Contents of Courses for B.Sc. Honours in Food Technology (Model)

Semester	Course Category	Theory / Practical	Credits	Paper Title	Marks	
					S. A	I.A
1	DSC- 1.1	Theory	3	Food Biochemistry	60	40
		Practical	2	Food Biochemistry	25	25
	DSC- 1.2	Theory	3	Principles of Food Science	60	40
		Practical	2	Principles of Food Science	25	25
	DSC- 1.3	Theory	3	Applied Mathematics	60	40
	OE- 1.1	Theory	3	Food and Nutrition	60	40
2	DSC- 2.1	Theory	3	Cereals and Millets Processing Technology	60	40
		Practical	2	Cereals and Millets Processing Technology	25	25
	DSC- 2.2	Theory	3	Food Microbiology	60	40
		Practical	2	Food Microbiology	25	25
	DSC- 2.3	Theory	3	Food Additives and Preservatives	60	40
	OE- 2.1	Theory	3	Food Safety	60	40
Exit option with Undergraduate Certificate with completion of courses equivalent to a minimum of 48 credits followed by 10 - 12 credit bridge course(s) for 2 months, including at least 6 credit jobs specific internship / apprenticeship to acquire job ready competencies required to enter a job						

OE Papers to be offered for the students other than Food technology

Model Curriculum

of

BSc Honours

in

Food Technology

1st and 2nd Semesters

Karnataka State Higher Education Council

Government of Karnataka

Model Curriculum

Program Name	**B Sc Food Technology**	Semester	**First Semester**
Course Title	**Food Biochemistry (Theory + Practical)**		
Course Code:	**DSC-1.1**	No. of Theory +Practical Credits	**3+2 = 5**
Contact hours	**42-45 hrs**	Duration of ESA/Exam	**2 Hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s): PUC with PCMB (KCET Appeared has first preference)

Course Objectives (COs):

CO1. To understand the chemical characteristic of different classes of nutrients with reference to their physical properties and to relate it to their functions.

CO2. To learn the processes of digestion absorption and metabolism of the nutrients.

Theory Content	**45 Hrs**
Unit–1	15

Introduction to Food Biochemistry -Food, Nutrients, Natural biomolecules, etc.,

Macro nutrients: a) Carbohydrates, b) Dietary Fibres c) Lipids d) Protein

- Classification, composition, functions, sources, and deficiency
- Digestion, absorption, transport, utilization, storage
- Metabolism
- Nitrogen Balance and methods of Determining Protein Quality

Unit -2	15

MICRONUTRIENTS - Minerals

Functions, sources, dietary requirements, biological availability, absorption and metabolism, deficiency, and toxicity of

- Macro minerals – Calcium, Phosphorous, Magnesium, Sodium, Potassium, Sulphur & Chloride
- Microminerals – Iron, Iodine, Zinc, Copper, Manganese, Selenium, Chromium, Fluoride and Molybdenum,
- Ultra-Trace elements (in brief) **Nuts and oilseeds**

Unit -3	15

MICRONUTRIENTS – Vitamins

Classification, sources, function, dietary requirements, absorption & metabolism, deficiency, & toxicity of

- Fat soluble vitamins- A, D, E & K.
- Water Soluble vitamins:
    - B complex - Thiamine, Riboflavin, Niacin, Folic acid, B6, B12, Biotin and Choline
    - Vitamin C

Learning Outcomes: Student will acquire the knowledge on

1. Functions of biological molecules
2. Biochemical pathways relevant to nutrient metabolisms

Formative Assessment:	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	10
Test 2	10
Assignment	05
Seminar	05
Project	10
Total	**40 Marks**
Formative Assessment as per NEP guidelines are compulsory	
Summative Assessment (60 marks) + Formative Assessment (40 marks) = Total 100 marks	

Course Title	**Food Biochemistry (Practical)**	Practical Credits	**2**
Course Code	**DSC (P)-1.1**	Contact Hours	**54 hrs**
Formative Assessment Marks	**25 marks**	Summative Assessment Marks	**25 marks**

Course Objective: To understand the basic biochemical techniques and its uses in analysis of foods

