cereal, pulses and oil seeds (Skill development component)		**90 Periods**
Sr. No.	**Content**	**No. of Practical (6 periods each)**
1	Primary processing of selected fruits and vegetables	1
2	Canning of apple/ pineapple, spinach/cauliflower	2
3	Preparation of squash	1
4	Preparation of dehydrated tomato powder	1
5	Determination of starch content of cereal flour	1
6	Determination of sedimentation value of cereal flour	1
7	Determination of adulterant (NaHCO3) in wheat flour or maida	1
8	Estimation of protein content of cereals and legumes	1
9	Determination of antinutritional factors in legumes	2
10	Preparation of protein isolate from pulses	1
11	Preparation of Soy milk	1
12	Study visit to milling industry	1
13	Visit to any food processing industry or unit	1

Reference Books:

1. Fruit and vegetable preservation: Principles and practices by Shrivastava R. P. and Sanjivkumar
2. Post harvest technology of fruits and vegetables: Handling, processing, fermentation and waste management Vol. I and II by Varma L. R. and Joshi V. K.
3. Technology of cereals by Kent N. L. Woodhead publishing, 1994
4. Flour milling process by Scott J. H.
5. Rice- chemistry and technology by Champagne E. T.
6. Cereal and cereal products by Dendy Dav. and Dobraszczyk B. J.
7. Food and feed from legumes and oil seeds by Smartt J. and Nwokolo E.

8. Baileys industrial oil and fat products by Bailey A. E. and Shahidi F.
9. Handbook of food preservation by Shafiur Rahman M.
10. Handbook of analysis and quality control for fruit and vegetable products by Ranganna S.
11. Handbook of postharvest and technology: cereals, fruits and vegetables, tea and spices by Chakraverty A., Mujumdar A. S., Hosalli S. R.

FPT-302 Food Microbiology II (General education component)			**60**
Sr. No.	**Credit**	**Content of the Credit**	**No. of periods**
1.	**I**	**Food Spoilage**	**15**
		Classification of foods based on stability: Perishable, Semi-perishable & stable	**1**
		Intrinsic and extrinsic factors affecting growth of microorganisms in foods	**1**
		General principles involved in food preservation	**2**
		Microorganisms important in food industry	**2**
		Sources of food spoilage micro-organisms	**2**
		Chemical and physical properties of food affecting microbial growth	**2**
		Spoilage of: i. Fruits and Vegetables ii. Meat and Poultry products iii. Canned foods iv. Bakery products	**4**
		Test /Tutorial/Discussion/Home assignment	**1**
2.	**II**	**Microbiology of milk**	**15**
		Dairy Development in India: Role of National Dairy Development Board (NDDB), National Dairy Research Institute (NDRI), Military dairy farm, Indian Dairy Corporation (IDC), Dairy Co-operatives, Milk Grid, Operation Flood	**2**
		Chemical components and nutritive value of milk, types of milk	**2**
		Common micro-organisms found in milk, Fermentation and spoilage of milk, Milk borne diseases	**8**
		Milk pasteurization and its storage	**2**

		Test/Tutorial/Discussion/Home assignment	**1**
3.	**III**	Thermal destruction of bacteria - use of low temperature and high Temperature, Determination of TDP, TDT, D, F, and Z values, Use of chemicals and antibiotics in food preservation, Canning, Dehydration Use of radiations, Principles of Hazard Analysis and Critical Control Points (HACCP), Introduction to Tetra pack technology Test/Tutorial/Discussion/Home assignment	**6**

FPT 312- Food Microbiology II (Skill development component)		**90 Periods**
Sr. No.	**Content**	**No. of Practical (6 periods each)**
1	Microscopic examination of Fungi causing Rust and Smut infections in Plants (Demonstration)	1
2	Isolation and study of microscopic characters of microorganisms from spoiled food sample (bread/bhakari/roti etc.)	2
3	Isolation and identification of *Xanthomonas* spp. from infected sample	2
4	Isolation and identification of *Aspergillus* spp. from onions infected with Black Mould	2
5	Isolation and identification of lactic cultures up to genus level	2
6	Microbiological tests 1. Standard Plate Count (for milk / milk product e.g. milk powder) 2. Direct Microscopic count 3. MBRT and Phosphatase test 4. Test for mastitis	4
7	Visit to a Dairy Industry	1
8	Visit to a Food Industry	1

Reference Books:

1. Banwart G. J. (1989). Basic Food microbiology, 2nd Edn. Chapman and Hall. International Thompson Publishing.
2. Charles R. Lane, Paul Beales, Kelvin J. D. Hughes (2012). Fungal Plant Pathogens.1st Edn. CABI Publishing.
3. Clarence Henry Eckles, Willes Barnes Combs, Harold Macy (1943). Milk and milk products, 4th Ed. McGraw-Hill book Company, Incorporated.
4. James M. Jay, Martin J. Loessner, David A. Golden (2005). Modern food microbiology, 7th Edn. Springer Science & Business.
5. Sukumar. De (2001). Outlines of Dairy Technology. 1st Ed. Oxford University Press Delhi.

6. William C. Frazier, Dennis C. Westhoff, N. M. Vanitha (2013). Food Microbiology, 5thEdn.McGraw-Hill Education (India).

