



NEHRU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

(Reaccredited with 'A' Grade by NAAC, ISO 9001:2015 & 14001:2004 Certified,
Recognized by UGC with 2(f) and 12(B) and Affiliated to Bharathiar University)

Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105, Tamil Nadu.



Scheme of Examination

(Applicable to the students admitted during the year 2020-2021)

B.Sc. Food Science and Nutrition

Semester	Part	Sub. Code	Name of the Subject	Instruction hours / week	Duration of Examination	Examination Marks			Credits	
						CIA	ESE	Total		
I	I	18U1TAM101/ 18U1HIN101/ 18U1MAL101/ 20U1FRN101	Language I	5	3	25	75	100	4	
	II	20U2ENG101	English I	5	3	25	75	100	4	
	III		20U3FSC101	Core Paper I - Basic Food Science	5	3	25	75	100	4
			20U3FSC102	Core Paper II - Food Chemistry	5	3	25	75	100	4
			20U3FSP103	Core Paper III - Basic Food science - Practical	3	3	20	30	50	2
			20U3FSA101	Allied Paper I Chemistry -I	4	3	20	55	75	3
	IV		18U4ENV101	Ability Enhancement Compulsory Course -Environmental Studies	2	3	-	50	50	2
			18U4HVY201	Value Education – Human Values and Yoga Practice I	1	-	-	-	-	-
				30				575	23	
II	I	18U1TAM202/ 18U1HIN202/ 18U1MAL202/ 20U1FRN202	Language II	5	3	25	75	100	4	
	II	20U2ENG202	English II	5	3	25	75	100	4	
	III		20U3FSC204	Core Paper IV - Human Physiology	5	3	25	75	100	4
			20U3FSC205	Core Paper V - Principles of Nutrition	5	3	25	75	100	4
			20U3FSP206	Core Paper VI - Principles of Nutrition - Practical	3	3	20	30	50	2
			20U3FSA202	Allied Paper II Chemistry -II	4	3	20	55	75	3
	IV		18U4HRC202	Ability Enhancement Compulsory Course- Human Rights and Constitution of India	2	3	-	50	50	2
			18U4HVY201	Value Education- Human Values and Yoga practice I	1	2	25	25	50	2
				30				625	25	

III	I	20U1TAM303/ 19U1HIN303/ 20U1MAL303/ 20U1FRN303	Language	5	3	25	75	100	4
	II	20U2ENG303	English III	5	3	25	75	100	4
	III	20U3FSC307	Core Paper VII – Nutrition in Health	5	3	25	75	100	4
		20U3FSP308	Core paper VIII- Family Meal Management - Practical	3	3	20	30	50	2
		20U3FSA303	Allied Paper III Biochemistry-I	4	3	20	55	75	3
	IV	20U4FSS301	Skill Based Paper - I Techniques of Food Evaluation	3	3	20	55	75	3
		19U4NM3BT1 / 19U4NM3AT1 / 19U4NM3CAF/ 19U4NM3GTS / 19U4NM3WRT	# @Basic Tamil – I / ##Advanced Tamil – I / * NME: Consumer Affairs / Gandhian Thoughts / Women’s Rights	2	3	50		50	2
		20U4FS3ED1	Extra Departmental Course : Diet and Health	2	3	-	50	50	2
		18U4HVY402	Value Education-Human values and Yoga Practice II	1	-	-	-	-	-
		20U4FSVALC	**Skill Enhancement Add on Course-Institution Industry Linkage	-	-	-	-	-	-
				30				600	24
IV	I	20U1TAM404/ 19U1HIN404/ 20U1MAL404/ 20U1FRN404	Language	5	3	25	75	100	4
	II	20U2ENG404	English IV	5	3	25	75	100	4
	III	20U3FSC409	Core Paper IX Clinical Nutrition and Dietetics -I	5	3	25	75	100	4
		20U3FSC410	Core Paper X Bakery and Confectionery	5	3	25	75	100	4
		20U3FSA404	Allied Paper IV Biochemistry -II	4	3	20	55	75	3
	IV	20U4FSS402	Skill Based Paper II Bakery and Confectionery - Practical	3	3	20	30	50	2
		19U4NM4BT2/ 19U4NM4AT2/ 19U4NM4GEN	# @Basic Tamil – II / ##Advanced Tamil - II / General Awareness	2	3	-	50	50	2
		18U4HVY402	Value Education -Human Values and Yoga Practice II	1	2	25	25	50	2
		20U4FSNVALC	**Skill Enhancement Add on Course-Institution Industry Linkage						Grade
				30				625	25

V	III	20U3FSC511	Core paper XI-Post Harvest Technology and Food Preservation	5	3	25	75	100	4
		20U3FSC512	Core paper XII- Public Health and Nutrition	5	3	25	75	100	4
		20U3FSC513	Core paper XIII- Clinical Nutrition and Dietetics -II	5	3	25	75	100	4
		20U3FSC514	Core paper XIV- Fundamentals of Food Microbiology	5	3	25	75	100	4
		20U3FSP515	Core Paper XV- Dietetics - Practical	3	3	20	30	50	2
		20U3FSE501/ 20U3FSE502/ 20U3FSE503	Elective -I	4	3	25	55	75	3
	IV	20U4FSS503	Skill Based Paper III- Mini Project	3	-	25	-	25	1
		20U4FST501	Internship	-	-	25	-	25	1
			30				575	23	
VI	III	20U3FSC616	Core paper XVI- Food Biotechnology	5	3	25	75	100	4
		20U3FSC617	Core paper- XVII-Nutraceuticals and nutrigenomics	5	3	25	75	100	4
		20U3FSC618	Core paper XVIII- Food Quality Analysis Techniques	5	3	25	75	100	4
		20U3FSP619	Core paper IX – Food Preservation and Quality Analysis - Practical	4	3	20	30	50	2
		20U3FSE604/ 20U3FSE605/ 20U3FSE606	Elective II	4	3	20	55	75	3
		20U3FSE607/ 20U3FSE608/ 20U3FSE609	Elective III	4	3	20	55	75	3
	IV	20U4FSS604	Skill Based Paper IV- Computer Application in Food Science and Nutrition - Practical	3	3	20	30	50	2
	V	20U5EXT601	Extension Activities	-	-	50	-	50	2
			30				600	24	
		Total					3600	144	

Additional Credit (Optional)	Semester II - VI	8^{\$}
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- # **Basic Tamil** - Students who have not studied Tamil up to 12th standard.
- ## **Advance Tamil** - Students who have studied Tamil language up to 12th standard and chosen other languages under part I of the UG programme but would like to advance their Tamil language skills.
- * **NME** - Student shall choose any one course out of three courses.
- @ No End Semester Examinations. Only Continuous Internal Assessment (CIA).
- \$ Not included in Total marks and CGPA Calculation.
- ** Examination and Evaluation for value added course shall be conducted by the Industry and the marks shall be submitted to the Controller of Examination for the award of the degree.

List of Discipline Specific Elective Papers (Choose any one of the paper):

Elective	Subject Code	Group	Title
Elective I	20U3FSE501	A	Food Safety, Sanitation and Hygiene
	20U3FSE502	B	Food Laws and Standards
	20U3FSE503	C	Food Additives
Elective II	20U3FSE604	A	Nutrition for Health & Fitness
	20U3FSE605	B	Nutrition Education and Counseling
	20U3FSE606	C	Food Service Management
Elective III	20U3FSE607	A	Food Packaging and Labelling
	20U3FSE608	B	Unit Operations
	20U3FSE609	C	Technology of Plantation Crops and Spices

Extra Departmental Course (EDC):

S. No.	Subject Code	Name of the Subject
1	20U4FS3ED1	Diet and Health

Self Study paper offered by department of Food Science and Nutrition:

S. No.	Semester	Subject Code	Name of the Subject
1	II to IV	20UFSSS01	Technology of Fruits, Vegetables and Plantation Crops
		20UFSSS02	Meat and Poultry Processing Technology

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Nehru Arts and Science College
Coimbatore

Course Code	Title		
20U3FSA101	Allied Paper I – Chemistry I		
Semester : I	Credits : 3	CIA: 20 Marks	ESE : 55 Marks

Course Objectives :

1. Realize the importance of basics in assemblage of small molecules
2. Utilize in retrieving meaningful conclusion through problem based learning.

