

# **COURSE CURRICULUM AND SCHEME OF EXAMINATION**

**Under**  
**Choice Based Credit System**

**For**  
**B. Sc. (Food Science and Technology)**  
**Batch 2018-21 (5<sup>th</sup> and 6<sup>th</sup> Semester)**

**DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY**

**University College**  
**Chaudhary Devi Lal University**  
**Sirsa - 125055**

## Semester V

B. Sc. Food Science and Technology (5 <sup>th</sup> Semester)									
Sr. No.	Course ID	Subject	Type	Credits	Contact Hours per week	Internal Assesment (IA)*	External Exam	Maximum Marks	Duratio n of Exam (hours)
1	BFST-501A	Food Safety & Food Laws	CC	4	4	30	70	100	3
2	BFST-501B	Lab-I Food Safety & Food Laws	CC	2	4	00	50	50	6: Two session of 3 Hrs. each
3	BFST-502	Food Engineering	CC	4	4	30	70	100	3
4	BFST-503	Food Additives	EC (Any One)	4	4	30	70	100	3
	BFST-504	Food Grain Storage		4	4	30	70	100	3
5	BFST-505	Lab-II Food Additives	EC (Any One)	2	4	00	50	50	6: Two session of 3 Hrs. each
	BFST-506	Lab-II Food Grain Storage		2	4	00	50	50	6: Two session of 3 Hrs. each
6	BFST-507	Lab-III Food Engineering	EC (Any One)	2	4	00	50	50	6: Two session of 3 Hrs. each
	BFST-508	Lab-III Technology of Cereals & Legumes		2	4	00	50	50	6: Two session of 3 Hrs. each
7	BFST-509	Lab-IV Malting & Brewing Technology	EC (Any One)	2	4	00	50	50	6: Two session of 3 Hrs. each
	BFST-510	Lab-IV Confectionary & Sugar Technology		2	4	00	50	50	6: Two session of 3 Hrs. each
Total				20	28	90	410	500	

\*IA = 20 Marks (10-Midterm examination; 5-Assignment hand written; 5-Attendance)

CC: Core Course, EC: Elective Course

## Semester VI

B. Sc. Food Science and Technology (6 <sup>th</sup> Semester)									
Sr. No.	Course ID	Subject	Type	Credits	Contact Hours per week	Internal Assesment (IA)*	External Exam	Maximum Marks	Duration of Exam (hours)
1	BFST-601A	Nutraceuticals & Functional Foods	CC	4	4	30	70	100	3
2	BFST-601B	Lab-V Nutraceuticals & Functional Foods	CC	2	4	00	50	50	6: Two session of 3 Hrs. each
3	BFST-602	Food Analysis & Instrumentation	CC	4	4	30	70	100	3
4**	BFST-603	Basic Concepts of Oils & Fats	EC (both BFST-603 & 604 or only BFST-605 )	4	4	30	70	100	3
	BFST-604	Lab-VI Basic Concepts of Oils & Fats		2	4	00	50	50	6: Two session of 3 Hrs. each
	BFST-605	Research Project		6	8	30	120	150	
5	BFST-606	Lab-VII Food Analysis & Instrumentation	EC (Any One)	2	4	00	50	50	6: Two session of 3 Hrs. each
	BFST-607	Lab-VII Basic Concepts of Nutrition		2	4	00	50	50	6: Two session of 3 Hrs. each
6	BFST-608	Lab-VIII Technology of Spices & Herbs	EC (Any One)	2	4	00	50	50	6: Two session of 3 Hrs. each
	BFST-609	Lab-VIII Food Biotechnology		2	4	00	50	50	6: Two session of 3 Hrs. each
Total				20	28	90	410	500	

\*IA = 20 Marks (10-Midterm examination; 5-Assignment hand written; 5-Attendance)

\*\*Research Project (BFST-605) of credit six is optional in place of one elective theory and one elective practical subject (i.e., BFST-603 & BFST-604 of 4 + 2 = 6 credits).

CC: Core Course, EC: Elective Course.