FPT-303 Food quality and analysis (General education component)			**60**
Sr. No.	**Credit**	**Content of the Credit**	**No. of periods**
1.	**I**	Food quality and its role in food industry, quality attributes: dominant and hidden attributes,	**2**
		Factors influencing the food qualities: Soil, field practices, harvesting practices, procedures, packaging, transportation, storage, conditions, processing conditions, packaging and storage conditions of finished products	**9**
		Functions of quality control departments and quality control laboratories	**3**
		Test/Tutorial/Discussion/Home assignment	**1**
2.	**II**	Defects: Classification, Genetical and physiological defects, structural defects, off-color; entomological Defects: holes, Scars, lesions, offcoloring, curled leaves; internal defects; pathological defects, mechanical defects; extraneous or foreign material defects	**5**
		Measurement of defects: Improving visibility by dilution, white background, color differences, standardization of conditions, reference standards, counts and measures, isolation of defects by floatation, elution, electronic sorting,	**5**
		Viscosity: types of fluids, different viscometers to measure viscosity, factors affecting consistency and viscosity of food	**2**
		Measurement of viscosity and consistency with Brookfield synchrolectric viscometer, Stormer viscometer, Ostwald viscometer	**2**
		Test/Tutorial/Discussion/Home assignment	**1**

3.	**III**	Texture: classification, role of firmness yielding quality, juiciness, chewiness, fibrousness, grittiness, mealiness, stickiness, Mmeasurement of texture/ kinesthetic characteristics.- by compression, mechanical thumb, puncture tester, succulometer, shearing by tenderometer, texturometer, maturometer, fibro meter, moisture content by barbender moisture tester Importance and need of colour determination, methods of colour determination with spectrophotometer, colorimeter, Hunter Lab system, CIE (Commission International de l'Eclairage) system, Lovibond colour measurement, disc colorimeter and their applications Test/Tutorial/Discussion/Home assignment	**3** **5** **6** **1**
4.	**IV**	Flavour: Definition and its role in food quality Taste: classification, taste qualities, relative intensity, reaction time; effect of disease, temperature, and taste medium on taste, basic tastes and interaction of tastes Odour: definition, Classification, mechanisms, olfactory abnormalities, odour testing techniques, thresholds, odour intensities Sensory evaluation: Objectives, panel selection, different test methods and their groups such as difference tests, rating tests, sensitivity tests, sensory scores Test/Tutorial/Discussion/Home assignment	**1** **4** **6** **3** **1**

FPT 313- Food quality and analysis (Skill development component)		**90 Periods**
Sr. No.	**Content**	**No. of Practical (6 periods each)**
1	Determination of carotenoids by TLC	1
2	Determination of ascorbic acid by titrimetric and photometric methods	2
3	Determination of iron, phosphorous & sulphur in foods	1
4	Determination of pigment in food sample	1
5	Determination of lead, arsenic, and tin content in food	1
6	Analysis of canned and processed products available in the market	1
7	Cut out analysis of canned product	1
8	Estimation of Vit A, D in desi ghee	1
9	Determination of viscosity liquid food	1

10	Determination of FFA and Acid value of given sample	1
11	Analysis of ice cream for fat, acidity, total solids, foreign fat	1
12	Evaluate the given food sample using different sensory test methods.	2
13	Visit to a food analytical laboratory	1

References:

1. Fundamentals of Quality Control for Food Industry by Krammer and Twigg Avi Publishing Company, 1966
2. Measurement and Control in Food Processing by Manabendra Bhuyan
3. Instrumentation and Sensors for the Food Industry by Erika Kress-Rogers And Christopher J.B. Brimelow
4. Process Systems Analysis and Control, by Coughanowr, D. R., 2nd edition McGraw Hill 1991.
5. Quality Control in Food Industry by Krammer and Twigg Avi Publishing Company, 1966
6. Handbook of Analysis and Quality Control for Fruit and Vegetable Products by Ranganna S. 2nd Ed. Tata-McGraw-Hill. 2001

FPT-401 Processing of dairy and dairy products (General education component)			**60**
Sr. No.	**Credit**	**Content of the Credit**	**No. of periods**
1.	**I**	Importance of milk industry in India: Status of Dairy Industry, MMPO, Milk cooperative system, National Dairy Development Board (NDDB), Operation Floods	**2**
		Milk : Definition, Composition, Chemical and functional properties of milk and milk components, physicochemical properties of milk protein, aggregation of Casein, micelles, factors affecting milk composition, milk secretion and lactation.	**6**
		Production, collection, testing quality, cooling, storage, and transportation of milk, Receiving and quality assessing of milk in dairy industry for detection of adulteration, decision for acceptance/rejection, determination of price of the milk	**6**
		Test/Tutorial/Discussion/Home assignment	**1**

