Anekant Education Society's

TULJARAM CHATURCHAND COLLEGE, BARAMATI, DIST- PUNE – 413102

Revised proposed Syllabus

For

B. Voc. (Food Processing & Post Harvest Technology)

(For TY- Semester V & VI)

Sponsored by

University Grant Commission

Under

National Skill Qualification Framework (NSQF)

To be implemented from

2021-22

Title of the Course: B. Voc. (Food processing and Post Harvest Technology)

(To be implemented from Academic Year - 2015-2016)

Course structure:

- B.Voc. is three year course with four theory and two practical courses in each year**.**
- Each theory course will be of three credits and each credit is of 15 periods
- Each practical course will be of six credits and each credit is of 15 periods
- Each period is of one clock hour.
- In each practical course there will be one visit to the relevant industry/ institute.
- In addition to the regular practicals based on the theory course, special emphasis will be on communications and soft skills development of the students.

Eligibility:

1) **First Year B.Voc. (Diploma):** A student who has passed the Higher Secondary School Certificate (10+2) in any stream or its equivalent examination

2) **Second Year B.Voc. (Advanced diploma):** Keeping terms of First Year of B. Voc. and if they fulfill the eligibility conditions.

3) **Third Year B.Voc. (Degree):** Student shall pass all First Year B. Voc. courses and satisfactorily keeping terms of Second Year of B. Voc.

Note: Admissions will be given as per the selection procedure / policies adopted by the college, in accordance with conditions laid down by the Savitribai Phule Pune University, Pune.

Examination Pattern:

Pattern of Examination: Semester

Theory courses Paper I, II, III, IV, V and VI: Semester

Practical Course: Practical examination will be conducted

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Third Year: Semester-V

Subj. Code	Subject Name	No. of Credits	Marks
Theory			
FP-13	Dairy Technology	4	100
FP-14	Food Quality, Laws and Regulations	4	100
FP-15	Principle of Post-Harvest Technology	4	100
Practical			
FP-5.1	Dairy Technology	6	150
FP-5.2	Entrepreneurship Development	6	150
FP-5.3	Project	6	150

Third Year: Semester-VI

Subj. Code	Subject Name	No. of Credits	Marks
Theory			
FP-16	Animal Product Technology	4	100
FP-17	Packaging Technology	4	100
FP-18	Food Safety, Hygiene and Sanitation	4	100
Practical			
FP-6.1	Animal Product Technology	6	150
FP-6.2	Packaging Technology	6	150
FP-6.3	Internship	6	150

Third Year Semester V

Dairy Technology

Theory **Paper No. FP-13**
Maximum Marks: 100 **Credits: 4**
Teaching Period: 4 Theory **Teaching Load: 60 Theory Period/Semester**

Objectives

- To know the need and importance of dairy industry
- To know the compositional and technological aspects of milk.
- To study processed milk products.

Outcomes

On completion of the course, students will be able to:

1. Give a comprehensive view of the composition of milk, its chemical, physical and organoleptic properties that can be applied in technological processing of milk.
2. Explain the production of milk and pre-treatment of milk.
3. Explain the dairy processing technologies.
4. Apply methods of analysis for dairy products and relate differences in composition and structure to differences in manufacturing processes.
5. Create a dairy product and evaluate relevant physical properties.

Unit-1: Livestock and dairy building: **12 Lectures**

Importance of livestock, their importance species and breeds, functional requirement, site selection, types of dairy barn, planning, layout and requirement of dairy barns.

Milk Societies, buying and collection of milk, transportation of milk, milk reception in dairies. Quality and quantity test at reception

Unit-2: Dairy Chemistry and Microbiology **12 Lectures**

Introduction, Milk - composition, food and nutritive value, physico-chemical and microbiological Properties of milk, Judging and Grading of milk,

Unit-3: Milk Processing **12 Lectures**

Milk Processing flow sheet – Filtration / clarification, Storage of milk, Standardization –simple problems in standardization, Homogenization, Pasteurization – Types of pasteurization process, Sterilization of milk. Equipments used in each process - Cream separating centrifuges, Pasteurizers (Heat Exchangers), Homogenizers, Bottle and pouch fillers, Milk Chillers.