**Total credits and marks for all the six semesters**

<b>Semester</b>	<b>Credits</b>	<b>Total marks</b>
<b>1<sup>st</sup></b>	20	500
<b>2<sup>nd</sup></b>	20	500
<b>3<sup>rd</sup></b>	20	500
<b>4<sup>th</sup></b>	20	500
<b>5<sup>th</sup></b>	20	500
<b>6<sup>th</sup></b>	20	500
<b>Open elective course</b>	12	300
<b>Grand total</b>	132	3300

## BFST-501A Food Safety & Food Laws

**Time: 3 Hrs.**

**Credits: 4**

**Max. Marks: 100**

**Theory: 70**

**IA: 30**

**Note for the paper setter:** The question paper will consist of nine questions in all. The first question will be compulsory and will consist of five short questions of 2 marks each covering the whole syllabus. In addition eight more questions will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt four more questions selecting at least one question from each unit.

### UNIT-I

#### **Introduction to food safety**

Definition, Historical background of food safety, Factors affecting Food Safety, Importance of Safe Foods.

#### **Food hazards of physical, chemical and biological origin**

Introduction, Physical Hazards with common examples, Chemical Hazards (naturally occurring environmental and intentionally added and contaminants due to processing), Seafood and Shell fish poisoning, Microbiological hazards (Bacterial and Fungal).

### UNIT-II

#### **Introduction to food acts, laws and standards**

Food safety and standard act, prevention of food adulteration act, legal Metrology Act, Fruit product Order, Meat Food Product Order, Milk and Milk Products Regulations, Indian Standards, Agmark Standards.

International Standards: Codex Standards, ISO Standards.

### UNIT-III

#### **Food safety management tools**

Prerequisites of food hygiene - GHPs, GMPs, HACCP, TQM – concept and need for quality, Microbiological tests for food safety related to (*Coliforms, Listeria, Staphylococci and Salmonella*), definition and principles of risk Analysis.

Steps involved in implementation of food safety programme. New approaches and advancements in food safety.

### UNIT-IV

**Regulatory agencies:** Food Safety and Standards Authority of India (FSSAI), The Export Inspection Council, World Health Organization (WHO), Food and Agriculture Organization (FAO), World Trade Organization (WTO).

**Consumer Protection Act:** rights of consumer and its major aspects.

#### **Recommended Books:**

- Adam MR and Moss MO. Food microbiology. New Age International (P) Ltd. ND.
- Jay JM. Modern Food Microbiology. CBS publishers ND.
- Potter NN. Food Science. CBS Publishers ND.
- Bhunia AK. Food borne Microbial Pathogens (Mechanism and Pathogenesis). Food Science text series Springer. Food Safety by Ian C Shaw: Publisher Wiley Blackwell.

## **BFST-501B Lab-I Food Safety & Food Laws**

**Time: 6 Hrs.**

**Credits: 2**

**Max. Marks: 50**

### **Practicals**

1. Detection and estimation of food additives and adulterants.
2. Preparation of HACCP charts for meat industry.
3. Preparation of HACCP charts for dairy industry.
4. Preparation of HACCP charts for fruits and vegetable industry.
5. Preparation of HACCP charts for cereal industry.
6. Analysis of aflatoxins in fungal contaminated food product.
7. Visit to Food Industries.

## BFST-502 Food Engineering

**Time: 3 Hrs.**

**Credits: 4**

**Max. Marks: 100**

**Theory: 70**

**IA: 30**

*Note for the paper setter:* The question paper will consist of nine questions in all. The first question will be compulsory and will consist of five short questions of 2 marks each covering the whole syllabus. In addition eight more questions will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt four more questions selecting at least one question from each unit.