2.	**II**	Microbial spoilage of milk, hydrolytic rancidity in milk and milk	**3**
		products, auto oxidation of milk fats and effects on milk quality	
		Milk processing operations: Standardization and/or processing (pasteurization, homogenization, sterilization and UHT processing), storage, packaging and distribution	**3**
		Liquid milks: whole, standardized, toned, double-toned, and skim milk. Recombined, reconstituted, and flavored milks.	**3**
		Butter: Manufacture, packaging, storage and marketing of butter; butter defects and their control, margarine	**2**
		Cheese: Manufacture of hard, semi hard, soft and processed cheeses, Storage, grading and marketing of cheese, Cheese defects and their control	**3**
		Test/Tutorial/Discussion/Home assignment	**1**
3.	**III**	Technology of fermented milk products: Principles and practices of manufacture, packaging, storage and marketing of Dahi, yoghurt, Shrikhand	**4**
		Technology of frozen milk products: Classification, manufacture, packaging, storage and marketing of ice cream, ices, sherbets; defects of frozen products and their control	**4**
		Technology of indigenous milk products: Principles and practices of manufacture, packaging, storage and marketing of ghee, khoa, Paneer channa and milk based foods	**4**
		Technology of evaporated and dried milk: Manufacture of evaporated milks and milk powders, packaging, storage, defects and their control	**2**
		Test/Tutorial/Discussion/Home assignment	**1**
4.	**IV**	Technology of Dairy by- products: Utilization of skim milk, buttermilk and way for the manufacture of casein and lactose	**3**
		Judging and grading of milk products	**1**
		Sanitary aspects: sanitation of dairy plant building, dairy equipments and their maintenance, selection and use of dairy cleaner and sanitizer, In plant cleaning system, dairy waste disposal and effluent treatment plant	**6**
		Scope and functioning of milk supply schemes and various national and international organizations, Specifications and standards in milk	**4**

		processing industry Test/Tutorial/Discussion/Home assignment	**1**

FPT- 411 Processing of dairy and dairy products (Skill development component)		**90 Periods**
Sr. No.	**Content**	**No. of Practical (6 periods each)**
1	a. Sampling of milk and milk production b. Platform test of milk	2
2	Determination of fat content of milk	1
3	Detection of adulterants in milk and milk products	1
4	Standardization of milk	1
5	Preparation of indigenous fermented milk products (dahi, Shrikhand, etc)	2
6	Preparation of coagulated milk product (paneer)	1
7	Preparation of channa	1
8	Preparation of channa based sweet (*Rasogulla*)	1
9	Fortified, reconstituted and flavoured milks	1
10	Preparation of khoa	1
11	Preparation of khoa based sweet	1
12	Preparation of ice-cream	1
13	Visit to dairy plant	1

References:

1. Outlines of Dairy Technology by Sukumar De, Oxford University Press.
2. Principles of Dairy Processing by James N. Warner, Wiley Eastern Ltd.
3. Milk and Milk Products by Eckles, Combs; and Macy, Tata McGraw Hill.
4. Technology of Indian Milk Products by Aneja et al. A Dairy India Publication.
5. The Fluid Milk Industry by Henderson JL AVI Publishing Co, USA
6. Indian Dairy Industry by K.S.Rangappa and K L Acharya Asia publishing house, Mumbai
7. Technology of Milk Processing by Khan QA and Padmanabhan ICAR, New Delhi
8. Judging of Dairy Products by J.A.Nelson and Trout The Olsen publishing Co. Milwankee, Wisconsin, USA

FPT-402 Processing of bakery, confectionary and spice products (General education component)			**60**
Sr. No.	**Credit**	**Content of the Credit**	**No. of periods**
1.	**I**	Bakery products, role of bakery ingredients (major and minor), Baked products from hard wheat: bread processes of bread making using straight and sponge, dough methods, role of each ingredient, quality control Testing of raw material, testing of final product, Defects in bread: staleness, roppines	**3**
		Baked product from soft wheat; cookies, crackers, biscuits, cakes – ingredients, process, fault causes and remedy, Macaroni products: spaghetti, noodles, vermicelli-process, Nutritional improvement of bakery products	**3**
		Setting of bakery unit, bakery norms, specifications for raw materials Packaging, marketing of products, preparation of project report	**2**
		History; Traditional confectionary goods; Types of confectionary; Classification of confectionery products	**1**
		Raw Materials/ ingredients- sugars: dextrose, fructose, lactose, maltose, caramel, honey, sorbitol, xylitol, iso-malt, soy maltose, polydextrose, mannitol; whipping agent, thickeners, acidulents, milk and milk products, flavouring agent, emulsifiers and other additives	**2**
		Starch derivatives, colours used in confectionary. Production of glucose syrup, Acid hydrolysis, enzyme hydrolysis	**1**
		Cocoa processing: cocoa bean, processing, roasting, fermentation, Production of cocoa butter, cocoa powder, its quality	**2**
		Test/Tutorial/Discussion/Home assignment	**1**
2.	**II**	Chocolate processing: ingredients, mixing, refining, conching, tempering, molding, cooling, coating, fat bloom	**3**
		High Boiled Sweets: introduction, composition, properties of high boiled sweets, preparation of high boiled sweets, traditional, batch and continuous method of preparation. different types of higher boiled sweets, recipes	**3**
		Toffee: definition, composition, types of toffee ingredient and their role. Batch and continuous method of toffee	**2**
		Caramel: definition, composition, factors affecting quality of caramel, caramel manufacture process, batch type, continuous types, checking of faults in caramel	**2**