Course Outcomes:

CO1	Recall the basics in structure and reactions of organic molecules
CO2	Comprehend chemical bonding and structure of chemicals
CO3	Identify covalent bonding in molecules and isomers
CO4	Summarize solution types and kinetics
CO5	Explain about conductance and pH calculations

Offered by : Food Science and Nutrition

Course content

Instructional Hours / Week: 3 (T) +1 (P)

Unit	Description	Text Book	Chapter
I	Structures: Methane, Ethylene, Acetylene and Benzene. Effects: Inductive effects, mesomeric effect, Hyper conjugative effect, electromeric effect, steric effects in simple and macromolecules	1,3,5	3,1
Instructional Hours			9
II	Chemical Bonding - Molecular orbital theory, bonding, antibonding and non-bonding orbitals. Molecular orbitals. MO configuration of H ₂ , N ₂ , O ₂ , F ₂ . Bond order. Diamagnetism and paramagnetism. Preparation and properties, structure, preparation and uses of Borane- NaBH ₄ , Borazole Chemistry.	4,2,1	20,30
Instructional Hours			9
III	Covalent bond: Orbital overlap, hybridization, geometry of organic molecules- CH ₄ , C ₂ H ₄ , and C ₂ H ₂ . Inductive effect. Electromeric, mesomeric, hyper conjugative and steric effects. Effect in properties of compounds. Stereoisomerism Conditions of optical activity-Optical isomerism of tartaric acid, Racemisation, Resolution of racemates- Geometrical isomerism of maleic and fumaric acids	4	26,27
Instructional Hours			9
IV	Solutions types - Liquid in Liquid. Raoult's law- - Deviation from ideal behaviour – positive deviation-Negative deviation- Fractional distillation. Kinetics - Rate, order, molecularity, pseudo first order, determination of order. Effect of temperature on the rate. Energy of activation.	4,2	28,9
Instructional Hours			9
V	Conductance - Types(definition only)- Ostwald dilution law - Kohlraush's law- -Applications Conductometric titrations. pH and its calculations - Buffers in living systems-Action of buffer solutions -. Henderson Hasselbalch equation.	6,7	7, 263
Instructional Hours			9

Allied chemistry Practicals- Volumetric analysis	
<ol style="list-style-type: none"> 1. Estimation of sodium hydroxide using standard sodium carbonate 2. Estimation of hydrochloric acid – standard Oxalic acid 3. Estimation of oxalic acid- standard sulphuric acid 4. Estimation of ferrous sulphate - standard Mohr salt solution 5. Estimation of oxalic acid - standard ferrous sulphate 6. Estimation of potassium permanganate -standard sodium hydroxide 	
Instructional Hours	15
Total Instructional Hours	60

*Questions can be taken from only theory portions

Text Books:

1. Veeriyam V, **Allied Chemistry I & II**, 1st Edition, 2004
2. Atkin's **Physical Chemistry**, 7th Edition, Oxford University Press, 2007.
3. Robert Thornton Morrison and Robert Nelson Boyd, **Organic chemistry**, 6th Edition, Prentice Hall of India Pvt. Ltd., 2008.
4. B.R. Puri, L.R. Sharma & Madan S. Pathania, **Principles of Physical Chemistry**, Vishal Publishing Company, 6th Edition, 2005.
5. Solomons & Fryhle, **Organic Chemistry**, 8th Edition, John Wiley & Sons, 2017.

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1. Jerry March, **Advanced Organic Chemistry**, 4th Edition, 2004.
2. Paula Yurkanis Bruice, **Organic Chemistry**, 3rd Edition, Pearson Education, 2018.
3. Clayden, Greeves, Warren and Wothers, **Organic chemistry**, 6th Edition, Oxford University Press, 2007.
4. <http://ebookacid.weebly.com/engineering/organic-chemistry-english-6th-edition>

Tools for Assessment (20 Marks)

CIA I	CIA II	CIA III	Assignment	Lab performance	Attendance	Total
4	4	5	2	2	3	20

Mapping

CO	PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		L	L	L	M	L
CO2		M	M	H	M	L
CO3		H	M	M	M	M
CO4		L	L	H	M	L
CO5		L	L	M	M	M

H - High; M - Medium; L - Low.

Course Designed by	Verified by HOD	Checked by	Approved by

Course Code	Title		
20U3FSC101	Core Paper I - Basic Food Science		
Semester : I	Credits : 4	CIA : 25 Marks	ESE : 75 Marks

Course Objectives:

1. Learn the composition of different food groups and its nutritional value
2. Provide knowledge on changes during cooking

Course Outcomes:

CO1	Enlist the food groups
CO2	Comprehend the nutritional composition of food groups
CO3	Recall the changes in fruits and vegetables on storage
CO4	Summarize the changes in food composition on cooking
CO5	Describe the preservation methods of meat and poultry

Offered by: Food Science and Nutrition

Course content

Instructional Hours / Week: 5

Unit	Description	Text Book	Chapter
I	Food group: Basic 4, 5 and 7 food groups, functional food groups-energy yielding, bodybuilding and protective foods (only sources), food pyramid. preliminary processing of foods, study of various cooking methods - boiling, steaming, stewing, frying, baking, roasting, broiling, cooking under pressure. Merits and demerits of cooking methods	1	1
Instructional Hours			15
II	Cereals, Pulses and Nuts and oil seeds: Cereals: Composition of rice, wheat, structure of wheat, nutritional importance, wheat and rice processing, effects of cooking on parboiled and raw rice, principles of starch cookery, gelatinization, dextrinization. Pulses: Varieties of pulses and grams, composition, nutritive value, antinutritional factors, cooking quality of pulses, processing, germination, soaking, fermentation and its advantages and disadvantages	1	2,3,4
Instructional Hours			15
III	Vegetables: Classification, composition, nutritive value, selection, and changes during cooking Fruits: Classification, composition, nutritive value, methods and effects of cooking, enzymatic browning, ripening changes, pectin content of fruits and its importance, pigments in fruits and vegetables and storage	1	8
Instructional Hours			15
IV	Milk, egg, fats and oils: Composition, nutritive value, kinds of milk, different milk products,- fermented and non-fermented products pasteurization and homogenization of milk, changes in milk during heat processing Egg: Structure, composition, selection, nutritive value, uses of egg in cookery, methods of cooking, foam formation and	1	5,6,9

	factors affecting foam formation, role of egg in cookery and egg quality Fats and Oils: Nutritional importance, types of fats, rancidity, changes on heating and role of fat in cookery		
	Instructional Hours		15
V	Meat and meat products: Classification of meat and poultry, structure, composition, nutritive value, selection, post mortem changes, Changes during cooking, cooking of meat, poultry and fish, preservation and storage of meat, fish and poultry	1	7
	Instructional hours		15
	Total Instructional hours		75

Text Books:

1. Srilakshmi, B., Food Science, (2016), 5 th edition, New Age Publishers, India, New Delhi.
2. Many, S and Shadaksharaswami, M. (2008) Food: Facts and Principles, 3rd edition, New Age Publishers.

Reference Books:

1. Swaminathan, M., (2012) Food science, Chemistry and Experimental foods, Bangalore Printing and Publishing Company.
2. Potter M,N. and Hotchkiss, J.H. (2007) Food Science, 5th edition, CBS Publications and Distributors, Daryaganji, New Delhi.
3. Philip, T. (2010). Modern Cookery for teaching and trade, 6th edition, Orient Longmans Ltd.

Journals:

1. Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.
2. Proceedings of the Nutrition Society of India, Nutrition Society of India, Hyderabad.

CO	PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		H	L	M	H	M
CO2		H	L	H	H	M
CO3		M	L	L	M	H
CO4		H	M	L	H	H
CO5		H	M	H	M	H

H - High; M - Medium; L - Low

Tools for Internal Assessment (25 marks)

CIA I	CIA II	CIA III	Assignment	Model preparation	Attendance	Total
5	5	6	3	3	3	25

Prepared By	Verified by	Checked By	Approved by

Course Code	Title		
20U3FSC102	Core Paper II - Food Chemistry		
Semester: I	Credits : 4	CIA : 25 Marks	ESE : 75 Marks

Objectives:

1. Understand the chemical components of foods
2. Provide insight into chemical changes in food components

Course Outcomes:

CO1	Recall the physical and chemical properties of food
CO2	Examine the changes in carbohydrates during processing
CO3	Analyze the changes in protein in different foods
CO4	Comprehend the chemical changes in fats and oils
CO5	Discuss the aromatic components of foods

Offered by: Department Food Science and Nutrition

Course content**Instructional Hours / Week: 5**

Unit	Description	Text Book	Chapter
I	Physio-chemical properties of foods: Moisture in foods, hydrogen bonding, bound water, water activity in foods, determination of moisture content in foods, true solutions, dispersions, sols, gels, foams, colloids and emulsions	1	1
Instructional Hours			15
II	Chemistry of Starch and Sugars: Components of Starch, starch hydration, gel formation, retrogradation, syneresis, effect of sugar, acid, alkali, fat and surface-active agents on starch, stages of sugar cookery, crystal formation and factors affecting it. types of candies, action of acid, alkali and enzymes. chemistry of milk sugar, Non enzymatic browning	1	3
Instructional Hours			15
III	Chemistry of Proteins: Components of wheat proteins, structure, gluten formation and its properties, effect of soaking, fermentation and germination on pulse proteins, properties of egg protein, chemistry of milk protein, changes in milk, egg and meat proteins during heating, addition of acid, alkalis on animal proteins	1	4
Instructional Hours			15
IV	Chemistry of Fats and oils: Physical and chemical properties of fats and oils rancidity, hydrogenation, winterization, decomposition of triglycerides, shortening power of fats, changes in fats and oils during heating, factors affecting fat absorption in Foods affecting absorption of oil.	1	6
Instructional Hours			15

V	Aroma compounds	2	5,7
	Properties and active principles of spices and condiments other food items, thresh hold values, forms of flavour, flavour compounds from fatty acid metabolism, carbohydrate metabolism, amino acid metabolism, factors affecting flavour compounds		
Instructional Hours			15
Total Instructional Hours			75

Text Books:

1. Shakuntala Manay, Shadaksharaswamy. M (2017) Foods, Facts and Principles, New Age International Pvt Ltd Publishers, 2nd Edition
2. Chandrasekhar, U. Food Science and applications in Indian Cookery (2002) Phoenix Publishing House, New Delhi
3. Swaminathan, M. Food Science, (2015) Chemistry and Experimental Foods, Bappa Publishers, Bangalore.