### UNIT-I

- **Units and Dimensions:** Fundamental and derived units, system of measurement, brief introduction to dimensions.
- **Material Balance & Energy Balance Calculations:** General principles, steady state and unsteady state problems
- **Screening:** Screening terminology, types of screens, effectiveness of screens

### UNIT-II

- **Mixing:** Theory, measurement of mixing, rates of mixing, types of mixers
- **Sedimentation:** Theory, free and hindered settling, sedimentation equipments.
- **Filtration:** Theory of filtration, filtration equations for constant pressure and constant rate filtration, filtration equipments
- **Size Reduction:** General principles, size reduction equipments, modes of operation of size reduction plant, calculation of energy requirements for comminution of solids

### UNIT-III

- **Mass Transfer Process:** Analogy between heat, mass and momentum transfer, Fick's Law of diffusion, Convective mass transfer coefficient, Basic mass transfer equations for molecular diffusion in solids, liquids and gases,
- **Psychrometry:** Properties of dry air, water vapor and water vapor mixture, psychrometric chart and its application.
- **Material Handling Process:** Introduction, Types of conveyors and application in food industry.

### UNIT-IV

- **Heat Transfer:** Conductive heat transfer-Fourier's law, conduction through rectangular slab, hollow cylinder, spherical shell, composite rectangular wall (series) and composite cylinder. Convective heat transfer-convective heat transfer coefficient, free and forced convection, overall heat transfer coefficient. Types of Heat exchangers. Radiation: Stefan-Boltzmann law, Radiative heat transfer.
- **Thermal Process calculations**  
Concept of D, Z and F values, evaluation of process time in canned foods by graphical and formula methods.

### Recommended books:

- Fundamentals of Food Process Engineering by R.T. Toledo (3<sup>rd</sup> Edition), Springer (2008).
- Introduction to Food Process Engineering by P.G. Smith, (2<sup>nd</sup> Edition), Springer, (2011).
- Fundamentals of Food Engineering by D.G. Rao, (1<sup>st</sup> Edition) PHI Learning Pvt, Ltd, New Delhi (2010).
- Introduction to Food Engineering by R.P. Singh & D.R. Heldman (4<sup>th</sup> Edition) Academic Press (2009).
- Transport Processes and Unit Operations by C.J. Geankoplis (3<sup>rd</sup> Edition), Prentice Hall of India Pvt Ltd, New Delhi, (2009).
- Food Engineering Operations by J.G. Brennan, J.R. Butters, N.D. Cowell and A.E.V. Lilley (3<sup>rd</sup> Edition, Elsevier Publication, USA (1990).

## BFST-503 Food Additives

**Time: 3 Hrs.**

**Credits: 4**

**Max. Marks: 100**

**Theory: 70**

**IA: 30**

**Note for the paper setter:** The question paper will consist of nine questions in all. The first question will be compulsory and will consist of five short questions of 2 marks each covering the whole syllabus. In addition eight more questions will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt four more questions selecting at least one question from each unit.

### UNIT-I

**Introduction to food additives:** general classification, their types and uses in different foods. Advantages of additives in food processing and preservation. Natural, synthetic and nature identical food additives. Labelling requirements and safety issues. Classification of spices, condiments and flavoring agents used in foods.

### UNIT-II

**Food preservatives:** Antioxidants, antimicrobial agents and anti-browning agents (uses, functions and properties). Class-I and Class-II preservatives.

**Food colours and pigments:** natural, synthetic and nature identical food colours, their properties, uses and functions in foods.

**Nutritive and non nutritive sweeteners:** their properties, uses and functions in foods.

**Acidulants and pH controlling agents:** acids, bases and buffers (properties and uses in foods).

### UNIT-III

Emulsifiers/surface active agents, Stabilizers, Thickeners, Firming agents, Gelling agents, Foaming agents, Anti-caking agents/Humectants, Sequestrants/chelating agents, Clarifying agents, flavoring agents/flavor enhancers, bleaching agents and enzymes used in foods: their uses, functions and properties.

### UNIT-IV

**Food additives:** fact or fiction. Prohibited food additives. Safety assessment and legal aspects for food additives. Risks and benefits of food additives. FSSAI regulation regarding application of food additives.