Content of Practical

Sl. No.	***Title of Experiments***
1	Introduction to instruments and equipments used in Nutritional biochemistry laboratory
2	Titremetry – acid base, redox, Vit C
3	Measurement of pH
4	Preparation of Buffers
5	Colorimetry / Spectroscopy estimations a. Glucose b. Hemoglobin c. Protein d. Minerals – Phosphorous and calcium e. Creatinine
6	Chromatographic separation and estimations a. Amino acids b. Carbohydrates c. Pigments d. Vitamins – Water and fat soluble

Learning Outcomes: Student will acquire the knowledge on

a. Functions of biological molecules

b. Biochemical pathways relevant to nutrient metabolisms

References	
1	Gaile Moe, Danita Kelley, Jacqueline Berning and Carol Byrd Bredbenner. 2013. Wardlaw's Perspectives in Nutrition: A Functional Approach. McGraw-Hill, Inc., NY, USA.
2	David L. Nelson and Michael M. Cox. 2012. Leininger Principles of Biochemistry, 6thEd.Macmillan Learning, NY, USA.
3	Donald Voet and Judith G. Voet. 2011. Biochemistry, 4th Ed. John Wiley and Sons, Inc., NY, USA.

References	
4	Carolyn D.Berdanier, ElaineB. Feldmanand Johanna Dwyer. 2008. Handbook of Nutrition and Food, 2nd Ed. CRC Press, Boca Raton, FL, USA.
5	Bob B.Buchanan, Wilhelm Gruissem and Russell L. Jones. 2002. Biochemistry & Molecular Biology of Plants. John Wiley and Sons, Inc., NY, USA.
6	Jeremy M.Berg, JohnL.Tymoczko, Lubert Stryer and GregoryJ. Gatto, Jr. 2002. Biochemistry, 7th Ed. W.H. Freeman and Company, NY, USA.

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Model Curriculum

Program Name	**B Sc Food Technology**	Semester	**First Semester**
Course Title	**Principles of Food Science (Theory + Practical)**		
Course Code:	**DSC-1.2**	No. of Theory +Practical Credits	**3+2 = 5**
Contact hours	**42-45 hrs**	Duration of ESA/Exam	**2 Hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s): PUC with PCMB (KCET Appeared has first preference)

Course Objectives (COs):

CO1. Learn about food groups, properties, nutrient composition,

CO2. Learn about factors affecting the cooking quality

Theory Content	**45 Hrs**
Unit–1	15

Introduction: Meaning and scope of Food Science

a. Properties of Food: Melting and Freezing Point, pH Value, Osmosis and Osmotic Pressure, Bound and Free Water, Colloids, Sols, Gels, Emulsion, Foams

b. Sensory Evaluation of Foods: Subjective and Objective Methods

Cereals, Millets, and their products

a. Structure And Nutrient Composition of Rice and Wheat

b. Gelatinization, Dextrinization, Parboiling, Malting

c. Formation Of Gluten, Amylase Rich Foods

d. Millets and their uses

Legumes/ Pluses:

a. Structure and Nutrient Composition of Pulses and Legumes

b. Toxic Constituents and Cooking of Pulses

c. Factors Affecting the Cooking Quality of Legumes

d. Soaking, Germination, Fermentation, Extrusion and Puffing

Unit -2	15

Fruits and vegetables:

a. Composition, Pigment and Flavouring Constituents, Changes During Coking

b. Enzymatic Browning, Loss of Nutrients During Cooking

Milk and Milk products:

a. Nutritional Composition of Milk and Milk Products (Butter, Ghee, Cheese, Curd)
b. Processing of Milk, Types of Processed Foods
c. Pasteurization, Homogenization, Coagulation of Milk

Egg, Meat, Fish and Poultry:

a. Egg: Structure, Composition, Grading, Factors Affecting the Quality in Egg Cookery

Meat, Poultry and Fish:

a. Structure of Meat and Meat Quality
b. Post-mortem Changes
c. Factors To Be Considered in Selection and Preparation of Meat, Poultry and Fish

Unit -3	15

Fats and oils

a. Composition and Types, Changes during heating (smoking point), Hydrogenated fats, Rancidity

Sweeting Agents:

a. Composition of sugar, jaggery and honey
b. Behaviour of sugar syrups at different temperatures and its application in food preparation
c. Crystallization of sugar
d. Artificial sweetening agents: Composition and Uses