Unit-4: Manufacture of Dairy Products **12 Lectures**

Manufacture of Ice Cream, Cream, Paneer, Butter, Ghee, Milk powder, Khowa, Cheese and milk based sweets (Only method of preparation)

Equipment used for manufacture of each product like Butter churn, ghee boiler, Evaporator, Nozzel, Spray and Drum Dryers etc.

Unit-5: Manufacture of other Dairy Products and sanitization **12 Lectures**

Manufacture of Homogenized, Standardized, rehydrated, Toned Milk and Sweetened Condensed milk, Extraction of casein from milk – properties - composition and industrial uses. Production of lactose and whey

Fermented products – Yoghurt, Curd, acidophilus milk, butter milk

Dairy plant sanitization – Cleaning in place – bottle and can washing, cleaning of tankers and silos – Detergents and sanitizers used.

Third Year **Semester V**

Dairy Technology

PRACTICAL **Paper No. FP-5.1**
Maximum Marks: 150 **Credits: 6**
Teaching Period: 2/weak **Teaching Load: 30 Practical/Semester (4 Period each)**

1. Physical examination of milk
2. Platform tests of milk
3. Detection of adulteration of milk
4. Testing of milk for acidity
5. Specific gravity of milk
6. To determine protein content in milk.
7. Preparation of Dahi
8. Preparation of Lassi
9. To prepare casein and calculate its yield.
10. Preparation of Basundi.
11. Preparation of Khoa.
12. Preparation of Gulabjamun.
13. Preparation of Paneer.
14. Preparation of Rasgulla.
15. Preparation of Flavoured milk.
16. Preparation of Ice-cream.
17. Preparation of Shrikhand.
18. Preparation of Butter
19. Preparation of Ghee
20. Preparation of Whey Powder
21. Preparation of SMP
22. Preparation of WMP
23. Visit to Dairy Industry
24. Preparation of Report and Presentation

References:-

1. De Sukumar, Outlines of Dairy Technology, Oxford University Press, Oxford.2007
2. Robinson, R.K. (2 vol.) 1986. Modern Dairy Technology. Elsevier Applied Science, UK.
3. Warner, J.M. 1976. Principles of Dairy Processing. Wiley Eastern Ltd., New Delhi.
4. Yarpar, W.J. and Hall, C.W. 1975. Dairy Technology and Engineering. AVI, Westport.
5. Rosenmal, I. 1991. Milk and Milk Products. VCH. New York.
6. Webb and Johnson, Fundamentals of Dairy Chemistry

Third Year **Semester V**

Food Quality, Laws and Regulations

Theory **Paper No. FP-14**
Maximum Marks: 100 **Credits: 4**
Teaching Period: 4 Theory **Teaching Load: 60 Theory Period/Semester**

Objectives:

- To learn about quality management in food production chain.

- To understand the role of food standards and regulations in maintaining food quality.

Outcomes:

On completion of the course, students will be able to:

1. Be able to critically evaluate the recent developments in the control of food safety.
2. Have an integrated view of the issues involved.
3. Be able to conduct risk assessments of food safety problems including genetic modification.
4. Demonstrate detailed knowledge of the requirements for compliance with national and international food safety legislation.
5. Know how to control and maintain a quality management system.

Unit-1: Food Quality: Introduction to food quality management – Definition, quality concepts, quality perception, quality attributes, safety, health, sensory, shelf life, convenience.

Evaluation of Food quality: Definition, Quality attributes of food, Sensory characteristics of Food, Sensory tests, Instruments used for color & texture evaluation, microbial quality of food. **10 Lectures**

Unit-2: Quality control and Effect of processing and storage on quality of food: Quality control of food, Role and responsibilities of Quality control department of food industry, Effect of processing on Quality of Food, Effect of storage on Quality of Food. **10 Lectures**

Unit-3: Food Adulteration: Introduction, Classification of Adulterants, Harmful effects of Adulterants, Methods of detection of some Adulterants. **10 Lectures**

Unit-4: Food Laws and Standards: Food Standards and regulations in India, Prevention of Food Adulteration Act, Food Safety Standard Authority of India (FSSAI).