### Recommended books:

- Branen, A.L., Davidson, P.M., Salminen, S. and Thorngate J.H. III (2002). Food Additives. (2<sup>nd</sup> edition). Marcel Dekker Inc. New York.
- Owen R. Fennema (1996). Food Chemistry. (3<sup>rd</sup> edition). Marcel Dekker Inc. New York.
- Belitz, H.-D., Grosch, W. and Schieberle, P. (2009). Food Chemistry. (4<sup>th</sup> edition). Springer-Verlag Berlin, Heidelberg.
- N. Shakuntala Manay and M. Shadaksharaswamy (2008). Foods: Facts and Principles. (3<sup>rd</sup> edition) New Age International (P) Ltd. Publishers, New Delhi.
- John M. deMan (1999). Principles of Food Chemistry (3<sup>rd</sup> edition ). Aspen Publishers, Inc. Gaithersburg, Maryland.
- Purselove, J.W.(1998). 'Spices' (Vol. I and II). Longman Publishers.
- Tainter, D.R. and Grenis, A.T. (1993). Spices and Seasonings – A Food Technology Handbook. VCH Publishers, Inc.
- Farrell, K.T. (1985). Spices, Condiments and Seasonings. AVI Publishing, Inc.

## BFST-504 Food Grain Storage

**Time: 3 Hrs.**

**Credits: 4**

**Max. Marks: 100**

**Theory: 70**

**IA: 30**

*Note for the paper setter:* The question paper will consist of nine questions in all. The first question will be compulsory and will consist of five short questions of 2 marks each covering the whole syllabus. In addition eight more questions will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt four more questions selecting at least one question from each unit.

### UNIT-I

Pests of stored grains and their classification. General problems of grain storage. Sources of infestation in stored food grains and their detection. Causes, types and content deterioration in stored food grains and methods to check them.

### UNIT-II

Internal feeders of stored grains and their management. External feeders of stored grains and their management.

Traditional and modern methods of bag and bulk storage. Chemical, non chemical and integrated methods of controlling stored grain insect pest.

### UNIT-III

New methods employed in managing stored grain pests: insect proof bins, insect proof bags, traps, irradiation, nanoparticles, silos, microwave technology, controlled atmosphere, low and high temperatures.

Storage structures and their significance for different food grains.

### UNIT-IV

Toxic contaminants found in food grains due to pests and types of spoilages or decay caused by them in food grains.

Pesticidal contamination tolerance limits, residue found in stored grains and precautions for safe handling and use of pesticides in stored grains. Cleaning, aeration and drying of food grains before storage at farmers, commercial and Govt. levels. Role of moisture in spoilage of different stored food grains.

### Recommended Books:

- Introduction of Insect – By Metalf & Lukemann.
- Pesticides and Pollution – By Mollan.

## **BFST-505 Lab-II Food Additives**

**Time: 6 Hrs.**

**Credits: 2**

**Max. Marks: 50**

### **Practicals:**

1. Description of generally recommended as safe (GRAS) food additives.
2. Spectrophotometric method for total chlorophyll determination.
3. Clarification of fruit juices with various chemical and physical methods.
4. Use of additives in bakery, fruits, vegetables, milk and meat products.
5. Determination of adulteration in milk, cereals, oils & fats, spices.

## **BFST-506 Lab-II Food Grain Storage**

**Time: 6 Hrs.**

**Credits: 2**

**Max. Marks: 50**

### **Practicals:**

1. To study various insect pests of grains.
2. To study the quality tests and physical parameters for grains.
3. To store the grains and check its shelf life.
4. To study the various pesticides used for grain storage.
5. To study the effect of moisture on spoilage of grains.
6. Visit to grain storage godowns.

## **BFST-507 Lab-III Food Engineering**

**Time: 6 Hrs.**

**Credits: 2**

**Max. Marks: 50**

### **Practicals**

1. Calculation of mixing index for a given sample.
2. Calculation of specific cake and filter medium resistance in a filtration operation.
3. To study the working principle and operation of a hammer mill.
4. To study the working principle and operation of a roller mill.
5. Determination of particle size of given sample using Sieve analysis.
6. Determination of freezing time using Plank's equation.
7. Calculation of refrigeration load of cold storage plant.
8. To study dehydration characteristics of food materials.
9. To study the boiling point elevation of liquid foods and water.
10. To study freezing point depression by changing salts concentration in liquid foods and water
11. Design calculations of belt conveyor, bucket elevator and screw conveyor.