Fermented foods

a. Mechanism of fermentation and changes occurring during fermentation
b. Indian fermented foods (Idli, dosa, dhokla, bread, batura)
c. Beverages:
   - ✓ Types: Alcoholic and non- alcoholic

Learning Outcomes:

1. Students will acquire knowledge on classification and properties of food
2. Students will acquire knowledge of food processing methods

Formative Assessment:	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	10
Test 2	10
Assignment	05
Seminar	05

Formative Assessment:	
Assessment Occasion/ type	**Weightage in Marks**
Project	10
Total	**40 Marks**
Formative Assessment as per NEP guidelines are compulsory	
Summative Assessment (60 marks) + Formative Assessment (40 marks) = Total 100 marks	

Course Title	**Principles of Food Science (Practical)**	Practical Credits	**2**
Course Code	**DSC (P)-1.2**	Contact Hours	**54 hrs**
Formative Assessment Marks	**25 marks**	Summative Assessment Marks	**25 marks**

Content of Practical	
1	**Sensory evaluation of foods**
2	**Starch cookery** a. Microscopic examination of starch molecules b. Gelatinization of starch and dextrinization c. Wheat preparation- gluten formation, effect of kneading
3	**Pulse cookery** a. Whole grams: effect of soaking and germination b. Dhals: effect of acid and alkali on cooking time
4	**Vegetables and fruits cookery** a. Effects of methods of cooking and added substances on pigments in vegetables b. Enzymatic browning in foods and its prevention
5	**Milk cookery** a. Coagulation and curdling of milk b. Preparation of paneer and khova
6	**Egg cookery** a. Grading of eggs for quality b. Ferrous sulphide formation and prevention c. Effect of beating egg white on stiffness of foam and its uses (custard and omelettes)

7	**Sugar and jaggery cookery:** a. Determination of stages of crystallization and its uses b. Preparation of groundnut toffee
8	**Fats and oils cookery:** a. Smoking point of different oil and fats b. Shallow frying- cutlet c. Deep frying- papad
9	**Market survey of processed food products**
10	**Visit to food processing and packaging industry research laboratory**
11	**Submission of class records and projects**

References	
1	Food and Nutrition- Dr. M. Swaminathan
2	Food Facts and Principles- S. Manay & Shadakshara Swamy
3	Food Science- Sumathi Mudambi
4	Fundamentals of Food and Nutrition- Mudami & Rajgopal 4th edition 2001
5	Principles of Food Science by Borgstrom and Macmillon
6	Food Science by Potter & Hotchkiss Judith E. Brown, Nutrition Now, 3rd edition, Wads Worth, Thomas learning, 10 Davis Drive Belmont CA 94002-3098 USA, 2002
7	Barbara A. Bowmaw and Robert M. Russell, Nutrition, 8th Edition, IISI press, Washington, DC, 2001.
8	C. Gopalan, B.V. Ramasastri and S.G. Balasubramaniam, Nutritive value of Indian foods, NIN, ICMR
9	Mehatab S. Bamji, N. Prahalad Rao, Vinod Reddy, Textbook of Human Nutrition, Oxford IBH publishing Co. Pvt. Ltd. New Delhi

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Model Curriculum

Program Name	**B Sc Food Technology**	Semester	**First Semester**
Course Title	**Applied Mathematics (Theory)**		
Course Code:	**DSC-1.3**	No. of Credits	**3**
Contact hours	**45 hrs**	Duration of ESA/Exam	**2 Hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s): PUC with PCMB (KCET Appeared has first preference)

Course Objectives (COs):

CO1. To understand basic theoretical engineering mathematics

CO2. To learn mathematical functions required for designing industrial plants of food industry

Theory Content	**45 Hrs**
Unit–1	17

- Taylor's and Mac laurin's expansions, indeterminate form
- Curvature, asymptotes, tracing of curves
- Function of two or more independent variables, partial differentiation, homogeneous functions and Euler's theorem, composite functions, total derivatives, derivative of an implicit function, change of variables, Jacobians, error evaluation, maxima and minima
- Reduction formulae, Gamma and Beta functions
- Rectification of standard curves, volumes, and surfaces of revolution of curves
- Double and triple integrals, change of order of integration, application of double and triple integrals to find area and volume