		Tablets: Definitions, recipe, composition, wet granulation, Slugging,	
		Manufacture of Tablet, and Checklist of tablet faults.	**2**
		Quality of confectionery, Standards and regulations, Packaging requirements of confectionary, economics and marketing of confectionary goods	**2**
		Test/Tutorial/Discussion/Home assignment	**1**
3.	**III**	Production and processing scenario of spice, flavour & plantation crops and its scope	**2**
		Major spices: Post harvest technology, composition, processed products of spices – ginger, chilli, turmeric, onion, garlic, pepper, cardamom, cashew nut and coconut	**3**
		Minor spices, herbs and leafy vegetables: processing and utilization, All spice, annie seed, sweet basil, caraway seed, cassia, cinnamon, clove, coriander, cumin, dill seed, Fern seed nutmeg, mint, marjoram, Rose merry, saffron, sage, etc	**4**
		Savory, thyme, ajowan, curry leaves, asafetida	**2**
		Tea, Coffee, Cocoa: Processing quality control	**3**
		Test/Tutorial/Discussion/Home assignment	**1**
4.	**IV**	Vanilla and annatto-processing	**3**
		Spice oil and oleoresins; Chemistry and physiological of taste, flavouring compounds in foods; Separation, purification and identification of natural flavouring materials; Synthetic flavouring agents and their stability	**4**
		Flavours of soft drinks, Baking and confectionery industry; Standards specification of spices and flavours; Packaging of spices and spice products; Processing of arecanut and its quality control	**4**
		Processing of cashewnut and its quality control; Flavours of major and minor spics; By products from plantation crops and spices	**3**
		Test/Tutorial/Discussion/Home assignment	**1**

FPT- 412 Processing of bakery, confectionary and spice products (Skill development component)		**90 Periods**
Sr. No.	**Content**	**No. of Practical (6 periods each)**

1	Preparation of bread/biscuit	1
2	Evaluation of quality parameters of bread/biscuit	1
3	Preparation of sponge cake	1
4	Preparation of toffee	1
5	Preparation of groundnut *chikki*	1
6	Preparation of caramel	1
7	Preparation of chocolate	1
8	Preparation of traditional Indian confection	1
9	Study of standard specification of spices	1
10	Detection of adulteration in spices	1
11	Extraction of oil/ oleoresins from spices	1
12	Preparation of curry powder	1
13	Preparation of Indian *Masala* for different foods	1
14	Visit to bakery unit	1
15	Visit to confectionary/spice industry	1

References:

1. Bakery Products Science and Technology by Zhou and Hui John Wiley and Sons, 2014
2. Modern Bakery Products by EIRI, EIRI Publication, New Delhi
3. Dough Wheat and Baked Products by Faridi and Faubin Springer, 2012
4. Baked Products by Stanley PC and Linda SY Asia publishing house, Mumbai
5. Spices and Plantation Crops by K.G. Shanmugavelu Agrotech Publication, Delhi
6. Spice and Condiments by Pruthi J.S. National Book Trus, 1996
7. Handbook on Spices and Condiments (cultivation, processing and extraction) by Panda H. Asia Pacific Business Press Inc. 2010
8. The Complete Book on Spices &Condiments (with cultivation, processing & uses) by NIIR BOARD Asia Pacific Business Press Inc. 2010
9. Spices and Herbs for the Food Industry by Lewis YS Food Trade Press, 1984
10. Industrial Chocolate Manufactory and Use by S. T. Beckett Springer, 2012 ISBN: 9781461521112
11. Sugar Confectionery and Chocolate Manufacture by R. Less and E.B. Jackson Springer, 2012
12. ISBN: 9781468414950
13. Chocolate, Cocoa and Confectionery: Science and Technology by Bernard W.

Minifie Springer, 1999 ISBN: 9780834213012
14. Sugar Confectionary Manufacture by Jackson EB Aspen Publication, 1999

FPT-403 Statistics, data analysis and financial accounting (General education component)			**60**
Sr. No.	**Credit**	**Content of the Credit**	**No. of periods**
1.	**I**	**Business Statistics I:** Definition & Scope of Statistics, Population & Sampling: Methods of Sampling-Simple Random Sampling with & without Replacement, Systematic Random Sampling, Stratified Random Sampling. Small sample tests-t-test, f-test and chi-square test Test/Tutorial/Discussion/Home assignment	**14** **1**
2.	**II**	**Business Statistics II:** Measures of central tendency-Mean, Median, Mode for grouped & Ungrouped Data, Measures of Dispersion- Variance, Standard Deviation & coefficient Of Variance, Correlation & Regression Test/Tutorial/Discussion/Home assignment	**14** **1**
3.	**III**	**Basic Accounting Concepts:** Double Entry Accounting: The Accounting Trail: Financial, Statements and their Nature: The Accounting Equation, Primary Books: Introduction, Ground Rules of Journalisation: Types of Journals, Test/Tutorial/Discussion/Home assignment	**14** **1**
4.	**IV**	Secondary Books: Introduction: Types of secondary books: Posting techniques in the ledger, Trial Balance and Final Accounts: Introduction: Preparation of the Trial Balance: Errors and their Rectification Test/Tutorial/Discussion/Home assignment	**14** **1**