## **BFST-508 Lab-III Technology of Cereals and Legumes**

**Time: 6 Hrs.**

**Max. Marks: 50**

**Credits: 2**

### **Practicals**

1. Physico–chemical testing of wheat and rice.
2. Milling of rice and assessment of per cent of head, broken, immature kernels  
1. degree of polish etc.
2. Parboiling and evaluation of quality of parboiled rice.
3. Evaluation of cooking quality of rice.
4. Conditioning and milling of wheat.
5. Determination of quality characteristics of flours.
6. Rheological properties of dough using Farinograph/ Extensograph/Mixograph.
7. Pasting properties of starches using Visco–amylograph/RVA.
8. Baking of bread, cookies and cakes and evaluation of their quality.
9. Processing of paste goods and evaluation of their quality.
10. Extrusion cooking and quality evaluation of extrudates.
11. Visit to wheat and rice, processing plants.

## **BFST-509 Lab-IV Malting & Brewing Technology**

**Time: 6 Hrs.**

**Max. Marks: 50**

**Credits: 2**

### **Practicals:**

1. Determination of moisture content of barley.
2. To determine the seed germination capacity of barley.
3. Determination of protein content of barley.
4. Determination of amount of husk in barley.
5. Preparation of malt.
6. To determine the length of acrospires.
7. Determination of Total Soluble Solids and Total Solids of malt.
8. Determination of reducing sugars in malt.

## **BFST-510 Lab-IV Confectionary & Sugar Technology**

**Time: 6 Hrs.**

**Max. Marks: 50**

**Credits: 2**

### **Practicals:**

1. Quality testing of raw as well as finished products of confectionary.
2. Preparation of: 1. Candies, 2. Caramel and 3. Toffees.
3. Collection of various types of confectionary packages.
4. Determination of sugar in confectionary product by saccharometer.
5. Determination of refractive index of sugar – solutions of different consistencies.
6. Organoleptic testing of different confectionary products.
7. Visit to sugar and confectionary industry.

## **BFST-601A Nutraceuticals & Functional Foods**

**Time: 3 Hrs.**

**Credits: 4**

**Max. Marks: 100**

**Theory: 70**

**IA: 30**

*Note for the paper setter:* The question paper will consist of nine questions in all. The first question will be compulsory and will consist of five short questions of 2 marks each covering the whole syllabus. In addition eight more questions will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt four more questions selecting at least one question from each unit.

### **UNIT-I**

Nutraceuticals: basic concepts and origin. Classification of nutraceuticals on the basis of food source and chemical/biochemical nature.

Functional foods: basic concepts and their categories. Plant and animal source based functional foods.

Role of functional foods and their bioactive (nutraceuticals) compounds in health promotion.

### **UNIT-II**

Introduction to probiotics: basic concepts, their attributes, need and mechanisms of action. Basic concepts of prebiotics and synbiotics. Role of probiotics in disease prevention.

Bioactive compounds: Phytochemicals and phytosterols as nutraceuticals and functional foods.

Dietary fibers (soluble and insoluble dietary fibers) and complex carbohydrates, fats and proteins as functional foods and nutraceuticals.

### **UNIT-III**

Significance of functional foods and nutraceuticals in management of various chronic diseases: cancer, CVDs, diabetes, stress, joints and bone problems.

Tea, coffee and other functional food beverages: their nutritional significances and bioactive compounds.

### **UNIT-IV**

Cereals (oats, wheat, millets and rice etc.) based functional foods. Fruits, vegetables, oilseeds and sea foods as functional foods and nutraceuticals.

Regulatory system for functional foods and nutraceuticals; safety issues and functional food regulations in India and International regulations. Functional foods available in the market.

### **Recommended books:**

- Robert E.C. Wildman (2001). Handbook of Nutraceuticals and Functional Foods. CRC Press. Boca Raton, London, New York, Washington, D.C.
- Robert E.C. Wildman (2007). Handbook of Nutraceuticals and Functional Foods. (2<sup>nd</sup> edition) CRC Press. Boca Raton, London, New York, Washington, D.C.