Unit -2	15

- Exact and Bernoulli's differential equations, equations reducible to exact
- Form by integrating factors, equations of first order and higher degree, Clairaut's equation,
- Differential equations of higher orders, methods of finding complementary functions and particular integrals, Method of variation of parameters
- Simultaneous linear differential equations with constant coefficients
- Cauchy's and Legendre's linear equations
- Bessel's and Legendre's differential equations
- Series solution techniques

Unit -3	14
• Differentiation of vectors, scalar and vector point functions, vector Differential operator. • Gradient of a scalar point function, Divergence and Curl of a vector point function and their physical interpretations, • Identities involving Del, second order differential operator • Line, Surface and volume integrals, Stoke's, divergence and Green's theorems.	

Learning Outcomes: Student will acquire the knowledge on

1. Differential and integral equation, Scalar and Vector quantities and their operations
2. Mathematical applications and functions required in designing plant layout

Formative Assessment:	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	10
Test 2	10
Assignment	05
Seminar	05
Project	10
Total	**40 Marks**
Formative Assessment as per NEP guidelines are compulsory	
Summative Assessment (60 marks) + Formative Assessment (40 marks) = Total 100 marks	

***Note –** Course to be taught by the Department of Mathematics

References	
1	B.S. Grewal. 2004. Higher Engineering Mathematics. Khanna Publishers Delhi. Shanti Narayan. 2004.
2	Differential Calculus. S. Chand and Co. Ltd., New Delhi. Shanti Narayan. 2004.
3	Integral Calculus. S. Chand and Co. Ltd. New Delhi.
4	Shanti Narayan. 2004. A Textbook of Vector Calculus. S. Chand and Co. Ltd. New Delhi

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Model Curriculum

Program Name	**B Sc Food Technology**	Semester	**First Semester**
Course Title	**Food and Nutrition (Theory)**		
Course Code:	**OE-1.1**	No. of Credits	**3**
Contact hours	**45 hrs**	Duration of ESA/Exam	**2 Hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s): PUC with PCMB (KCET Appeared has first preference)

Course Objectives (COs):

CO1. Students will learn basic of nutrients benefits to human.

CO2. Classification of Food groups, energy, and their functions

Theory Content	**45 Hrs**
Unit–1: Introduction to Food and Nutrition	15

- Understanding relationship between food, nutrition, and health.
- Functions of food-physiological, psychological, and social. Concept of balanced diet.
- Lipids - Classification, Composition function – essential fatty acids, deficiency, food sources of EFA, Function of TGL, Characteristics of animal and vegetable fats, sterols - cholesterol - function, food sources, phospholipids - function, ketone bodies – fat requirements - food sources, dietary lipids and their relation to CVD.

Unit -2: Carbohydrates and Proteins:	15

- Proteins - Composition - structure and classification, function of protein, Amino acids Indispensable and dispensable amino acids -special function of amino acids - protein deficiency - Protein Energy Malnutrition - KWASHIORKOR and MARASMUMS - etiology, clinical features, treatment, and prevention
- Evaluation of protein quality PER, BV, NPU and NPR, chemical score mutual and amino acid supplementation of proteins.

Unit -3: Energy	15

- Energy units - Kilocalories, Megajoules, determination of energy value of foods, using Bomb calorimeter, diagram of Bomb Calorimeter – gross calorific values, Physiological energy, value of foods, relation between oxygen used and calorific value.
- Determination of energy requirements, direct calorimetry. Relation between Respiratory quotient and energy output - Specific dynamic action of food (Thermogenic food in REE) definition, determination of BMR by different methods.
- Factors affecting BMR - determination of energy metabolism, during work - energy requirements for various types of activities, PAL, RDA for different age and gender.
- Reference man and reference woman - FAO committee and ICMR committee percent calories supplied by carbohydrates, fats and proteins in average Indian diets - Energy requirements for different age groups.

Learning Outcomes:

1. Student will acquire the knowledge on nutrients and their functions.
2. Student will acquire the knowledge on sources of nutrients.

Formative Assessment:	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	10
Test 2	10
Assignment	05
Seminar	05
Project	10
Total	**40 Marks**
Formative Assessment as per NEP guidelines are compulsory	
Summative Assessment (60 marks) + Formative Assessment (40 marks) = Total 100 marks	

References	
1	B. Srilakshmi, Food Science, New Age International Publishers (India), 2003.
2	NIN, ICMR (1990). Nutritive Value of Indian Foods.