Reference books:

1. Business Mathematics & Statistics – By prof Arvind V. Rayarikar, Dr.Prakash G. Dixit
2. Business Mathematics & Statistics- by R.J.Shah

3. Financial Accounting -by Dr.Mahesh Kulkarni, Suhas Mahajan
4. Financial Accounting -Dr. Jitendra Ahirrao
5. Basic Accounting – Rajni Sofat and Preeti Hiro

FPT- 413 Industrial training (Skill development component)

It is compulsory to submit the certificate of completion of the said training report issued by the organization where the student has done his/her work. The said organization will award internal marks and hand it over to the Parent institute in a sealed envelope along with the duly signed attendance record and the certificate of completion. The external marks will be awarded by the external examiner on the day of external evaluation in which student has to be present along with the certificate of completion and project report. The copy of the project report should be kept in the departmental library as well as Central library of the college.

Note: The college representative has to visit the organization where the student is doing his/her training twice in one semester.

Syllabus of T. Y. B. Voc. (Food Processing Technology)

FPT – 501 Technology of Meat, Fish, Poultry and food beverages. (General Education Component)	**4 Credits**	**60 lectures**

Chapter 1	**Meat**	**15 Lectures**
	1. Sources and development of meat industries in India and its importance in national economy. 2. Chemical composition and microscopic structure of meat. 3. Effect of feed, breed and management meat production and quality. 4. Slaughtering of animals; inspection and grading of meat. 5. Properties and shelf life of meat. 6. Introduction to post mortem changes; Factors affecting post mortem changes. 7. Mechanical deboning, meat tenderization. 8. Aging, pickling and smoking of meat. 9. Meat plant sanitation and safety; Meat By-product utilization.	
Chapter 2	**Fish**	**15 lectures**
	1. Types of fish. 2. Composition and structure of fish. 3. Post mortem changes in fish. 4. Handling of fresh water fish. 5. Canning, Smoking, freezing and dehydration of fish. 6. Preparation of fish products, fish saudage and home makings.	
Chapter 3	**Poultry**	**15 lectures**
	1. Structure, composition, nutritive functional properties of egg.	

	2. Preservation of egg by different methods. 3. Factors affecting on quality of egg and measures of egg quality. 4. Processing of Egg Products.	
Chapter 4	**Food Beverages**	**15 lectures**
	1. Introduction of beverages 2. Importance of beverages and status of beverage industry. 3 Types of beverages. 4. Packaged drinking water processing. 5. Processing of beverages: Juice based beverages, Synthetic beverages, Carbonated beverages, dairy based beverages, low calorie beverages, alcoholic beverages, fruit beverages, tea, coffee, Cocca etc.	

FPT -511 Technology of Meat, Fish, Poultry and food beverages. (Skill development Component)		**90 Periods**
Sr. No.	**Content**	**No. of Practicals (6 periods each)**
1	Slaughtering of meat	**1**
2	Identification of physical characteristics of meat	**1**
3	Determination of pH of meat	**1**
4	Determination of ERV of meat	**1**
5	Identification of meat and poultry cuts	**1**
6	Microscopic structure of meat, poultry, fish and egg	**1**
7	Determination acid insoluble ash of fish	**1**
8	Estimation of TBA	**1**

9	Chemical analysis of meat, poultry and fish	**1**
10	Qualitative identification of fish	**1**
11	Determination of pH of fish	**1**
12	Determination of sodium chloride form fish	**1**
13	Curing of fish	**1**
14	Evaluation of egg quality	**1**
15	Preparation of instant Tea/Coffee	**1**
16	Preparation of RTS beverage	**1**
17	Preparation of carbonated beverage	**1**

Recommended References:

1. Lawrie, R.A. 1975. Meat Science, 2nd Edn. Pergamon Press, Oxford UK.

2. Lavie A. 1980. Meat Handbook. 4th Edn. AVI, Westport.

3. Portsmouth, J.I. 1979, Commercial Rabit Meat Production. 2nd Edn. Saiga Survey, England.

4. Stadelmen, W.J. and Cotterill, O.J., 1977. Egg. Science and Technology. 2nd Edn. AVI, Westport.

5. Srivastava, R.P. and Kumar, S. 1998.

6. Fruit and Vegetable Preservation: Principles and Practices. 2nd Ed. International Book Distributing Co. Lucknow. Ting, S.V. and Rousett, R.L. 1986.