Reference Books:

1. Meyer, L.H, Food Chemistry, (2004), 1/e edition, CBS Publishers and Distributors, New Delhi
2. Paul, P.C. and Palmer, H.H. Food Theory and Applications (2000) John Wiley and Sons, New York, (Revised Edition)
3. Chopra H.K, Panesar, P.S, Food Chemistry (2010) Narosa Publishing House, New Delhi

Journal

1. Journal of Food Chemistry and Nutrition

Mapping

CO	PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		H	L	M	H	H
CO2		M	M	L	H	H
CO3		L	M	L	H	H
CO4		M	L	L	H	H
CO5		M	L	L	H	H

Tools for Internal Assessment (25 marks)

CIA I	CIA II	CIA III	Assignment	Group activity	Attendance	Total
5	5	6	3	3	3	25

Prepared by	Verified by	Checked by	Approved by

Course code	Title		
20U3FSP103	Core Paper III – Basic Food Science – Practical		
Semester : I	Credits : 2	CIA : 20 Marks	ESE : 30 Marks

Course Objective:

1. Learn the composition of different food groups and its nutritional value
2. Provide knowledge on changes during cooking

Course Outcomes:

CO1	Enlist the food groups
CO2	Comprehend the nutritional composition of food groups
CO3	Recall the changes in fruits and vegetables on storage
CO4	Summarize the changes in food composition on cooking
CO5	Describe the preservation methods of meat and poultry

Offered by: Department of Food Science and Nutrition

Course content**Hours of instruction/week: 3**

Unit	Descriptions
1.	Food group: Grouping of foods, measuring of different groups of foods and its nutritive value
2.	Edible portion: Determination of edible portion percentage.
3.	Cereals - Methods of cooking fine and coarse cereals. Examination of starch.
4.	Fat as a medium for cooking-shallow and deep fat frying.
5.	Pulses - Cooking of soaked and un soaked pulses. Common preparation with pulse
6.	Vegetables -Experimental cookery using vegetables of different colours and textures. Common preparation with vegetables
	Fruits -Prevention of darkening in fruits and vegetables. Common preparation with fruits
7.	Milk and milk products- Experimental cookery – cream of tomato soup, cheese curry and cooking vegetables in milk.
8.	Common preparation with milk, cheese and curd.
9.	Fleshy foods fish, meat and poultry- preparations.
10.	Egg experimental cookery- boiled egg, poached egg. Common preparations with egg
	Total Instructional hours 45

Mapping

CO \ PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1	H	L	M	H	M
CO2	H	M	H	H	M
CO3	M	L	L	M	H
CO4	H	L	L	H	H
CO5	H	M	H	M	H

H-High; M-Medium; L-Low.

Tools for Assessment (20 Marks)

Test I	Test II	Observation Note book	Attendance	Lab Performance	Lab Results	Total
4	4	3	3	3	3	20

Prepared By	Verified by	Checked By	Approved by

Course Code	Title		
20U3FSA202	Allied Paper II – Chemistry II		
Semester : II	Credits : 3	CIA : 20 Marks	ESE : 55 Marks

Objective:

1. Understand the different structures of chemicals
2. Inbuilt skills in thermodynamics

Course Outcomes:

CO1	Recall the basics of metals and coordination chemistry
CO2	Comprehend preparation and properties of aromatic compounds
CO3	Describe the properties of proteins and carbohydrates
CO4	Discuss the basic laws of thermodynamics
CO5	Explain about electrodes and batteries

Offered by: Department of Food Science and Nutrition

Course Content**Instructional Hours / Week: 4**

Unit	Description	Text Book	Chapter
I	Metals General methods of extraction of metals. Types of ores. Methods of ore dressing.. Reduction methods, electrical methods, types of refining Van Arkel Zone refining. Coordination chemistry Nomenclature. Theories of Werner, Pauling, Chelation examples. Hemoglobin, Chlorophyll. Applications of EDTA in qualitative and quantitative analysis.	1,3,5	3,1
	Instructional Hours		9
II	Aromatic compounds: Electrophilic substitution in benzene- Mechanism of nitration, halogenation, alkylation, acylation, sulphonation, Preparation and properties of naphthalene. Heterocyclics: Preparation, uses and electrophilic substitution properties of furan, thiophene, pyrrole and pyridine	4,2,1	20,30
	Instructional Hours		9
III	Amino Acids: Classification, preparation and properties, preparation of peptides. Classification of proteins by physical properties and by biological functions. Carbohydrates: classification, preparation and properties of glucose and fructose. Discussion of open chain ring structures of glucose and fructose.	4	26,27
	Instructional Hours		9
IV	Energetics: Definition of first law thermodynamics. Types of systems. Reversible, irreversible. Isothermal and adiabatic processes. Spontaneous processes, Joule-Thomson effect. Enthalpy, bond energy. Need for the second law. Carnot cycle and Carnot theorem. Entropy and its significance. Free energy change.	4,2	28,9
	Instructional Hours		9
V	EMF (Definition)-Theory of oxidation and reduction-Nomenclature of cell- Daniel cellReference electrode-Standard Hydrogen	6, 7	7, 263

Electrode(SHE)-Saturated Calomel Electrode (SCE). Determination of pH-Hydrogen, Quinhydrone and glass electrodes Hydrogen-Oxygen fuel cell-Batteries-Lead-storage battery-Batteries of future-Lithium ion batteries.		
Instructional Hours		9
ORGANIC ANALYSIS: systematic analysis		
<ol style="list-style-type: none"> 1. Detection of Elements (N, S, Halogens). 2. To distinguish between aliphatic and Aromatic. 3. To distinguish between saturated and unsaturated. 4. Functional group tests for phenols, acids (mono and di), aromatic primary amine, amide, diamide, carbohydrate 5. Functional groups characterized by confirmatory test. 		
Instructional Hours		15
Total Hours		60

* Questions shall be taken from Unit I to Unit V theory

Text Books:

1. Veeriyar V, **Allied Chemistry I & II**, 1st Edition, 2004
2. Atkin's **Physical Chemistry**, 7th Edition, Oxford University Press, 2007.
3. Robert Thornton Morrison and Robert Nelson Boyd, **Organic chemistry**, 6th Edition, Prentice Hall of India Pvt. Ltd., 2008.
4. B.R. Puri, L.R. Sharma & Madan S. Pathania, **Principles of Physical Chemistry**, Vishal Publishing Company, 6th Edition, 2005.
5. Solomons & Fryhle, **Organic Chemistry**, 8th Edition, John Wiley & Sons, 2017.

Reference Books:

1. Jerry March, **Advanced Organic Chemistry**, 4th Edition, 2004.
2. Paula Yurkanis Bruice, **Organic Chemistry**, 3rd Edition, Pearson Education, 2018.
3. Clayden, Greeves, Warren and Wothers, **Organic chemistry**, 6th Edition, Oxford University Press, 2007.
4. <http://ebookacid.weebly.com/engineering/organic-chemistry-english-6th-edition>

Tools for Assessment (20 Marks)

CIA I	CIA II	CIA III	Assignment	Group activity	Attendance	Total
4	4	5	2	2	3	20

Mapping

CO	PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		H	H	M	M	L
CO2		H	H	M	M	L
CO3		M	H	H	H	H
CO4		H	M	H	M	L
CO5		H	M	L	M	H

H - High; M - Medium; L - Low.

Course Designed by	Verified by HOD	Checked by	Approved by

Course Code	Title		
20U3FSC204	Core Paper IV - Human Physiology		
Semester : II	Credits: 4	CIA: 25 Marks	ESE : 75 Marks

Course Objectives:

1. Provide insight into anatomy of human body
2. Inbuilt knowledge on functions of organs

Course Outcomes:

CO1	Comprehend the basic elements of human physiology
CO2	Explain the anatomy of digestive system
CO3	Illustrate the functions of cardio and respiratory system
CO4	Recall the physiology of reproductive system
CO5	Analyze role of endocrine system and nervous system

Offered by: Department of Food Science and Nutrition

Course Content**Instructional Hours / Week: 4**

Unit	Description	Text Book	Chapter
I	Cell: Structure and functions and Tissues - Structure and functions Blood: RBC, WBC, Platelets and Lymph. Blood coagulation, blood grouping and Rh factor. Sense organs - Structure and function of eye, Nose, tongue, ear and skin	1	2
Instructional Hours			15
II	Digestive system: Anatomical Consideration of the digestive tract including liver and pancreas, digestion and absorption of carbohydrate, protein and fat, structure of excretory system- kidney, nephrons, urine formation composition of urine, micturition	1	3
Instructional Hours			15
III	Cardio and respiratory system: Cardio system: Structure of heart and blood vessels, Properties of Cardiac Muscle, Functional Tissues, Cardiac Cycle, Heart Rate, Cardiac Output, Blood Pressure, Radial Pulse Respiratory System: Anatomy of respiratory tract mechanism of respiration,, transport of respiratory gases in blood, gaseous exchange in lungs and tissues	1	5
Instructional Hours			15
IV	Reproductive and immune system: Reproductive system: Anatomy of male and female reproductive organs, physiology of menstruation, pregnancy and associated changes, placenta, mammary gland and lactation Immune system: Types of immune system	1	7
Instructional Hours			15

V	Related practical experiences	1	8
	. Microscope and its use		
	. Determination of bleeding time and coagulation time		
	. Estimation of Blood profile -Haemoglobin, RBC, WBC, blood group		
	. Preparation of blood – smear and DLC		
	. Blood pressure and pulse rate recording		
Instructional hours			15
Total Instructional hours			75

***Questions can be taken only from theory portions**

Text Books:

1. Chatterjee C.C (2016), Human Physiology 11th Edition, Medical Allied Agency, Kolkata
2. Sembulingam, K. (2012) Essentials of Medical Physiology, 6th Edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.