References	
3	Raina U, Kashyap S, Narula V, Thomas S, Suvira, Vir S, Chopra S (2010). Basics Food Preparation: A Complete Manual, Fourth Edition. Orient Black Swan Ltd.
4	Seth V, Singh K (2005). Diet planning through the Life Cycle: Part 1. Normal Nutrition. A Practical Manual, Fourth edition, Elite Publishing House Pvt. Ltd.
5	Guthrie H.A. - Introductory Nutrition C.V. Mosby Co. St. Louis, 2006.

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Model Curriculum

Program Name	**B Sc Food Technology**	Semester	**Second Semester**
Course Title	**Cereal and Millets Processing Technology (Theory + Practical)**		
Course Code:	**DSC-2.1**	No. of Theory +Practical Credits	**3+2 = 5**
Contact hours	**42-45 hrs**	Duration of ESA/Exam	**2 Hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s): PUC with PCMB (KCET Appeared has first preference)

Course Objectives (COs):

CO1. Classifications of cereals and nutrition composition

CO2. Processing and development of product.

Theory Content	**45 Hrs**
Unit–1	10

Introduction to Cereals and Millets

- Importance and uses, composition, nutritive value and structure of cereal grain (Paddy, Wheat, Barley and Maize). Present status and Production of cereals and millets.
- Physio-chemical properties of cereals, major and minor millets. Toxins, Malting, Changes during cooking, Changes during germination.

Unit -2	20

A) Processing of Cereals

- Paddy/Rice, Wheat, Oats, Maize/ corn, Sorghum, Finger millet: Properties, types, milling, treatments before and after milling, Products and by-products of cereals, Rice Parboiling.
- Storage of cereals- basic types, moisture management, drying of cereals, aeration, grain respiration, functional changes, deterioration, microflora and macro flora, pests and other infestations.

B) Breakfast cereals

- Uncooked breakfast cereals and Ready to eat cereal- advantages and disadvantages
- Types of cereal flours fermented and non-fermented cereal products, macaroni products.
- Breakfast cereal foods: Flaked, puffed, expanded, extruded, and shredded.

Unit -3	15

Cereal cookery

- Cereal protein- Gluten formation, Factors affecting gluten formation, types of cereal dough, problems encountered in cereal cookery.
- Cereal Starch- various types of starch-modified and unmodified starches, gelatinization, factors affecting gelatinization, Effects of cooking on starch, factors affecting the properties of starch as a thickening agent.
- Gelatin- concentration, heating, stirring, effects of added ingredients, aging of gel, retrogradation.
- Effect of dry heat- dextrinization, effect of cooking on nutritive value.

Learning Outcomes:

a. Student will acquire the knowledge on chemical composition and sources of cereals

b. Student will acquire the knowledge on techniques and skills developing novel products

Formative Assessment:	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	10
Test 2	10
Assignment	05
Seminar	05
Project	10
Total	**40 Marks**
Formative Assessment as per NEP guidelines are compulsory	
Summative Assessment (60 marks) + Formative Assessment (40 marks) = Total 100 marks	

Course Title	**Cereal and Millets Processing Technology (Practical)**	Practical Credits	**2**
Course Code	**DSC (P)-2.1**	Contact Hours	**54 hrs**
Formative Assessment Marks	**25 marks**	Summative Assessment Marks	**25 marks**

Practical Contents	
1	Physical and Frictional Characteristics of cereals
2	Determination of Moisture Content of Cereals
3	Identification of different millets, products at markets
4	Processing of cereals: Germination, Soaking, Size reduction, Fermentation
5	Cooking quality of rice
6	Parboiling and milling methods
7	Processing of value-added products from millets
8	Conditioning and milling of wheat
9	Production of popcorns
10	Production of flaked rice and puffed rice
11	Preparation of sorghum malt
12	Quality evaluation – physical, chemical, and biological (insects, pests, and microbes)
13	Visit to Cereal processing unit.