7. Citrus Fruits and Their Products. Marcel Dekker, New York.

FPT - 502 Food sanitation, Packaging and Storage technology (General Education Component)	**4 Credits**	**60 lectures**

Chapter 1	What is Sanitation of food Importance / benefits of sanitation. Physical, biological and chemical hazards and it's control methods. Physical Sanitizing agents : e.g. Hot water, Steam and UV light Chemical Sanitizing agents : e.g. chlorine, iodine and their compounds, Phenolic compounds. Advantages and disadvantages of sanitizeers.	**15 Lectures**
Chapter 2	Introduction of Packaging - Introduction to principles of food packaging, Functions of packaging materials, Types of packaging and packaging materials, Desirable properties of packaging Materials, Selection of packaging material for different foods.	**15 Lectures**
Chapter 3	Packaging materials: Paper as a package materials, it's types and advantages. Corrugated and paper board boxes etc. Glass as packaging material: advantages disadvantages Metal as package material: advantage disadvantages Aluminium as package material advantages and disadvantages Plastic as packaging material advantages and disadvantages. classification of polymers such as Polyethylene, poly peopeylene, PVC, PVDC etc. and it's uses Coating : Types of coating, need of coating Methods of coating.	**15 Lectures**
Chapter 4	Storage technology: Introduction to the storage of food materials Food losses and damage during storage	**15 Lectures**

	Modified atmosphere packaging atmospheɛe packaging Different storage technologies for different food materials.	

FPT - 512 Food sanitation, Packaging and Storage technology (Skill Development Component)		**90 Periods**
Sr. No.	**Content**	**No. of Practicals (6 periods each)**
1	Determination of GSM	**1**
2	Cut out analysis of canned products	**1**
3	Tearing strength tester	**1**
4	Bursting strength tester	**1**
5	Breaking strength tester	**1**
6	Preparation of Packaging Album	**1**
7	Estimation of BOD (Biological Oxygen Demand)	**1**
8	Estimation of COD (Chemical Oxygen Demand)	**1**
9	Determination of hardness of water	**1**
10	Bacteriological examination of water: Coliform MPN test	**1**
11	Measurement of water absorption of paper, paper boards	**1**
12	Measurement of thickness of packaging films, papers and boards	**1**
13	Determination of shelf life of foods	**1**
14	Visit to food storage wares and godowns	**1**
15	Layout and design of cold storage	**1**
16	Visit to cold storage plant	**1**

17	Visit to packaging industry	**1**

Reference Books:

Fundamentals of Packaging by F.A. Paine Institute of Packaging, 1981 ISBN: 9780950756707

Plastic Packaging: Properties, Processing and Applciations by Culter JD and Hernandez RJ Hanser, 2004 ISBN: 9783446229082

Packaging Technology by Richard C, Derek , M, Mark J.K. CRC Press, 2003 ISBN: 9780849397882

Principles of Food Packaging Sacharwo S and Griffin RC. AVI Publication, 1980A

Handbook of Food Packaging by Painy FA Blackie Academics, 1992

Principles of Food Sanitation by Marriot and Gravi Springer, 2006

Hygiene and Sanitation by Roday S. McGraw Hill Education, 2011

Essentials of Food Sanitation by Marriot N. Springer 1997

FPT - 503 Quality assurance, Certification and Patent Application (General Education Component)	**60 lectures**

Chapter 1	Objectives, importance and functions of quality control Methods of quality assessment of food materials: Fruits, vegetables, cereals, dairy products, meat, poultry, egg and processed food products.	**15 Lectures**
Chapter 2	Sanitation and hygiene, GMP, GLP, Statistical quality control Food laws and standards PFA, AGMARK	**15 Lectures**
Chapter 3	Sampling and specification of raw materials and finished	**15 Lectures**

	products, Concept of codex, Al metarials / USFDA /Iso 9000 series. Rules and Regulations for waste disposals.	
Chapter 4	Food adulteration and food safety, HACCP Introduction, patent act, patent rules, patent types, patent process, IPA and IPR	**15 Lectures**

FPT - 513 Quality assurance, Certification and Patent Application (Skill Development Component)	**6 Credits**	**90 lectures**
Internship in a Food Industy.		

Reference Books:

Manual of Food Quality Control: Quality assurance in the food control microbiological laboratory FAO FAO PublicationHACCP and ISO 22000

Application to Foods of Animal Origin by Arvanitoyannis. I.S. Wiley-Blackwell Publication, Oxford [ISBN: 978-1-4051-5366-9]

Food Safety Management and ISO 22000 – Food Industry Briefing Early Ralph Food Industry Briefing Publication [ISBN: 9781405193245]

ISO 22000: Food Safety Management Systems Requirements for Any Organization in the Food...ISO International Organization for Standardization

HACCP, GMP and ISO 22000 –Overview--- Institute of Workforce EducationSaint Augustine College Publication [ISBN: 9781633051485]

HACCP – A Food Industry by briefing Mortimore S.E. and Wallace C.A. Wiley Blackwell, New York . ISBN: 978-1-118-42723-1

FPT - 601 A. Human values and Ethics **(General Education Component)**	**2 Credits**	**30 lectures**

Chapter 1	variety of Moral Issues : Understanding the Harmony in the Society (Society being extention of family). Integrity, work Ethics, courage, Empathy, self confidence, Moral Autonomy, Professionalism, Professional Ideas and virtues, Principles of Ethics and Morality: Ethics as Subset of Morality, Ethics and Organizations, employee Duties and Rights Discriminatory and prejudicial employee practices	**15 Lectures**
Chapter 2	Risk Benefit Analysis: Reducing Risk, The Government Regulators Approach to Risk Handling Ethical Dilemmas of work, Market strategies and Ethics, Ethical Practices in market place, Ethics in finance, Ethics in Business and Environment Competence and Professional Ethics: Ability to utilize the Professional competence for Augmenting universal Human order. Ability to identify and develop appropriate technologies. Ability to identify the scope and characteristics of people - friendly and eco - friendly production.	**15 Lectures**