Compulsory National Legislations: Essential Commodities Act, Standards of Weights and Measures, Export (Quality control and Inspection) Act

Voluntary based Product Certifications: Bureau of Indian Standards Act, Agmark Grading and Marketing Act and Rules Nutritional Labeling & Education act. **15 Lectures**

Unit-5: Consumer Protection

Government agencies: Municipal Laboratories, Food and Drug Administration, The central Food Testing Laboratory, Export Inspection Council Laboratory

Voluntary Agencies: Quality control laboratories of companies, Quality control laboratories of Consumer co-operatives, Private testing laboratories, Consumer Guidance Society

International Organizations and Agreements in the area of Food Standardization and quality control: Codex Alimentarius, Codex India, World Health Organization, International Organization for Standardization, Food and Agriculture Organization, Joint FAO/WHO Expert committee on food additives, British Retail Consortium(BRC) standard for Foods. **15 Lectures**

References

1. Food Science – Norman N. Potter, Joseph H. Hotchkiss CBS Publishers and distributors, New Delhi, 1997 5th edition.
2. Cereal technology – Matz.
3. Manay NS and Shadaksharaswamy M, Food-Facts and Principles, New Age International (P) Ltd. Publishers, New Delhi, 1987
4. Quality Control for Food Industry Krammer&Twigg
5. Quality Control in Food Industry S.N. Herschdogrfer
6. B. Srilakshmi, Food science, New Age Publishers, 2002

7. Tannenbaum, S.R. Ed. 1979. "Nutritional and Safety Aspects of Food Processing", Marcel
8. Pieternel A, Luning, Willem J. Marcelis, Food Quality Management Technological and Managerial principles and practices, Wageningen,2009.

Third Year Semester VI

Principles of Post Harvests Technology

Theory **Paper No. FP-15**
Maximum Marks: 100 **Credits: 4**
Teaching Period: 4 Theory **Teaching Load: 60 Theory Period/Semester**

Objectives:

- To obtain that the student has the knowledge of the post-harvest physiology and technology of foods and the necessary abilities
- To design different post-harvest treatments and strategies, understanding the scientific basis.

Outcomes:

On completion of the course, students will be able to:

1. Understand technologies of post harvest technology and its role in providing better quality produce to the consumer.
2. Understand importance prevention of losses
3. Understand utilization of the produce and methods for shelf life extension
4. Understand cold chain management
5. Learn quality control and various standards required for domestic and export market

Unit-1 History and role of post-harvest technology; Harvesting factors and Quality- Pre-harvesting factor, Maturity of harvest, Harvesting Methods, Post-Harvest Physiology **12Lecture**s

Unit-2: Structure and Composition of Food Grains, Engineering Properties of agricultural Materials, Physical Properties, Mechanical Properties, thermal properties, Rheological Properties and Cleaning and Grading . **12 Lectures**

Unit-3: Post harvest technology of Cereal, Pulses, Oilseeds, Fruits and Vegetables, Material Handling, Transportation and Marketing **12 Lectures**

Unit-4: Post Harvest Handling of Foods of Animal Origin, Post Slaughter Handling of Meat, Post-Harvest Handling of Fish and Seafood and Post-Harvest Handling of Milk. **12 Lectures**

Unit-5 Food storage systems- Direct Damage, Indirect damage, Sources of infestation, Traditional storage structures, improved storage structures, modern storage structures, storage of agricultural perishables, controlled and Modified atmosphere storage, Post-harvest treatments for quality retention of horticultural crops, methods to reduce decay. **12 Lectures**

References:

1) Preservation of Fruits & Vegetables by Srivastava & Kumar. 1996. Intl. Book Publishing Co. Lucknow