References

1	Chakraverty A. Post Harvest Technology of Cereals, Pulses and Oil seeds. Oxford and IBH Publishing Co. Ltd., Calcutta.
2	Chakraverty A, Majumdar A.S, Vijaya Raghavan G.S and Ramaswamy H.S. Handbook of Post-Harvest Technology. Marcel Dekker Inc., New York. Basel.
3	Dendy DAV and Dobraszczyk BJ. 2001. Cereal and Cereal Products. Aspen.
4	Development in Milling & Baking Technology by AFST (I), CFTRI, Mysore, India
5	Kent NL. 1983. Technology of Cereals. Fourth Edition. Pergamon Press.
6	Lorenz KL.1991. Handbook of Cereal Science and Technology. Marcel Dekker
7	Matz SA. 1969. Cereal Science. AVI Publ.
8	Samuel A.Matz. Cereals Technology , CBS Publications.

References	
9	Sahay K.M and Singh K.K. Unit operations of Agricultural Processing. Vikas Publishing House Pvt. Ltd.
10	Srilakshmi. Food Science, 7thEdition. New Age International (P) Ltd, 2018. New Delhi

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Model Curriculum

Program Name	**B Sc Food Technology**	Semester	**Second Semester**
Course Title	**Food Microbiology (Theory + Practical)**		
Course Code:	**DSC-2.2**	No. of Theory +Practical Credits	**3+2 = 5**
Contact hours	**42-45 hrs**	Duration of ESA/Exam	**2 Hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s): PUC with PCMB (KCET Appeared has first preference)

Course Objectives (COs):

CO1. To learn characteristics of different microorganisms

CO2. To learn about food spoilage and food borne diseases

Theory Content	**45 Hrs**
Unit–1	10

Microbiology: Introduction, historical developments in food microbiology; prokaryotes and eukaryotes; classification of microorganisms - a brief account (Yeast, Mold and Bacteria);

Microbiological Techniques - Sterilization, Cultivation of Microorganisms, culture media and types of culture media, Nutritional requirements of microorganisms, Growth curve, Measurement of growth; Isolation of microorganisms - serial dilutions, streak plate, pour plate & spread plate methods; Staining Techniques - Simple and differential, fluorescent, negative, Structural staining - capsule, spore, cell wall and reserved food material, Preservation of cultures

Unit -2	20

Food spoilage: Determination of microorganisms and their products in food; sample preparation for analysis; Culture dependent methods- Direct microscopic observation, culture, enumeration and isolation methods; Chemical and Physical methods - Chemical, immunological and nucleic acid based methods.

Methods to assess microbial diversity, Merits and demerits of culture dependent and culture independent methods; Molecular analysis of bacterial community - Culture independent techniques - Denaturing Gradient Gel Electrophoresis (DGGE), Terminal Restriction Fragment Length Polymorphism (T-RFLP), Analytical methods for microbial metabolites- microbial toxins and metabolites.

Unit -3	15
Food borne diseases: Bacterial food borne diseases - Staphylococcal in toxification, Botulism, Salmonellosis, Shigellosis, Enteropathogenic Escherichia coli Diarrhea, Clostridium perfringens gastroenteritis, Bacillus cereus Gastroenteritics; Food Borne Viral Pathogens - Norwalk virus, Norovirus, Reovirus, Rotavirus, Astrovirus, Adenovirus, Parvovirus, Hepatitis A Virus. **Food Borne Animal Parasites** - Protozoa - Giardiasis, Amebiasis, Toxoplasmosis, Cysticercosis/Taeniasis; Roundworm - Trichinosis, Anisakiasis; Mycotoxins- Aflatoxicosis, Deoxyni valenol Mycotoxicosis, Ergotism. **Indicators microorganisms**; Quality assurance: Microbiological quality standards.	

Learning Outcomes: Student will acquire the knowledge on

- Be able to understand and identify the specific processing technologies used for pulses and oil seeds and the various products derived from these materials.
- Understand the application of scientific principles in the processing technologies specific to the materials.
- Grasp the changes in the composition of foods with respect to the type of processing technology used.