Reference Books:

1. Best and Taylor, (2011) 13th Edition, The Physiological Basis of Medical Practice, Saunders Company.
2. Chaudhri, K. (2016), 7th Edition, Concise Medical Physiology, New Central Book Agency (Parental) Ltd., Calcutta.

PSO CO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1	H	H	M	L	L
CO2	L	H	M	M	M
CO3	H	H	M	L	L
CO4	L	H	M	M	L
CO5	L	H	M	L	M

H - High; M - Medium; L - Low.

Tools for Internal Assessment (25 marks)

CIA I	CIA II	CIA III	Assignment	Laboratory Results	Attendance	Total
5	5	6	3	3	3	25

Prepared By	Verified by	Checked By	Approved by

Course Code	Title		
20U3FSC205	Core Paper V - Principles of Nutrition		
Semester : II	Credits : 4	CIA: 25 Marks	ESE : 75 Marks

Course Objective:

1. Illustrate the utilization of different nutrients inside the body
2. Understand the physiological functions of each nutrients

Course Outcomes:

CO1	Recall the estimation of energy values of foods
CO2	Classify the nutrients based on its functions
CO3	Summarize the metabolic functions of nutrients
CO4	Identify the food sources of macro and micronutrients
CO5	Examine the deficiency disease of nutrients

Offered by: Department of Food Science and Nutrition

Course content

Hours of instruction/week: 5

Unit	Description	Text Book	Chapter
I	<p>Introduction to Nutrition: General introduction, history of Nutrition. Energy - Definition of Kilocalories, Joule, energy value of foods, determination, physiological fuel values, SDA of foods, basal metabolic rate-definition, factors influencing BMR. Recommended Dietary Allowances for energy.</p> <p>Carbohydrates - Classification, functions, source, digestion, absorption and utilization, dietary fibre and health</p>	1	3, 6
Instructional Hours			12
II	<p>Protein: Classification, functions, sources and requirements, digestion, absorption and utilization, Protein quality – PER, BV, NPU, digestibility coefficient, -definition and calculation Reference protein, essential amino acids and mutual supplementation of dietary protein .Fats and Lipids - Classification, functions, sources, requirement, importance of essential fatty acids, their requirements and deficiency.</p>	1	4
Instructional Hours			12
III	<p>Lipids and Water Lipids - Classification, functions, digestion, absorption and metabolism, functions, sources and requirements Water – Importance, distribution in the body, functions of water and sources, water intake and loss, maintenance of water and regulation of acid-base balance in the body, electrolyte balance.</p>	1	4
Instructional Hours			12
IV	<p>Vitamins: Fat soluble vitamins –A, D, E and K- functions, source, requirements, deficiency disorders. Water soluble vitamins –The B-complex vitamins – Thiamine Riboflavin, Niacin, Folic acid, Biotin, Pantothenic acid and Vitamin C - functions, source, requirements and deficiency disorders</p>	1	9,10
Instructional Hours			12

V	Minerals - General functions in the body, classification- macro and micro minerals.	1	7, 8
	Macrominerals – Calcium and phosphorus - functions, absorption and utilization, requirements, deficiency and toxicity. Microminerals – Iron, Fluorine, Zinc, copper, Iodine -functions, absorption, utilization, requirements, deficiency and toxicity.		
Instructional Hours			12
Related practical experiences			
<ol style="list-style-type: none"> 1. Microscope and its use 2. Determination of bleeding time and coagulation time 3. Estimation of Blood profile -Haemoglobin, RBC, WBC, blood group 4. Preparation of blood – smear and DLC 5. Blood pressure and pulse rate recording 			
Instructional Hours			15
Total Instructional Hours			75

Text Books:

1. Srilakshmi, B., Nutrition Science, New Age International (P) Ltd., New Delhi, 2017.
2. Mahtab, S, Bamji, Kamala Krishnasamy, G.N.V. Brahmam, Text Book of Human Nutrition, Third Edition, Oxford and IBH Publishing Co. P. Ltd., New Delhi, 2015
3. Swaminathan, M., Advanced Textbook on Food and Nutrition, Vol. 1, Second Edition, Bangalore Printing and Publishing Co. Ltd., Bangalore, 2012.

Reference Books:

1. Dietary Guidelines for Indians, ICMR, National Institute of Nutrition, Hyderabad, 2013.
2. Gordon M. Wardlaw, Paul M.Insel,Perspectives in nutrition third edition, Mosbyear Book,Inc.St.Louis,Missouri,2015
3. Krause, M.V. and Hunesher, M.A., Food, Nutrition and Diet Therapy, 14th Edition, W.B. Saunders Company, Philadelphia, London, 2013

CO	PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1		H	H	M	L	L
CO2		L	H	M	M	M
CO3		H	H	M	L	L
CO4		L	H	M	M	L
CO5		L	H	M	L	M

H - High; M - Medium; L - Low.

Tools for Internal Assessment (25 marks)

CIA I	CIA II	CIA III	Assignment	Laboratory Results	Attendance	Total
5	5	6	3	3	3	25

Prepared By	Verified by	Checked By	Approved by

Course code		Title	
20U3FSP206	Core Paper VI – Principles of Nutrition Practical		
Semester : II	Credits : 2	CIA : 20 Marks	ESE: 30 Marks

Course Objective:

1. Develop skills in qualitative and quantitative analysis of food
2. Understand the interactions between food components

Course Outcomes:

CO 1	Recall the chemical properties of micro and macro molecules
CO 2	Categorize the structures of micro and macro molecules
CO 3	Identify the standard procedure for nutrient analysis
CO 4	Demonstrate the analysis of nutrients in given sample
CO 5	Interpret the results of nutrient content in a sample

Offered by: Department of Food Science and Nutrition

Course content

Hours of instruction/week: 3

Unit	Description
1.	Qualitative tests for sugars – Monosaccharides and Disaccharides
2.	Quantitative estimation of glucose
3.	Estimation of energy –Bomb calorie meter
4.	Qualitative tests for protein
5.	Qualitative Tests for Minerals
6.	Estimation of Iron
7.	Estimation of Calcium
8.	Estimation of Ascorbic Acid
9.	Estimation of total fat
10.	Estimation of phosphorus
Total Instructional hours	
45	

Mapping

CO	PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1		M	L	M	L	L
CO2		M	M	L	L	M
CO3		M	M	L	M	M
CO4		M	M	L	L	H
CO5		L	H	H	H	H

H - High; M - Medium; L - Low.

Tools for Assessment (20 Marks)

Test I	Test II	Observation note book	Attendance	Lab Performance	Lab results	Total
4	4	3	3	3	3	20

Course Designed by	Verified by HOD	Checked by	Approved by

CourseCode	Title		
20U3FSA303	Allied Paper III – Biochemistry I		
Semester : III	Credits : 3	CIA : 20 Marks	ESE: 55 Marks

Course Objective:

1. Learn the basic functions, structures and biological importance
2. Gain knowledge on nature of nutrients

Course Outcomes:

CO 1	Recall the structure and properties of biomolecules
CO2	Summarize the functions of biomolecules
CO3	Comprehend the importance of macromolecules
CO4	Describe the components responsible for genetic expression
CO5	Discuss the biochemistry of enzyme reactions

Offered by: Department of Food Science and Nutrition

Course content

Hours of instructions/week : 3(T)+1(P)