2) Preservation of Fruits & Vegetables by Siddappa et al. 1999. ICAR, New Delhi
3) An introduction to Post Harvest Technology by RBH Wills. 2003.
4) Post Harvest Technology of Fruits & Vegetables by Verma& Joshi. 2000. Indus Publication, New Delhi
5) Hand Book of Post Harvest Technology by Chakravarty et al. 2003. Mercer-Dekker Ltd
6) Kadar, A.A. 1992. *Post-harvest Technology of Horticultural Crops*. 2nd Ed. University of California.
7) Salunkhe, D.K., Bolia, H.R. and Reddy, N.R. 1991. *Storage, Processing and Nutritional Quality of Fruits and Vegetables*. Vol. I. Fruits and Vegetables. CRC.
8) Verma, L.R. and Joshi, V.K. 2000. *Post Harvest Technology of Fruits and Vegetbales*. Indus Publ.
9) Thompson, A.K. 1995. Post harvest technology of fruits and vegetables. Blackwell Sciences.
10) Peter, K.V. 2003. Plantation Crops. NBT, New Delhi

Third Year **Semester V**

Entrepreneurship Development

PRACTICAL **Paper No. FP-5.2**
Maximum Marks: 150 **Credits: 6**
Teaching Period: 2/weak **Teaching Load: 30 Practical/Semester (4 Period each)**

1. **Preparatory activity**
   - **a.** List various types of industries.
   - **b.** Narrate need of self-employment.
   - **c.** Anticipate importance of entrepreneurship development
2. **Creativeness and innovativeness:**
   - **a.** Teacher will assign any one Food Technology based (in a group of not more than 5-6 students) item/product, (may be Functional foods, convenient foods, Enriched and fortified foods, etc.). List at least ten uses of this item/product other than pre-defined. Think out of box.
   - **b.** List at least ten Food Technology products which have passed through innovativeness.

3. Identification of self-employment areas:
   - **a.** Teacher will assign this exercise in group of 5-6 students.
   - **b.** List at least five Food Technology based areas which have, in group's opinion, self-employment potential. Select any one promising area.
   - **c.** Develop market survey format for the selected area.
   - **d.** Perform market survey for self-employment opportunities.
   - **e.** Describe the outcome. Also narrate the experience.
   - **f.** It is compulsory to attach photographs of group conducting market survey.

9. Visit report:
   - **a.** Visit nearby :
     i. District Industries Centre (DIC).
     ii. Any one financial institution including bank.
     iii. Training institute / GITCO/EDI/ iNDEXTb/etc.
   - **b.** Prepare the visit report which include followings:

i. Brief history of organization.
ii. Type and details of services /support/ assistance being given.
iii. Any other information which are useful to be self-employer or entrepreneur.
iv. Brochures/technical literature collected from agencies.

10. Preparing project feasibility report of assigned product:

a. Teacher will assign any one product (physical or service based having Food Technology) to the group of 5-6 students.
b. Prepare project feasibility report (Technical and financial). Specifically include capacity requirement calculations and project set up planning details. Also present the same to whole batch.

11. Case analysis and presentations:

Teacher will assign one case of successful entrepreneur and one case of failed entrepreneur to the group of 5-6 students. Student will discuss in group, will analyze and will present the same to whole batch. Student will also prepare the report on analysis. Case may be put up with printed pages but analysis has to be hand written.

References:

1) Entrepreneurship development and Management, R.K.Singal, S.K.Kataria and Sons.
2) Developing Entrepreneurship,Pareek& Co. Learning systems,Delhi
3) Entrepreneurship & Venture – Management, Clifford and Bombak, Joseph R. Momanso.
4) Planning an Industrial unit, J. N. Vyas.
5) EDI study material, EDI, BHAT, Ahmedabad, Website : http://www.ediindia.org

PRACTICAL

Third Year Semester V

Project

PRACTICAL **Paper No. FP-5.3**
Maximum Marks: 150 **Credits: 6**
Teaching Period: 2/weak **Teaching Load: 30 Practical/Semester (4 Period each)**

Group of four students shall undertake project work related to design and development of innovative food product, its quality evaluation, packaging, labeling and shelf life testing under the supervision of a faculty member. In principle, the research /design work has to be carried out by the student himself taking advice from his supervisor when problem arises. The work will be allotted at the beginning of the fifth semester specifying the different aspects to be carried out by the student. At the end of the semester the student will submit an interim report on his/her work in typed form. Evaluation shall include oral presentation.