FPT - 601 B. Food laws and Regulations (General Education Component)	**2 Credits**	**30 lectures**

Chapter 1	Introduction to Food Laws and Regulations Need of the standards and their enforcement. Various types of laws (Mandatory, Regulatory and Voluntary/Optional) Food safety and standards Act, 2006 (fssai) - inception,	**15 Lectures**

	imposta - Importance and significanance, discussion on important sections	
Chapter 2	FSS Regulations - Regulations on Licensing and Registration , Regulations on contaminants, toxins and residues, FSS Regulations on food products Standards and food additives FSS Regulations on laboratory and sampling analysis FSS Regulations on packaging and Labelling Environment Protection Act 1976 Standards of weights and Measures Act, 1976	**15 Lectures**

FPT - 611 A. Food Plant Design and layout **FPT - 611 B. Project management and entrepreneurship** **(Skill development component)**		**90 Periods**
Sr. No.	**Content**	**No. of Practicals (6 periods each)**
1	1.Preparation of project report	**1**
2	Layout of food storage wares and godowns	**1**
3	Layout and design of cold storage	**1**
4	Layout of milk and milk product plant	**1**
5	Layout and design of bakery and related product plant	**1**
6	Design and layout of multiproduct and composite food plant	**1**
7	Waste treatment and management of food plant	**1**
8	Visit to food storage wares and godowns	**1**

9	Visit to cold storage plant	**1**
10	Studies on Market Survey based on enterprise	**1**
11	Preparation of Project Report	**1**
12	Project selection, identification, appraisal and scope	**1**
13	Methods of monitoring and feasibility of projects	**1**
14	Studies on investment and repayment plants	**1**
15	Project monitoring and Control-PERT Modeling	**1**

Reference Books:

Milk Plant Layout H.S. Hall FAO Pub., Rome 1968

Plant Layout and Design by James M.Moore. Mac Millan, New York 1971

Textbook of Dairy Plant Layout and Design--- ICAR, New Delhi 2010

Applied guide to process and plant design by Sean Moran Elsevier, 2015

Facility Planning And Layout Design by Chandrashekar Hiregoudar, Technical Publications, 2017

Engineering for Dairy and Food Products A.W. Faral Rebert E., Kriger Pub Co., New York 1980

Practical Plant Layout Richard Muther McGraw Hill, 1955

Amerine, M.A. Pangborn, R.M., and Rosseler, E.B. 1965. Principles of Sensory

Evaluation of Food. Academic Press, New York. By Birk, G.G., Herman, J.G. and Parker, K.J. Ed. - 1977. Sensory Properties of Foods.

Applied Science, London by Charalambous, G. and Inglett, G. 1981.

The Quality of Foods and Beverages. (2 vol.set). Academic Press, New York. Furia, T.E. Ed. 1980.

Regulatory Status of Direct Food Additives. CRC Press, Florida. Krammer, A. and Twigg, B.A. 1970.

Quality Control for the Food Industry. 3rd Edn. AVI, Westport. Pattee, H.E. Ed. 1985.

Evaluation of Quality of Fruits and Vegetables. AVI, Westport. Ranganna, S. 1986.

Handbook of Analysis and Quality Control for Fruits and Vegetable products. Tata McGraw Hill, New Delhi. Tannenbaum, S.R. Ed. 1979.

Nutritional and Safety Aspects of Food Processing, by marcel Dekker, New York.

FPT - 602 A. Disaster management **(General Education Component)**	**2 Credits**	**30 lectures**

Chapter 1	Environmental pollution: Water pollution – Introduction, water quality standards, sources of water pollution, classification of water pollutants, effect of water pollutants; Air Pollution – Introduction, composition of air, structure of atmosphere, ambient air quality standards, classifications of air pollutants, sources of common air pollutants, effects of common air pollutants; Land Pollution – Introduction, lithosphere, land uses, causes of land degradation; Noise pollution – introduction, sources of noise pollution, effect of noise pollution; Radioactive pollution, Eutrophication; Control of environmental pollution through Law	**15 Lectures**
Chapter 2	Current Environmental Global Issues: Introduction, global warming, green house effect, acid rain, depletion of ozone layer, etc. Disaster Management: Introduction, disaster management Act 2005, National Disaster Management Framework in India, NDMA, NCMC, CMG, NDRF, NIDM.	**15 Lectures**

FPT - 602 B. Agribusiness management **(General Education Component)**	**2 Credits**	**30 lectures**

Chapter 1	Introduction: Importance; present status; export potential; employment generation Entrepreneurial motivation; Planning and evaluation of projects: Growth of firm, project identification and selection, factors inducing growth; Project feasibility study: Post planning of project, project planning and control; New venture management; Creativity.	**15 Lectures**
Chapter 2	Government schemes and incentives for promotion of entrepreneurship; Government policy on small and medium enterprises (SMEs)/SSIs; Export and import policies relevant to food processing sector; Venture capital; Contract farming and joint ventures, public-private partnerships; Overview of food industry inputs; Characteristics of Indian food processing industries and export; Social responsibility of business.	**15 Lectures**