Unit	Description	Text Book	Chapter
I	Carbohydrate Monosaccharide-Definition, classification, structure and properties. Disaccharides-Definition, types, structure and biological importance, Polysaccharides-types and properties	1	3
	Instructional Hours		9
II	Lipids Definition, Classification and properties of lipids, Types of fatty acids-saturated, unsaturated and essential fatty acids. Classification and significance of lipo proteins and phospholipids. Importance of steroids, structure and biological significance of cholesterol.	1	4
	Instructional Hours		9
III	Amino acids Classification of amino acids, essential amino acids, reactions of amino and carboxyl groups of amino acids. Proteins -Definition, classification and function of Proteins, structural levels of organization (Preliminary treatment), Denaturation and is electric point of Proteins.	1	4
	Instructional Hours		9
IV	Nucleic acids Components of DNA and RNA, Double helical structure of DNA. Structure and types of RNA, Denaturation and denaturation of DNA, Genetic code. Protein synthesis (an outline)	1	6
	Instructional Hours		9
V	Enzymes Classification of enzymes with examples, coenzymes and cofactors (structures not needed), Active site-Lock and Key model, Induced fit hypothesis, Factors affecting enzyme activity, Types of inhibition of enzyme action, Chemical and industrial applications of enzymes.	1	17
	Instructional hours		9

Related practical experiences	
QUALITATIVE ANALYSIS	
1. Analysis of carbohydrates:	
a. Monosaccharides-Pentose-Xylose.Hexoses- Glucose,Fructose,	
b. Disaccharides-Sucrose,Lactose	
c. Polysaccharide-Starch.	
CHARACTERISATION OF LIPIDS [Group experiment]	
1. Determination of acid number.	
2. Determination of iodine number	
Instructional hours	15
Total instructional hours	60

*Questions shall be taken only from the theory part

Text Books:

1. Fundamentals of biochemistry–A.C. Deb New Central Book Agency, Calcutta 6th Edition.

Reference Books:

1. Biochemistry–Lehninger, Nelson, Cox-CBS Publishers
2. Harper's Biochemistry: R.K.Murray, D.K.Granner, P.A.Mayes and U.W.Rodwell–Lange Medical publications, 23rd edition.
3. Textbook of Medical Biochemistry–Rana Shinde and Chatterjee.

Journal

1. Journal of Biochemistry and Biotechnology, open access journal, allied academics

Mapping

CO	PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		H	L	L	L	L
CO2		H	M	M	L	M
CO3		H	M	H	L	M
CO4		H	L	M	M	L
CO5		H	M	L	L	L

H - High; M - Medium; L - Low

Tools for Internal Assessment (20 marks)

CIAI	CIAII	CIA III	Assignment	Group activity	Attendance	Total
4	4	5	2	2	3	20

Prepared By	Verified by	Approved by	Checked By

Course Code	Title		
20U3FSC307	Core Paper VII - Nutrition in Health		
Semester : III	Credits : 4	CIA : 25 Marks	ESE : 75 Marks

Course Objective:

1. Gain knowledge on the nutritional needs of individuals at different age level
2. Gain expertise in planning and preparing normal diets.

Course Outcomes:

CO1	Recall the dietary guideline in meal Planning
CO2	Relate nutritional demands in different physiological needs
CO3	Identify the nutritional needs for different age groups
CO4	Determine the eating habits and eating problems in different individuals
CO5	Plan a balanced menu based on individual requirements

Offered by: Department of Food Science and Nutrition

Course content

Hours of instruction/week: 5

Unit	Description	Text Book	Chapter
I	Meal Planning Definition- Health, RDA, adequate nutrient intake, nutraceuticals, Basic Principles of Meal Planning –Factors to be consider while planning menu for different age groups, Recommended Dietary Allowance-RDA for Indians, basis for requirement, energy allowance for different growth pattern of children, energy allowance for various activities	2	1
Instructional Hours			12
II	Pregnancy and Lactation Nutritional needs during Pregnancy – Stages of pregnancy, Normal growth and weight change, complications, Nutritional requirements, and Meal planning Nutrition during Lactation - Physiology of lactation, hormonal control and relaxation, nutritional components of colostrum and mature milk, breast milk substitutes, Nutritional requirements of lactating mothers and Meal planning	2	7,8
Instructional Hours			12
III	Infancy, Preschool and School Going Children Nutrition during Infancy - Growth and development, advantages of breast feeding, factors to be considered in bottle feeding, Weaning foods, Growth chart. Problems of feeding in normal and premature infants. Nutritional needs of toddlers (1-5 year) and School going children, Factors to be considered while planning meals for school going children, Eating problems of children and their management, packed lunch	2	4
Instructional Hours			12
IV	Nutrition During Adolescent Nutrition during Adolescence - Physical Growth changes, growth spurts in boys and girls, Nutritional requirements and problems in adolescence- anaemia, obesity, anorexia nervosa and bulimia nervosa	2	6
Instructional Hours			12

V	Nutritional Needs of Adult and Old Age	1	8
	Nutritional needs of adults (men and women) - In relation to occupation, Nutrition in menopausal women, hormonal changes, low cost balanced food.		
	Nutrition during Old Age – Physiological changes in ageing, psycho-social and economic factors affecting eating behaviour, Nutritional problems of aged and their management		
Instructional hours			15
Total Instructional hours			75

Text Books:

1. Shakuntala Manay, Shadaksharaswamy. M (2017) Foods, Facts and Principles, New Age International Pvt Ltd Publishers, 2nd Edition
2. Srilakshmi, B. (2016) Dietetics, New Age International Pvt. Ltd
3. Swaminathan, M. Food Science, (2015) Chemistry and Experimental Foods, Bappco Publishers, Bangalore.

Reference Books:

1. Vinodhini Reddy, Prahlad Rao, Govmth Sastry and Kashinath (1993) Nutrition Trends in India, NIN, Hyderabad.
2. Shills, E.M. Olson, A.J. and Shike, Lea and Febiger (2001) Modern Nutrition in Health and Diseases, 9th Edition,

Journal

1. Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.

Mapping

CO	PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1		H	H	H	L	L
CO2		H	H	H	L	L
CO3		M	H	M	L	L
CO4		M	H	H	L	L
CO5		H	H	H	L	M

H - High; M - Medium; L - Low

Tools for Internal Assessment (25 marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Attendance	Total
5	5	6	3	3	3	25

Prepared by	Verified by HoD	Checked by	Approved by

Course Code	Title		
20U3FSP308	Core Paper VIII – Family Meal Management Practical		
Semester: III	Credits: 2	CIA: 20 Marks	ESE : 30 Marks

Course Objective:

1. Gain knowledge on the nutritional needs of individuals at different age level
2. Gain expertise in planning and preparing normal diets.

Course Outcomes:

CO1	Recall the dietary guideline in meal Planning
CO2	Relate nutritional demands in different physiological needs
CO3	Identify the nutritional needs for different age groups
CO4	Determine the eating habits and eating problems in different individuals
CO5	Plan a balanced menu based on individual requirements

Offered by: Dept. of Food Science and Nutrition

Hours of instruction/week: 3

Course content

Descriptions	
1.	Food groups and its measuring techniques Plan menu, display and compute nutritive value
2.	Pregnant women
3.	Lactating mother
4.	Infants and preschool children
5.	Low cost supplementary and weaning foods
6.	School going children
7.	Adolescent girls and boys
8.	Adult man and woman -Based on income
9.	Adult man and Woman-Based on physical activity
10.	Old age
Total Instructional Hours: 45	

Mapping

CO	PSO	PSO1	PSO 2	PSO3	PSO 4	PSO 5
CO1		H	H	H	L	L
CO2		H	H	H	L	M
CO3		M	H	M	L	L
CO4		H	H	H	L	L
CO5		H	H	H	L	L

H - High; M - Medium; L - Low

Tools for Assessment (20 Marks)

Test I	Test II	Observation note book	Attendance	Lab Performance	Lab results	Total
4	4	3	3	3	3	20

Prepared by	Verified by HoD	Checked By	Approved by

Course Code	Title	
20U4FS3EDI	Extra Departmental Course – Diet and Health	
Semester : III	Credits : 2 Marks	ESE : 50 Marks

Course Objectives: To

1. Learn the food groups and functions of nutrients
2. Inbuilt skills to make right food choices

Course Outcomes:

CO1	Enlist the nutrients in different food groups
CO2	Identify the basic functions of nutrients
CO3	Relate the functions of nutrients with growth and development
CO4	Compare the physical activity pattern of individual
CO5	Choose right food choices and plan a balanced diet

Offered by: Department of Food Science and Nutrition

Course content

Hours of instruction/week: 2

Unit	Description	Text Book	Chapter
I	Food groups: Definition: Definition-Food, Supplement, Basic food group, Nutritional composition of cereals and millets, pulses and legumes, fruits and vegetables, milk and milk products, meat, poultry and egg, Principles of cooking, cooking methods, Methods to retain nutrients in food during processing.	1, 3	3, 1
Instructional Hours			6
II	Nutrients and nutritional requirements: Classification of nutrients based on function, Functions of carbohydrates, protein and fat, vitamins, minerals and water. Nutritional requirements during infancy, preschool, school going, adolescents, adults, pregnant women and lactating mothers	1	4
Instructional Hours			6
III	Meal planning: Definition- RDA, Adequate nutrients, Balanced Diet, principles of menu planning, factors affecting menu planning, RDA for different age groups, Food allowance for different age groups, Food pyramid, Balanced diet plate, food exchange list, principles in planning menu for different age groups	2	6,7
Instructional Hours			6
IV	Physical activity and health assessment parameters Benefits of physical activity, WHO classification and standard for physical activity, components of physical fitness, dietary approach, benefits of relaxation techniques Health assessment parameters: WHO standards for weight for age, height for age, Classification on BMI, waist hip ratio, body fat, blood pressure, standard measurement methods	2,3	8, 9
Instructional Hours			6