Third Year Semester VI

Animal Product Technology

Theory **Paper No. FP-16**
Maximum Marks: 100 **Credits: 4**
Teaching Period: 4 Theory **Teaching Load: 60 Theory Period/Semester**
Objectives:

- To understand need and importance of livestock, egg, Fish and poultry industry
- To study structure, composition and nutritional quality of animal products.
- To study processing and preservation of animal foods.
- To understand technology behind preparation of various animal food products and by-product utilization.

Outcomes:

On completion of the course, students will be able to:

1. Explain the composition, structure and function of meat, eggs, milk and fish;
2. Identify and describe the physical and biochemical changes occurring during the conversion of muscle to meat;
3. Describe and evaluate the implication of storage and processing operations on the quality of selected foods of animal origin;
4. Collect and interpret the data of experiments on the effect of processing conditions on quality parameters of animal food products;
5. Identify and explain the product composition, quality and production process of commercially available selected animal food products.

Unit-1 Introduction

Sources of Meat and Meat Products in India, it's important in National Economy

Meat: Definition of Meat, Classification, Structural and Composition of meat, Nutritive value of meat**,** Slaughtering of animals: Pre-slaughter transport and care and anti-mortem inspection, post-mortem inspection and grading of meat, Pre and post slaughter operations,

Processing and preservation of meat: Aging or chilling, freezing, pickling, curing, cooking and smoking of meat, Meat tenderization, gelation preparation, Preservation with antibiotics, radiations, Recent concepts in animal product processing

Unit-2 Egg:

Structure, Composition and quality of egg: Structure, composition of egg, Nutritive value of egg, Evaluation of quality and grading of eggs

Processing and Preservation of eggs: Egg processing – freezing, drying and canning, Preservation of shell eggs, Effect of heat on egg protein, Egg foams and factors influencing. Preparation of protein concentrate

Unit-3 Poultry:

Slaughtering of poultry, structure & composition and Nutritive value of poultry meat: Pre-slaughter transport and care and antimortem inspection, post-mortem inspection and grading of poultry meat. Processing and preservation of poultry meat: Manufacture of poultry products, Preservation of poultry meat, Sources and developments of meat and poultry industries and importance in national economy, By-products utilization of abattoir

Unit-4 Fish:

Structure and composition of fish: Types and Classification of Fish, Structure of fish, Composition and Nutritive value of fish, Post mortem changes

Processing and preservation of fish: Fish spoilage, Processing of fish meal, fish flour, fish – oil, Canning and freezing of fish, Fish cookery, Commercial fish handling preservation transport, Preparation of various fish products

Unit-5 Slaughter House by product utilization and Waste Management

References:

1. Manay S.N. and Shadaksharaswamy M. (2001); Food facts and principles, 2nd edn, New Age International (P) limited publishers.
2. Potter N. N. and Hotchkiss J.H. (1966); Food Science, 5th edn., CBS Publishers and distributors.
3. Y.H. Huiet at (2001) Meat Science & Applications, Marcel Dekker Inc.
4. NIIR Board; Preservation of Meat and Poultry Products, 1st, Asia Pacific Business Press Inc.
5. Stadelman W.J. and Cotterill O.J. (1973); Egg Science & Technology, 1st, The AVI Publishing Company, Inc.