Formative Assessment:	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	10
Test 2	10
Assignment	05
Seminar	05
Project	10
Total	**40 Marks**
Formative Assessment as per NEP guidelines are compulsory	
Summative Assessment (60 marks) + Formative Assessment (40 marks) = Total 100 marks	

Course Title	**Food Microbiology (Practical)**	Practical Credits	**2**
Course Code	**DSC (P)-2.2**	Contact Hours	**54 hrs**
Formative Assessment Marks	**25 marks**	Summative Assessment Marks	**25 marks**

Practical Contents	
1	Good Microbiology laboratory practices: Laboratory safety (Dos and Don'ts), hazard from chemicals, handling of cultures and chemicals, disposal of chemicals and cultures.
2	Introduction to different Glass wares used in Microbiology Laboratory and handling of different instruments and Equipment's used for culture and Sterilization.
3	Preparation of basic liquid (Nutrient broth) and basic solid media (Nutrient Agar and Potato Dextrose Agar), selective, differential media and enriched media (MacConkey Agar and Blood Agar). for cultivation of bacteria and fungi.
4	Pure culture techniques used for isolation and purification of microorganisms - Streak plate method / Pour plate method / Spread plate method.
5	Different staining methods to study morphological and structural characteristics of bacteria and fungi. - Gram Staining / Fungal staining (Lacto-phenol cotton blue) / Sporestaining / Flagella staining / Capsule staining / Negative staining.
6	Culture preservation techniques (Agar slants, stabs and glycerol stocks).
7	Study the effect of salt, pH and temperature on microbial growth.
8	Determination of bacterial growth by turbidity measurements and to plot bacterialgrowth curve.
9	Detection and enumeration of pathogenic and indicator organisms in food; MPN of coliforms;
10	Evaluation of microbiological quality of commonly consumed street foods.
11	Extraction and detection of alfa toxin for infected foods.
12	Preservation of potato/onion by UV radiation

References	
1	Food Microbiology, Fundamentals and Frontiers, Doyle, P., Bonehat, L.R. and Mantville, T.J (2010): ASM Press, Washington DC.
2	Bacterial Pathogenesis A Molecular Approach. 2nd Edition. 2001 by Abigail A. Salyers and Dixie D. Whitt. ASM Publications.
3	Basic Food Microbiology, Banwart, G.J. (1997). CBS Publishers.

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4	Fundamental Food Microbiology, Bibek Ray (1996). CRC Press.
5	Microbiology; Pelczar, Chan and Krieg; Tata McGraw Hill, Delhi
6	Modern Food Microbiology, James M. Jay (2000). 5th Edition, CBS Publishers.

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Program Name	**B Sc Food Technology**	Semester	**Second Semester**
Course Title	**Food Additives and Preservatives (Theory)**		
Course Code:	**DSC-2.3**	No. of Credits	**3**
Contact hours	**45 hrs**	Duration of ESA/Exam	**2 Hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s): PUC with PCMB (KCET Appeared has first preference)

Theory Content	**45 Hrs**
Unit–1	10

Food additives: Definitions, classification, and function. Role of Food Additives in food preparation and uses in processed food products. Chemical, technological, and toxicological aspects of food additives, pH controllers, salts and chelating/sequestering agents, leavening agents, antioxidants, emulsifying and stabilizing agents, anti-caking agents, thickeners, firming agents, Proteins, starches and lipids as functional ingredient; isolation, modification, specifications, functional properties and applications in foods.

Unit -2	20

Health and safety aspects of food additives: Present status of various food additives. Controversial food additives Saccharin, history, function, aspartame, nitrite and nitrate compounds, nitrosamines. Additives to improve acceptability, permitted food colors, natural and artificial sweeteners composition, uses, emulsifiers, enzymes, fat replacers, gelling agents, leavening agents, stabilizers, surfactants, tenderizers, texturizers, thickeners, vitamins, nutraceuticals, essential oils and oleoresins viscosity modifiers, whipping agents.

Unit -3	15

Food Flavors and Food adulteration: Types of flavours, flavoring constituents, stability of flavours during food processing, analysis of flavours, extraction techniques of flavours, flavours emulsions; flavours Spices and flavors in food industries. Food adulteration, definition, reasons for food adulteration, methods of adulteration, and methods of detection. Normal food adulterants in coffee, tea leaves, edible oil, milk, cereals, spice powders. Adverse effects of food adulterants.

Learning Outcomes:

- Students will understand the chemical and technological properties of relevant food additives used as food improvement.
- Students learnt the knowledge of the food additives, the reasons of their use in foods and toxicological evaluation.
- Students will acquire competence in the proper use of additives in safe food production.
- Students identify the importance of data collection & its role in determining scope of Bio-statistics. Interpret statistical results correctly and effectively.