V	Related Practical Experiments	
	<ol style="list-style-type: none"> 1. Identification of food groups 2. Identification of nutrients in given foods 	
	Planning and Preparing menu for	
	<ol style="list-style-type: none"> 1. Children 2. Adolescent 3. Adults 4. Pregnant women and lactating mother 	
	Instructional hours	6
	Total instructional hours	30

Text Books:

1. B. Sri Lakshmi, Dietetics, Seventh Edition, New Age International, 2014.
2. B. Sri Lakshmi, Food Science, Sixth Edition, New Age International, 2015.
3. Sumati.R Mudamri and M.V.Rajagopal, Fundamental of Foods, Nutrition and Diet Therapy, New Age International, New Delhi, 2008

Reference Books:

1. Sreelakshmi. B (2016), Exercise physiology fitness and sports nutrition
2. Sreelakshmi. B (2014) Dietetics

Journals:

1. International Journal of Behavioral Nutrition and Physical Activity
2. International Journal of Nutrition and Metabolism
3. International Journal of Nutrition and Food Sciences

Course Designed by	Verified by HOD	Checked by	Approved by

Course Code	Title		
20U4FSS301	Skill Based Paper I - Techniques of Food Evaluation		
Semester : III	Credits : 3	CIA : 20 Marks	ESE: 55 Marks

Objectives:

1. Inbuilt knowledge on different characteristics of food
2. Learn various methods of evaluating the quality of foods

Course Outcomes:

CO 1	Relate the Psychological and Physiological factors to food quality
CO 2	Distinguish the principle behind different methods for evaluating food quality
CO 3	Identify and apply the appropriate technique to evaluate the quality of foods
CO4	Evaluate and discuss the different quality parameters
CO 5	Interpret the defects in the food quality

Offered by: Department of Food Science and Nutrition

Course Content

Instructional Hours / Week : 3

Unit	Description	Text Book	Chapter
I	Introduction to Food Evaluation Quality Definition, Objectives and Need for Evaluation of Food Quality, Factors Affecting the Evaluation of Food Quality – Psychological and Physiological	3	1,2
Instructional Hours			9
II	Methods of Evaluation of Food Quality – Subjective Methods Sensory Characteristics of Food - Appearance, Colour, Flavour, Taste, Texture and Consistency, Conducting Sensory Tests – Training Panel Members, Testing Laboratory – Preparation of Samples, Techniques of Smelling and Tasting, Testing time, Design of Experiment, Reasons for Testing Food Quality Practical Preparation of Samples for testing Sample presentation Tasting procedures- Chewing, nibbling, slurping, mouth rinsing Organoleptic Evaluation- Flavour, Colour, Clarity, Viscosity, texture, smelling procedures	3	10, 14
Instructional Hours			9
III	Sensory Tests used for Food Evaluation Types of Tests, Difference Tests, Rating Tests, Sensitivity Tests, Descriptive Tests, Interpretation of scores, Application of software in interpreting scores practical Threshold tests- Absolute, Recognition, Differential, Terminal Discrimination tests- paired comparison, duo trio difference, triangular difference, single sample test, two alternative forced choice test Descriptive tests- Simple descriptive, Descriptive with rating, Flavour profile, Dilution profile technique	3	10
Instructional Hours			9
IV	Methods of Evaluation of Food Quality – Objective Methods Basic Guidelines, Advantages and Disadvantages, Tests Used, Chemical, Physico-chemical, Microscopic, Physical Method, Instruments used for Texture Evaluation Practical	3	15

	Measurement of volume, moisture content, texture, rheology, colour, pH Nutrient Analysis		
Instructional Hours			9
V	Evaluation of Microbial Quality of Foods Methods, Assays used to assess the Microbial Loads of different foods, Permitted levels of Microbial Load in different foods, Microbes responsible for Food Quality Practical Microbial load analysis in food sample	2	12
Instructional Hours			9
Total Hours			45

***Questions shall be taken only from the theory part**

Text books:

1. Srilakshmi, B. Second Edition, Food Science, New Age International (P) Limited Publishers, New Delhi.2016
2. Harry T. Lawless, Hildegarde, Sensory Evaluation of Food Principles and Practices, Second Edition, Springer Science, 2010.
3. Joshi, V.K Sensory Science : Principles and Applications in Food Evaluation,, 2016.

Reference books:

1. Huttenwigs, B.J. Food Color and Appearance, Published by Blackie Academic and Professional, London, 2010.
2. Howard R. Beckley, Jacqueline, H. Sensory and Consumer Research in Food Product Design and Development, 2016
3. Bi, Jian, Sensory Discrimination Tests and Measurements: Statistical Principles, Procedures and Tables, 2016.

Journals:

1. Food Science and Technology International (FSTI),journals.sagepub.com
2. Journal of Food Measurement and Characterization, springer journal

Mapping

CO	PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		H	H	L	L	L
CO2		H	H	L	M	L
CO3		M	H	H	H	H
CO4		H	M	H	M	L
CO5		H	M	L	M	H

H - High; M - Medium; L - Low

Tools for Assessment (20 Marks)

CIA I	CIA II	CIA III	Assignment	Performance in Practical	Attendance	Total
4	4	5	2	2	3	20

Course Designed by	Verified by HOD	Checked by	Approved by

Course Code	Title		
20U3FSA404	Allied Paper IV – Biochemistry II		
Semester : IV	Credits : 3	CIA : 20 Marks	ESE : 55 Marks

Objectives:

1. Learn principles of biochemical metabolism
2. Gain knowledge on different biochemical cycles

Course Outcomes:

CO 1	Recall the biochemical functions of biomolecules and hormones
CO 2	Illustrate the general metabolic pathways of macromolecules
CO 3	Discuss the interrelationship between carbohydrate, fats and protein metabolism
CO 4	Comprehend the disorders in metabolic pathways
CO 5	Describe the metabolism in deficiency disorders

Offered by: Dept. of Food Science and Nutrition

Course Content:

Hours of instructions / week: 3 (T) + 1 (P)

Unit	Description	Text books	Chapter
I	Metabolic pathways: Carbohydrate metabolism: Glycolysis, TCA cycle, HMP shunt, Glycogenesis and glycogenolysis. Disorders of carbohydrate metabolism: Diabetes mellitus, glycosuria.	1	16
Instructional Hours			9
II	Protein metabolism: General pathway of amino acid metabolism – deamination, transamination and decarboxylation. Urea cycle. Glycine and phenylalanine metabolism	1	18
Instructional Hours			9
III	Lipid Metabolism: Beta oxidation and biosynthesis of fatty acids- palmitic acid, ketone bodies. Inter-relationship of carbohydrate, fat and protein metabolism (Flow chart).	1	17
Instructional Hours			9
IV	Hormones and Vitamins: Hyper and hypo secretions of pituitary, adrenal and thyroid glands. Fat and water soluble vitamins- Sources, metabolic functions and deficiency diseases.	1	30
Instructional Hours			9
V	Bioenergetics: Basic principles of thermodynamics – entropy, enthalpy and free energy; Laws of thermodynamics, Structure of mitochondria, high-energy phosphates, oxidation reduction reactions.	1	2
Related Practical			
1. Analysis of Amino acids: a. Histidine b. Tyrosine. c. Tryptophan d. Arginine e. Cysteine f. Methionine			
2. Blood glucose analysis			
Instructional Hours			15
Total instructional hours			60

*Questions shall be taken only from the theory part

Text Books:

1. Fundamentals of Biochemistry – A.C. Deb New Central Book Agency, Calcutta 6th Edition.

Reference Books:

1. Biochemistry – Lehninger, Nelson, Cox-CBS Publishers 2.
2. Harper's Biochemistry: R.K. Murray, D.K Granner, P.A. Mayes and U.W.Rodwell – Lange Medical publications, 23rd edition.
3. Textbook of Medical Biochemistry – Rana Shindae and Chatterjee. 4. An Introduction to practical Biochemistry – D.T. Plummer.