FPT - 612 A. Disaster management **FPT - 612 B. Agribusiness management** **(Skill development Component)**		**90 Periods**
Sr. No.	**Content**	**No. of Practicals (6 periods each)**
1	Water quality parameters	**1**
2	Determination of pH of water samples	**1**

3	Determination of chloride in water	**1**
4	Determination of calcium hardness of water	**1**
5	Determination of total hardness of water	**1**
6	Determination of minerals in water	**1**
7	Visit to Industrial Sewage Disposal Unit	**1**
8	Data collection from market on various projects on food processing and analysis	**1**
9	Project proposals as entrepreneur	**1**
10	Calculation of project cost and break even analysis of specific project	**1**
11	Different schemes for food entrepreneurs	**1**
12	Visit to public enterprise	**1**
13	Visit to private enterprise	**1**
14	Visit to agro-processing/food business centres	**1**
15	SWOT analysis of public enterprises	**1**
16	SWOT analysis of private enterprise	**1**
17	Presentation of project proposals in the class	**1**

Reference Books:

Entrepreneurship Development by C.B. Gupta and N.P. Srinivasan, S. Chand & Sons, New Delhi. 20122.

Entrepreneurship Development by Anil Kumar, S., Poornima, S.C., Mini, K., Abraham and Jayashree, K.

New Age International Publishers, New Delhi. 20033.

Management: Theory and Practice by Gupta, C.B. Sultan Chand & Sons, New Delhi. 20014.

Dynamics of Entrepreneurial Development and Management by Vasant Desai Himalaya Publishing House, New Delhi. 2000

Text Book of Environmental Studies for Undergraduate Courses by Bharucha Erach. University Grants Commission, University Press, Hyderabad. 2005

Introduction to Environment Science by Sharma J P Lakshmi Publications. 20037. Methods in Environmental Analysis – Water by Gupta P K Soil and Air. Agro bios, Jodhpur. 2004

Natural Disaster Sharma, R.K. & Sharma, GAPH Publishing Corporation, New Delhi. 20059.

Environment and Ecology: Biodiversity, Climate Change and Disaster Management by Husain Majid Online book. 2013.

FPT - 603 Food Business Management (General Education Component)	**4 Credits**	**60 lectures**

Chapter 1	Definitions, management principles, scientific principles, administrative principles; Maslow's Hierarchy of needs theory; Functions of management: Planning, organizing, staffing, directing, controlling; Organizational structures, principles of organization; Types of organization: Formal and informal, line, line and staff, matrix, hybrid;	**15 Lectures**
Chapter 2	Introduction to economics: Definitions, nature, scope, difference between microeconomics and macroeconomics; Theory of demand and supply, elasticity of demand, price and income elasticity;	**15 Lectures**
Chapter 3	Markets: Types of markets and their characteristics; National income: GDP, GNP, NNP, disposable personal income, per capita income, inflation; Theory of production: Production function, factors of production. Law of variable proportions and law of returns to scale; Cost: Short run and long run cost, fixed cost, variable cost, total cost, average cost, marginal cost, opportunity cost; Break even analysis;	**15 Lectures**

Chapter 4	Finance management: Definition, scope, objective; Different systems of accounting: Financial accounting, cost accounting, management accounting; Human resource management: Definitions, objectives of manpower planning, process, sources of recruitment, process of selection; Corporate social responsibility: Importance, business ethics.	**15 Lectures**

FPT - 613 Food Business Management (Skill development Component)		**90 Periods**
Sr. No.	**Content**	**No. of Practicals (6 periods each)**
1	Data collection from market on various projects on food processing and analysis	**2**
2	Project proposals as entrepreneur - individual and group	**2**
3	Calculation of project cost and break even analysis of specific project	**1**
4	Different schemes for food entrepreneurs	**1**
5	Visit to public enterprise	**1**
6	Visit to private enterprise	**1**
7	Visit to agro-processing/food business centres	**1**
8	SWOT analysis of public enterprises	**1**
9	SWOT analysis of private enterprise	**1**
10	Presentation of project proposals in the class	**1**
11	Market Survey - a. Consumer Survey b. Distributer Survey	**2**

12	Visit to bank	**1**

Reference Books :

1. L.M. Prasad Principles and Practices of Management, 9th Ed. S. Chand & Sons, New Delhi 20012.

2. Principles of Management by Koontz Harold Tata McGraw-Hill Education Private Limited, New Delhi.

3. Managerial Economics by P.C. Thomas 9th Ed. Kalyani Publishers

4. Modern Economic Theory by K.K. Dewett and M.H. Navalur, S. Chand & Sons, New Delhi.5.

5. Human Resource Management by P. Subba Rao Himalaya Publications. New Delhi6.

6. Financial Accounting by S.P. Jain Kalyani Publications, Ludhiana

7. Agriculture, Finance and Management by Reddy and Raghuram. Oxford & IBH Pub Co, 19968.

8. Marketing Management Kotler and Keller, BurtonPearson, Education Australia, 20089.

9. Management: Principles and Guidelines by Duening and Ivacevinch Dreamtech Press, 2003