Formative Assessment:	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	10
Test 2	10
Assignment	05
Seminar	05
Project	10
Total	**40 Marks**
Formative Assessment as per NEP guidelines are compulsory	
Summative Assessment (60 marks) + Formative Assessment (40 marks) = Total 100 marks	

References	
1	Branen, A.L., Davidson PM & Salminen S. 2001. Food Additives. 2nd Ed. Marcel Dekker.
2	Gerorge, A.B. 1996. Encyclopedia of Food and Color Additives. Vol. III. CRC Press.
3	Gerorge, A.B. 2004. Fenaroli's Handbook of Flavor Ingredients. 5th Ed. CRC Press.
4	Madhavi, D.L., Deshpande, S.S & Salunkhe, D.K. 1996. Food Antioxidants: Technological, toxicological and Health Perspective. Marcel Dekker
5	Mahindru, S N (2000) Food Additives- Characteristics Detection and Estimation. Tata Mc Graw Hill Publishing Co. Ltd.

Government of Karnataka

Model Curriculum

Program Name	**B Sc Food Technology**	Semester	**Second Semester**
Course Title	**Food Safety (Theory)**		
Course Code:	**OE-2.1**	No. of Theory Credits	**3**
Contact hours	**45hrs**	Duration of ESA/Exam	**2 Hrs**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s): PUC with PCMB (KCET Appeared has first preference)

Course Objectives (COs):

CO1. To develop the knowledge of students on food safety, its management tools and the laws & standards related to food.

Content of Theory	**45 Hrs**

Unit–1

Introduction to Food Safety

A. Definition, types of hazards, biological, chemical, physical hazards

B. Factors affecting Food Safety

C. Importance of Safe Foods

Unit -2

Food Safety Management Tools

A. Basic concept - Prerequisites- GHPs, GMPs,

B. HACCP, ISO series, TQM - concept and need for quality

C. Risk Analysis

D. Accreditation and Auditing

Unit -3

Food Laws and Standards

A. Indian Food Regulatory Regime

B. Global Scenario

C. Other laws and standards related to food

Learning Outcomes: After the successful completion of the course, the student will be able to:

- To study the types of hazards associated with food
- To gain knowledge on food regulations (national as well as international)
- To understand the design and implementation of food safety management systems such as ISO series, HACCP and its prerequisites such as GMP, GHP etc.

Formative Assessment:	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	10
Test 2	10
Assignment	05
Seminar	05
Project	10
Total	**40 Marks**
Formative Assessment as per NEP guidelines are compulsory	
Summative Assessment (60 marks) + Formative Assessment (40 marks) = Total 100 marks	

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 41
5	Forsythe, S. J. The Microbiology of Safe Food, second edition, Wiley Blackwell, U.K.,2010
6	Mortimore S. and Wallace C. HACCP, A practical approach, Chapman and Hill, London,1995
7	Blackburn CDW and Mc Clure P.J. Food borne pathogens. Hazards, risk analysis & control. CRC Press, Washington, U.S.A, 2005

MODEL QUESTION PAPER
CREDIT BASED SEMESTER B.Sc. DEGREE EXAMINATION – MONTH, YEAR I
I Semester B.Sc. Food Technology (Basic and Hons.) Theory
(CODE NO): TITLE OF THE COURSE

Time: 2 Hours Max. Marks: 60

I.Write short notes on any TEN of the following: 2x10=20
1-12

II. Write explanatory notes on any FIVE of the following questions: (4x5=20)
1-7

III.Write essays on any TWO of the following: (10x2=20)

1-4

Ensure equal distribution from all Units
In each question:

a. Shall be questions based on basic conceptual understanding etc.

b. Shall be questions based on deeper understanding, analytical, problem solving skills etc.

c. Shall be questions based on critical thinking, higher order thinking skills etc.

MODEL QUESTION PAPER
I Semester B.Sc. Food Technology (Basic and Hons.) Degree Practical Examination Month & Year
COURSE CODE AND TITLE

Time:	Max. Marks: 25
I. Major:	10 marks
II. Minor:	5 marks
IV. Spotters: a. b.	2×1.5=3 marks
V. Viva.	2 marks
VI. Record.	5 marks