## **BFST-601B Lab-V Nutraceuticals & Functional Foods**

**Time: 6 Hrs.**

**Max. Marks: 50**

**Credits: 2**

### **Practicals:**

1. Extraction and estimation of lycopene content in tomato and tomato products.
2. Determination of DPPH radical scavenging activity of different raw and processed food samples.
3. Extraction and estimation of total phenolic contents of different food samples.
4. Extraction of lycopene from raw sample and formulation of new product (functional food product) with higher antioxidant activity.
5. Extraction and estimation of carotene from raw carrot samples.
6. Formulation of probiotic functional foods (yoghurt, dahi etc.) and its sensory evaluations.
7. Formulation of functional food with better antioxidant activity, reducing power and total phenolic contents.
8. Estimation of total flavonoids content (catechin) of tea samples.

## BFST-602 Food Analysis & Instrumentation

Time: 3 Hrs.  
Credits: 4

Max. Marks: 100  
Theory: 70

IA: 30

**Note for the paper setter:** The question paper will consist of nine questions in all. The first question will be compulsory and will consist of five short questions of 2 marks each covering the whole syllabus. In addition eight more questions will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt four more questions selecting at least one question from each unit.

### UNIT-I

Sampling: basic concepts of sampling, types of samples and sampling. Storage and preservation methods for samples.

Chemical composition analysis of food products: principles and basic concepts for moisture, carbohydrates, protein, fat, fiber and mineral analysis.

Various analytical procedures and their principles: temperature, pH, turbidity etc.

### UNIT-II

Chromatography: Principle and working of paper chromatography, thin layer chromatography, Column chromatography, Gas chromatography and High Pressure Liquid Chromatography.

Electrophoresis: basic principle and working electrophoresis technique of gel, paper, high voltage and starch gel electrophoresis.

Brief introduction and principles to Separation techniques: filtration, centrifugation and supercritical fluid extraction.

### UNIT-III

Analysis of rheological and pasting behaviour of food material: rheometer, visco-amylgraph and farinograph: basic principle and working.

Sensory evaluation of foods: sensory characteristics of foods. Methods for sensory evaluation: discrimination tests, rating tests, sensitivity tests, descriptive analysis and affective tests (consumer tests).

Colour measurements: hunter colorimeter, basic concept and working principle.

### UNIT-IV

Brief introduction and principles: Spectroscopic techniques using UV/Visible, polarimetry, refractometry (hand refractometer and Abbe refractometer).

Microscopic techniques in food analysis (light microscopy).

Microbiological examination of food materials: basic concept and methods to detect microbiological contamination in food materials.

Analysis of properties of milk and milk products: fat content, SNF (solid not fat), CLR (corrected lactometer reading), titer-able acidity, detection of various adulterants in milk: basic concept and principles.

### Recommended Books:

- AOAC International. 2003. Official methods of analysis of AOAC International. 17th Ed. Gaithersburg, MD, USA, Association of Analytical Communities.
- Kirk RS & Sawyer R. 1991. Pearson's Chemical Analysis of Foods. 9th Ed. Longman Scientific & Technical.
- Nielsen S. (Eds.). 1994. Introduction to Chemical Analysis of Foods. Jones & Bartlett.
- Pomrenz Y & Meloan CE. 1996. Food Analysis - Theory and Practice. 3rd Ed. CBS.
- Ranganna S. 2001. Handbook of Analysis and Quality Control for Fruit and Vegetable Products. 2nd Ed. Tata-McGraw-Hill.

## BFST-603 Basic Concepts of Oils and Fats

**Time: 3 Hrs.**

**Credits: 4**

**Max. Marks: 100**

**Theory: 70**

**IA: 30**

**Note for the paper setter:** The question paper will consist of nine questions in all. The first question will be compulsory and will consist of five short questions of 2 marks each covering the whole syllabus. In addition eight more questions will be set unit-wise comprising of two questions from each of the four units. The candidates are required to attempt four more questions selecting at least one question from each unit.

### UNIT-I

Introduction to oils and fats and their nomenclature and classification. Physical, chemical and functional properties of fats and oils. Nutritional importance of oils and fats.