Third Year Semester VI

Animal Product Technology

PRACTICAL **Paper No. FP-6.1**
Maximum Marks: 150 **Credits: 6**
Teaching Period: 2/weak **Teaching Load: 30 Practical/Semester (4 Period each)**

1. Estimation of moisture content of meat
2. Estimation of protein content of meat
3. To study shelf-life of eggs by different methods of preservation
4. Evaluation of eggs for quality parameters
5. Canning of meat/meat product formulation
6. Quality evaluation of fish/prawn
7. Fish product formulation/canning.
8. Estimation of moisture content of fish
9. Estimation of protein content of fish

Third Year Semester VI

Packaging Technology

Theory **Paper No. FP-17**
Maximum Marks: 100 **Credits: 4**
Teaching Period: 4 Theory **Teaching Load: 60 Theory Period/Semester**
Objectives:

- To understand the purpose and principles of food packaging.
- To impart knowledge and skills related to types, functions, testing of various packaging materials used in food processing industries
- To evaluate the suitability of packaging material for a particular type of food.
- To understand the operations involved in packaging material manufacture.

Outcomes:
On completion of the course, students will be able to:

1. Describe the role and function of packaging materials used for a range of consumer food needs and wants.
2. Design solutions to packaging problems.
3. Measure and evaluate the chemical, physical and mechanical properties of packages and packaging.
4. Explain knowledge of the legal, environmental, quality aspects associated with packaging materials and operations used in the food industry.

Unit-1: Introduction, Protection of Food products - major role of food packaging - Functions of packaging, Need for protective packaging. Packaging requirements and selection of packaging materials; Types of Container, packaging materials and Forms: Paper and Glass. **12 Lectures**
Unit-2: Metals: Tinplate containers, tinning process, components of tinplate, tin free steel (TFS), types of cans, aluminum containers, lacquers; Plastics: types of plastic films, laminated plastic materials, co-extrusion, edible films, biodegradable plastics. **12 Lectures**
Unit-3: Test for Packaging Materials, their methods of testing and evaluation; Barrier properties of packaging materials: Theory of permeability, factors affecting permeability, permeability coefficient, gas transmission rate (GTR) and water vapor transmission (WVTR) rate and its measurement. **12 Lectures**
Unit-4: Food packaging systems: Different forms of packaging such as rigid, semi rigid, flexible forms and different packaging system for (a) dehydrated foods (b) frozen foods (c) dairy products (d) fresh fruits and vegetables (e) meat, poultry and sea foods. **12 Lectures**
Unit-5: Vacuum, CA and MA packaging systems, gas packaging machine; seal and shrink packaging machine; form and fill sealing machine; aseptic packaging systems; bottling machines; carton making machines. **12 Lectures**

Third Year Semester VI

Packaging Technology

PRACTICAL **Paper No. FP-6.2**
Maximum Marks: 150 **Credits: 6**

Teaching Period: 2/weak **Teaching Load: 30 Practical/Semester (4 Period each)**

1) Identification and testing of packaging materials
2) Determination of wax from wax paper;
3) Testing of lacquered tin plate sheets;
4) Measurement of tin
5) Determination of equilibrium moisture content;
6) Grading of glass bottles for alkalinity;
7) Determination of water vapour transmission rate of packaging material;
8) To perform vacuum packaging of food sample and carry out its storage study;
9) Testing the compression strength of the boxes;
10) Packaging the food material in seal and shrink packaging machine and study its shelf life;
11) Testing the strength of glass containers by thermal shock test; Testing the strength of filled pouches by drop tester.
12) Preparation of album of different types of packaging.
13) Visit to industry
14) Preparation of visit report & presentation

References

1. Crosby NT.1981. *Food Packaging: Aspects of Analysis and Migration Contaminants*. App. Sci. Publ.
2. Kadoya T. (Ed). 1990. Food Packaging. Academic Press.
3. Mahadeviah M & Gowramma RV. 1996. *Food Packaging Materials*. Tata McGraw Hill.
4. Palling SJ. (Ed). 1980. *Developments in Food Packaging*. App. Sci. Publ.
5. Painy FA. 1992. *A Handbook of Food Packaging*. Blackie Academic.
6. Sacharow S & Griffin RC. 1980. *Principles of Food Packaging*. AVI Publ.
7. Stanley S & Roger CG.1970. *Food Packaging*. AVI Publ.
8. Gordon L. Robertson: Food Packaging- Principles and Practice Marcel Dekker Inc,USA (1993)
9. Donald Downing: Complete Course in Canning (3 Volumes) CTI Publications inc, USA (1996)
10. Mathlouthi M. (Editor): Food Packaging and Preservation Elsevier Applied Science Publications Essex, UK (1986)
11. J. R.D.David, R. H Graves and V.R. Carlson: Aseptic Processing and Packaging of Foods: CRC Press, New York