Journal:

1. Journal of Biochemistry and Biotechnology, open access journal, allied academics

Mapping

CO	PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		M	L	L	L	L
CO2		H	M	M	L	L
CO3		M	H	M	L	L
CO4		M	M	H	L	L
CO5		H	M	H	M	M

H - High; M - Medium; L - Low

Tools for Internal Assessment (20 marks)

CIA I	CIA II	CIA III	Assignment	Model preparation	Attendance	Total
4	4	5	2	2	3	20

Course Designed by	Verified by HOD	Checked by	Approved by

Course code	Title		
20U3FSC409	Core Paper IX – Clinical Nutrition and Dietetics I		
Semester : IV	Credits : 4	CIA : 25 Marks	ESE : 75 Marks

Objectives:

1. Gain knowledge and develop skills in assessing the patients.
2. Acquire skills to modify diet for disease conditions

Course Outcomes:

CO1	Recall the principles and basic guidelines in menu planning
CO2	Distinguish between normal diet and therapeutic diet
CO3	Analyse normal symptoms of disease and identify the disease conditions
CO4	Examine the nutritional requirements in different disease conditions
CO5	Modify the diet based on the therapeutic conditions

Offered by: Dept. of Food Science and Nutrition

Course content

Hours of instruction/week : 5

Unit	Descriptions	Text Book	Chapter Number
I	Concepts of diet therapy Growth and Scope of Dietetics Purposes and Principles of Therapeutic Diets, Modifications of Normal Diets, Classification of the Therapeutic Diets, Role of Dietitians, Characteristics of Dieticians, Diet Counseling, Team Approach to Nutritional Care, Principles of Food Prescription, Indian Dietetic Association.	1	1,11,12
	Instructional hours		15
II	Obesity and Underweight Obesity- Definition, Central obesity and over all obesity, Body Mass Index (BMI), Waist to Hip ratio, Waist to Height ratio, WHO Classification -BMI, W/H, W/Ht, Etiological factors, diet modifications and complications. Underweight – Definition, Etiological Factors, Diet Modifications, complication	1	14
	Instructional hours		15
III	Diabetes Mellitus Etiology, Types, Clinical and Biochemical Changes, Diagnostic Tests, GTT, HbA1c, Diet Modifications, Use of Food Exchange Lists, Insulin-Types and Use, Oral Hypoglycemic Agents, Glycaemic Index, Acute and Chronic Complications of Diabetes and diet modification	1	18
	Instructional hours		15
IV	Diseases of the Cardio Vascular System Cardiovascular Diseases –Atherosclerosis, Coronary Heart Disease, Congestive Heart Failure – Etiology, Complications, Diet Modifications Hypertension – Etiology, Sodium Restricted Diets, Fat Controlled Diets	1	15
	Instructional hours		15
V	Deficiency Disorders Prevalence, Causes, Symptoms and Prevention of PEM, Iron, Vitamin A and zinc deficiency disorders.	2	
	Instructional hours		15
Total Instructional hours			75

Text Books:

1. Srilakshmi, B. Dietetics New Age International P. Ltd., New Delhi, 2016.
2. Dietary Guidelines of Indians – A Manual, National Institute of Nutrition, Hyderabad, 2015.
3. Garg, M. Diet, Nutrition and Health, ABD Publishers, 2016.

Reference Books:

1. Krause, M.V. and Mahan, L.K. Food, Nutrition and Diet Therapy, 9th Ed., W.B. Saunders Company, Philadelphia, 2009.
2. Maimun Nisha, Diet Planning for Diseases, Kalpaz Publishers, 2016.

Journals

1. Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.
2. Proceedings of the Nutrition Society of India, Nutrition Society of India, Hyderabad.

Mapping

CO	PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1		H	M	H	L	L
CO2		H	M	H	L	L
CO3		M	H	L	M	M
CO4		H	H	H	L	L
CO5		H	L	H	L	L

H - High; M - Medium; L - Low

Tools for Internal Assessment (25 marks)

CIA I	CIA II	CIA III	Assignment	Case Study	Attendance	Total
5	5	6	3	3	3	25

Prepared By	Verified by	Checked By	Approved by

Course Code	Title		
20U3FSC410	Core Paper X – Bakery and Confectionery		
Semester : IV	Credits : 4	CIA : 25 Marks	ESE : 75 Marks

Objectives:

1. Understand the science in baking and confectionery products
2. Distinguish the techniques in different bakery product preparation

Course Outcomes:

CO1	Recall the chemical composition of wheat
CO2	Describe the role of different ingredients in baking and confectioneries
CO3	Demonstrate various methods of making bakery products
CO4	Evaluate the quality of bakery and confectionery products
CO5	Interpret the reason for faults in bakery products

Offered by: Department of Food Science and Nutrition

Course Content

Instructional Hours / Week : 5

Unit	Description	Text Book	Chapter
I	Wheat Processing History of baking, Structure and Composition of the Wheat Kernel, Steps in Wheat Milling, By products of wheat, Enrichment of Flour and Bread. Quality aspects of flour and dough	1,3	3,1
	Instructional Hours		15
II	Baking Principles of Baking, Classification of Baked Foods, Role of Ingredients –Water, Yeast, Sugar, Shortening, Milk, Egg, Butter, Salt, Leavening Agents, Spices, Flavorings, Fruits and Nuts, Food Colors, Setting Materials, Cocoa and Chocolate, emulsifiers, flour improvers, recipe balance, storage of baked products, selection of packaging materials	4,2,1	20,30
	Instructional Hours		15
III	Chemically leavened bakery products Cake Making – Functions of Ingredients Cake Mixing Methods, baking changes in cake, Types of Cakes, Cake Judging, Cake Faults and remedies Biscuit, Cookies, Types and techniques of icing, Frosting and fillings. Sensory evaluation of baked products- objective and subjective methods	4	26,27
	Instructional Hours		
IV	Yeast leavened bakery products and pastries Bread-Functions of ingredients, bread making methods, Baking changes in bread, types of bread, bread faults and remedies Pastries-Role of ingredients and types of pastries		
	Instructional Hours		15
V	Confectionery Processing of Raw Materials -Cocoa and Chocolate. Making of Toffee, Chocolates, Fruit Drops, Hard Boiled Candies (clear, hard, pulled, grained, filled), Soft candies (fondant, modified fondants like toffee, fudge, marshmallows, gums, jellies, chocolates) Bars, Chewing Gums, Special Confectionery Foods- tablets, Lozenges.	1,2	7, 263
	Instructional Hours		15
Total Instructional Hours			75

Text Books:

1. Dubey, S.C. (2012), Basic Baking IV Edition, The Society of Indian Bakers, New Delhi.
2. Bakers Handbook on Practical Baking (2008) Compiled and Published by US Wheat Associates, New Delhi.
3. NIR Board, The Complete Technology Book on Bakery Products, National Institute of Industrial Research, New Delhi (2010)
4. Yogambal Ashokkumar Textbook of Bakery and confectionery second edition PHI learning private limited New Delhi. 2012

Reference Books:

1. Fellows, J.P. (1998), Food Processing Technology – Principles and Practice, Ellis Horwood Limited, London.
2. Avantina Sharma, (2006), Text Book of Food Science and Technology, International Book Distributing Co., Chaman Studio Building, Charbagh, Lucknow, UP.

Journal

1. Journal of Food Science, open access journal

Mapping

CO	PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		L	M	L	H	H
CO2		L	L	M	H	H
CO3		L	L	M	H	H
CO4		L	M	L	H	H
CO5		M	M	L	H	M

H - High; M - Medium; L - Low

Tools for Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment	E-content development	Attendance	Total
5	5	6	3	3	3	25

Course Designed by	Verified by HOD	Checked by	Approved by

Course code	Title		
20U3FSC511	Core Paper XI – Post Harvest Technology and Food Preservation		
Semester : V	Credits : 4	CIA : 25 Marks	ESE : 75 Marks

Objective:

1. Learn the causative factors for post-harvest losses of foods
2. Acquire knowledge on food processing and preservation

Course Outcomes:

CO 1	Comprehend the significance of post- harvest technology
CO 2	Identify the causes of post-harvest loss of food
CO 3	Distinguish the principles of different preservation methods
CO 4	Apply appropriate methods to preserve foods
CO 5	Make use of permitted preservatives to produce safe food

Offered by: Dept. of Food Science and Nutrition

Course content

Hours of instruction/week : 5

Unit	Descriptions	Text Book	Chapter Number
I Introduction to Post harvest technology	Introduction to Post Harvest Technology - Definition, importance and problem encountered. Buffer stock – definition, quantity of stores available. Governmental measures to augment food production- need for food conservation. Food loss in the postharvest period, extent of losses, loss in the field, threshing yard, storage, marketing loss. Role of Post-Harvest Technology in combating malnutrition in India.	1,3	1, 1
Instructional hours			15
II Agents causing food loss and its Control	Agents Causing Food Losses - Physical agents, (moisture, temperature), Chemical losses, biological losses- insects- insects attacking food grains - types and life cycle, damage caused to food grains and detection of insect infestation, rats and rodents, birds, animals-Nature of damage, identification. Control of spoilage agent -Physical, chemical and biological	1, 3	1, 1
Instructional hours			15
III Food preservation	Introduction – Principles of food preservation Preservation using low temperature -Refrigeration, types of Freezing, Advantages. Difference between refrigeration and freezing, freeze drying and freeze concentrate, Steps involved in freezing common foods, spoilage Preservation by use of high temperature -Blanching, Pasteurisation, Sterilisation- definition, types and advantages. Canning- Steps in canning, types of cans, spoilage Drying and dehydration-Definition, sun drying, solar drying, mechanical drying, factors affecting drying, merits and demerits, Freeze drying, spray drying -mechanism and advantages, Merits and demerits	1,3	15, 16, 17
Instructional hours			15

IV Preservation by Using sugar and salt	1	15, 16
Principles involved in preservation of Sugar, Sugar Concentrates – Principles of Gel Formation Preparation of Jam, Jelly, Marmalades, sauce, squash, RTS, Preserves, Candied, Glazed, Crystallized Fruits Pickling – Principles Involved and Types of Pickles- Indian Pickles, Vinegar, Salt Preservation		
Instructional hours		15
V Preservation by chemicals and Fermentation	1	10
Chemical Preservatives – Definition, Role of Preservation, Classification, Permitted Preservatives, FPO Specification Definition, Types of Fermentation, Advantages Common Fermented Foods- Beer, Wine and Cheese Making		
Instructional hours		15
Total Instructional hours		75

Text Books:

1. Sivasankar, B. (2013) Food Processing and preservation 2nd edition, prentice Hall, Pvt, Ltd.
2. Srilakshmi, N., (2016) 6th Edition, Food Science, New Age International Private Ltd., New Delhi, 2002.
3. Swaminathan, M., Food Science, Chemistry and Experimental Foods, Bappco Publishers, Bangalore, 2014.