### UNIT-II

Source and physico-chemical properties of following oils:-

- a) Animal – Butter oil, lard and tallow.
- b) Plant – Groundnut, Sunflower, Soybean and Coconut oil.

Extraction of oils/fats basic concepts and principle, various techniques of fat extraction, their advantages and limitations.

### UNIT-III

**Refining:** degumming, choice of alkali, batch and continuous refining.

**Bleaching:** choice of adsorbent, batch and continuous bleaching.

**Deodorization:** process parameters: batch and continuous processing.

Problems during storage – rancidity & reversion: Types and their control.

### UNIT-IV

**Hydrogenation of oils:** mechanism, process parameters and batch processing.

Fractionation and winterization of oils.

**Functions of oils and fats in foods processing:** Frying, Cooking, Baking.

**By products of oil processing:** soap and lecithin.

**Recommended Books:**

- Food Chemistry by Meyer LH, 2006, CBS Publisher, New Delhi.
- Food Science by Potter NN, 5<sup>th</sup> Ed, 2006, CBS Publisher, New Delhi.
- Food Oils & Fats: Technology, Utilization and Nutrition by Lawson H, 1995, CBS Publisher, New Delhi.

## **BFST-604 Lab-VI Basic Concepts of Oils and Fats**

**Time: 6 Hrs.**

**Max. Marks: 50**

**Credits: 2**

### **Practicals:**

1. To determine moisture content of oilseed
2. To determine FFA of oil
3. Determination of Iodine Value, R.M. Value and Polenske Value
4. To determine Saponification value, anisidine value and peroxide value of oil.
5. Determination of melting point of fats.
6. Detection of sesame oil in vanaspati by furfural test.
7. Detection of adulteration with mineral oil, Cotton seed oil or Ground nut oil.
8. Organoleptic evaluation of fats and oils
9. Visit to vegetable oils industry.

## **BFST-606 Lab-VII Food Analysis & Instrumentation**

**Time: 6 Hrs.**

**Max. Marks: 50**

**Credits: 2**

### **Practicals:**

1. Estimation of pH, conductivity, salinity and TDS (total dissolved solids) of different liquid foods and water.
2. Estimation of proteins, fat and fiber in given food sample.
3. Separation and estimation of gluten content from wheat flour sample.
4. Separation and identification of carotenoids by thin layer and/or column chromatography.
5. Isolation of starch and its analysis of its rheological properties.
6. Demonstration of instruments : GLC, HPLC, Atomic absorption, Flame photometer, Farinograph, UV-Vis spectrophotometer and microscopes.

## **BFST-607 Lab-VII Basic Concepts of Nutrition**

**Time: 6 Hrs.**

**Max. Marks: 50**

**Credits: 2**

### **Practicals:**

1. Identification of food sources for various nutrients.
2. Instruction to diet planning using food exchange list.
3. Calculation of BMI & BMR.
4. Evaluation of own diet.
5. Planning of diet for children, adult and old people.
6. Planning of diet for patient suffering from Ulcer, Anemia, Diabetes, Diarrhea and Cardiac diseases.

## **BFST-608 Lab-VIII Technology of Spices & Herbs**

**Time: 6 Hrs.**

**Max. Marks: 50**

**Credits: 2**

### **Practicals:**

1. Classification and identification of different spices and herbs.
2. Determination of moisture in ground spices.
3. Determination of total ash in spices.
4. Determination of extraneous matter in spices.
5. Determination of pungency rating (Scoville method) in Red Pepper.
6. Adulteration tests for different spices.
7. Identification of Saffron by sulphuric – diphenylamine test.
8. Visit of spice processing industry.

## **BFST-609 Lab-VIII Food Biotechnology**

**Time: 6 Hrs.**

**Credits: 2**

**Max. Marks: 50**

### **Practicals:**

1. Isolation of DNA from micro-organisms.
2. Isolation of RNA from yeast cells.
3. Colorimetric estimation of DNA.
4. Colorimetric estimation of RNA.
5. Demonstration of PCR.
6. Demonstration of tissue culturing in Lab.
7. Digestion of DNA by Restriction Endonucleases.
8. Making & Selection of competent *E. coli*.