Third Year Semester VI

Food Safety, Hygiene and Sanitation

Theory **Paper No. FP-18**
Maximum Marks: 100 **Credits: 4**
Teaching Period: 4 Theory **Teaching Load: 60 Theory Period/Semester**

Objectives

To understand the following:

- Food safety, hygiene and sanitation

- Industrial waste utilization
- Design and implementation of food safety management systems such as ISO series, HACCP and its prerequisites such as GMP, GHP etc.

Outcomes:

On completion of the course, students will be able to:

1. Identify food safety hazards and their control
2. Identify & prevent potential sources of food contamination
3. Apply the principles of Hazard Analysis Critical Control Points (HACCP)
4. Recognize the principal legal responsibilities of food handlers regarding personal hygiene
5. Apply a range of food quality systems
6. Prepare a food safety plan

Unit-1: Introduction to Food Safety: Definition, Types of hazards, biological, chemical, physical hazards, Factors affecting Food Safety, Importance of Safe Foods. **12 Lectures**

Unit-2: Food Safety Management Tools: Basic concept, Prerequisites- GHPs ,GMPs, SOPs etc, HACCP, ISO series, TQM - concept and need for quality, components of TQM, Kaizen. Risk Analysis, Accreditation and auditing **12 Lectures**

Unit-3: Industrial byproducts and waste utilization: Potential & prospects of byproduct & waste utilization from the food Industries in India Byproduct & waste with special reference to Agricultural & agro based industries, cereal & cereal product, fruits and vegetable, meat, Poultry and fish, milk & milk products. **12 Lectures**

Unit-4: Hygiene and Sanitation in Food Service Establishments: Introduction, Sources of contamination, Control methods using physical and chemical agents, Waste Disposal, Pest and Rodent Control, Personnel Hygiene, Food Safety Measures. **12 Lectures**

Unit-5: Recent concerns: New and Emerging Pathogens, Packaging, Product labelling and Nutritional labeling, genetically modified foods\Transgenic, Organic foods, Newer approaches to food safety, Recent Outbreaks. **12 Lectures**

References:

1. Lawley, R., Curtis L. and Davis,J. The Food Safety Hazard Guidebook , RSC publishing, 2004
2. De Vries. Food Safety and Toxicity, CRC, New York, 1997
3. Marriott, Norman G. Principles of Food Sanitation, AVI, New York, 1985
4. Forsythe, S J. Microbiology of Safe Food, Blackwell Science, Oxford, 2000 &Sons; USA, 1987
5. Quality Control for Food Industry – Krammer & Twig

Third Year — Semester VI

Internship

PRACTICAL — **Paper No. FP-6.3**

Maximum Marks: 150 — **Credits: 6**

Teaching Period: 2/weak — **Teaching Load: 30 Practical/Semester (4 Period each)**

Students should undergo an project work for a period of 60 days, during course of three year. The programme is arranged by the Department of Food Processing and Post-Harvest Technology in consultation with the food industries. The purpose of the programme is to get hands-on experience on various aspects of food industries that forms the strong foundation for the young food technologists. The department will allot students to the industry, in consultation with the industry concerned. Student should report for the programme on the stipulated date. He/ she shall complete this period of 60 days In-plant training in either summer or winter vacation. On completion, each student should prepare a project report duly certified by the supervisor in the industry. Consequently, a seminar should be conducted in the department to present the finding of the project work. The bonafide project report attested by the head of the department will be evaluated by the external examiner and a viva voce will be conducted.