Reference Books:

1. Fellow, P., (2010) Food Processing Technology – Principles and Practices, 3rd Edition, CRC Press Woodland Publishers, England.
2. Chakravarthi, A., Mujumdar, A.S., Raghavan, G.S.V and ramasami, H. S. (2003) Handbook of Post Harvest Technology, Marcel Dekker Inc., New York.

Journal

3. Journal of food processing and preservation, IFST, Wiley online library

Mapping

CO	PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		L	L	L	H	H
CO2		L	L	L	H	M
CO3		M	M	L	H	H
CO4		L	L	L	H	H
CO5		L	M	M	H	H

H - High; M - Medium; L - Low

Tools for Internal Assessment (25 marks)

CIA I	CIA II	CIA III	Assignment	Model preparation	Attendance	Total
5	5	6	3	3	3	25

Prepared by	Verified by HoD	Checked By	Approved by

Course code	Title		
20U3FSC512	Core Paper XII – Public Health and Nutrition		
Semester : V	Credits : 4	CIA : 25 Marks	ESE : 75 Marks

Objectives:

1. Develop comprehensive skills in community nutrition
2. Provide knowledge on national and international organization and community nutritional programme

Course Outcomes:

CO 1	Exhibit comprehensive skills in public health nutrition
CO 2	Detect the public health issues through appropriate assessment methods
CO 3	Examine the signs and symptoms of communicable diseases
CO 4	Discuss the role of national and international agencies in combating malnutrition
CO 5	Evaluate the nutritional and health status of the community

Offered by: Dept. of Food Science and Nutrition

Course content

Hours of instruction/week : 5

Unit	Descriptions	Text Book	Chapter Number
I	Introduction to Public Health Nutrition Definition of community, public health nutrition, public health nutrition cycle, nutritional status of community. Public health nutrition and national development, assessment of public health and nutritional status of the community	4,1	1, 1
Instructional hours			15
II	Assessment of Community Health and Nutritional Status Direct parameters - Anthropometry, biochemical, clinical and dietary methods – definition, instruments and tools, standard of reference and measurement techniques Indirect parameters – vital statistics, health indicators, socio-economic indices, KAP, ecological factors	1	22
Instructional hours			15
III	Epidemiology in Public Health Introduction and definition of epidemiology, role of epidemiology in public health, Epidemiology of communicable diseases-causes, signs, symptoms, treatment and prevention- respiratory, intestinal and other infections Immunization-types of immunity, immunization agents, schedules National and International programmes on immunization	4	26
Instructional hours			15
IV	Nutrition Policy and Programs Nutrition policy and programs- National nutritional policy- National nutrition mission, Poshan abiyon, Integrated child development scheme (ICDS), Midday Meal Program, National programs for the prevention of anemia, Vitamin A deficiency, Iodine deficiency disorders.	1,3	22
Instructional hours			15

IV	National and International Agencies National and International Agencies in combating malnutrition- National Organization- Role of ICAR, ICMR, NIN, FNB, CFTRI, and NNMB International organization- WHO, FAO, UNICEF, Health Care-PhC, ESI	1, 3	23
Instructional hours			15
Total Instructional hours			75

Text books:

1. Nutrition Science, B.Srilakshmi (2001), new age international publishers.
2. Text book of community nutrition, Suryatapa Das (2014), Academic publishers
3. Park.A.(2007), Park's Text book of Preventive and Social Medicine XIX Edition M/S Banarasidas, Bharath Publishers, 1167, Prem Nagar, Jabalpur, 428001(India)
4. Gibney MJ, Margetts BM, Kearney JM, Arab L (2004) Public Health Nutrition Blackwell Publishing Co. UK

Reference Books:

1. Jelliffe DN, Assessment of Nutritional Status of the community
2. Nutrition News-NIN.
3. Bamji. M.S, Prahlad Rao N, Reddy. V (2004). Text Book of Human Nutrition, II Edition, oxford and PBH Publishing Co. Pvt. Ltd, New Delhi
4. Brahman, G.N.V., Lakshmaiah, A., Rao, M. and Reddy, G. (2005) Methodology on Assessment of Diet and nutritional Status of Community, National Institute of nutrition, Hyderabad.

Journal

1. Indian Journal of Community Health (IJCH), National Publication of Indian Association of Preventive and Social Medicine (IAPSM).

Mapping

CO	PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1		L	H	M	L	L
CO2		H	H	H	M	L
CO3		H	H	H	L	M
CO4		L	H	M	M	L
CO5		M	H	M	M	L

H - High; M - Medium; L - Low

Tools for Internal Assessment (25 Marks)

CIA I	CIA II	CIA III	Assignment	Mini survey	Attendance	Total
5	5	6	3	3	3	25

Prepared By	Verified by	Checked By	Approved by

Course code	Title		
20U3FSC513	Core Paper XIII – Clinical Nutrition and Dietetics II		
Semester : V	Credits : 4	CIA : 25 Marks	ESE : 75 Marks

Objectives:

- 1.Learn about the causes, symptoms and treatment of various disease conditions
- 2.Develop skills in planning therapeutic diets for various disease conditions.

Course Outcomes:

CO 1	State the role of nutrients in disease conditions
CO 2	Identify the causes of signs and symptoms
CO 3	Detect the severity of disease condition
CO 4	Determine the requirements of nutrients during specific disease condition
CO 5	Modify the individual diet with appropriate therapeutic diets

Offered by: Dept. of Food Science and Nutrition

Course content

Hours of instruction/week : 5

Unit	Descriptions	Text Book	Chapter Number
I	Gastro Intestinal Disorders: Diseases of Gastrointestinal Tract-Peptic Ulcer, Etiology, Clinical Symptoms, Diagnosis, Treatment by Drugs and Diet Modifications Diarrhea, Dysentery, Constipation, Etiology and Diet Modifications	3	1
Instructional hours			15
II	Diseases of the liver: Functions of Liver Damages Caused, Clinical Symptoms of Jaundice, Hepatitis Cirrhosis, Hepatic Coma Diet Modifications	2	2,3,4
Instructional hours			15
III	Kidney Diseases: Outline of Contamination- Spoilage and Preservation of Vegetables and Fruits, Milk and Milk Products and Canned Foods, Meat and Meat Products, Egg and Poultry. Outline of Contamination- Spoilage and Preservation of Cereal and Cereal Products and Sugar and Sugar Products		8
Instructional hours			15
IV	Fevers and Food Allergy: Fever -Causes, Types, Metabolic Changes, Diet Modifications for Typhoid, Tuberculosis, Malaria, Pneumonia, Influenza Food Allergy - Definition, Causes, Science And Symptoms Types of Allergy, Diagnosis, Dietary Modifications.	1	5,6,9
Instructional hours			15
V	Nutrition in Cancer and HIV: Cancer- Etiology of Cancer, Types of Cancer, Goals of Nutritional Care, Dietary Recommendation for Cancer Survivors. Nutritional therapy for Cancer HIV- Definition- HIV and AIDS, Causes, Stages of HIV infection, Opportunistic Infections in HIV /AIDS, Treatment, Relationship between Nutrition and AIDS, Nutritional Management in HIV/AIDS	1	7
Instructional hours			15
Total Instructional hours			75

Text Books:

1. Srilakshmi, V. Dietetics New Age International P. Ltd., New Delhi, 2011.
2. Dietary Guidelines of Indians – A Manual, National Institute of Nutrition, Hyderabad, 2011.
3. Garg, M. Diet, Nutrition and Health, ABD Publishers, 2016.

Reference books:

1. Krause, M.V. and Mahan, L.K. Food, Nutrition and Diet Therapy, 9th Ed., W.B.Saunders Company, Philadelphia, 2009.
2. Maimun Nisha, Diet Planning for Diseases, Kalpaz Publishers, 2016

Mapping

CO	PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1		L	H	M	M	L
CO2		H	H	H	L	M
CO3		H	H	H	L	L
CO4		L	H	M	M	L
CO5		M	H	M	L	M

H - High; M - Medium; L – Low

Tools for Internal Assessment (25 marks)

CIA I	CIA II	CIA III	Assignment	Case Study	Attendance	Total
5	5	6	3	3	3	25

Prepared by	Verified by	Checked by	Approved by

Course code	Title		
20U3FSC514	Core Paper XIV – Fundamentals of Food Microbiology		
Semester : V	Credits : 4	CIA : 25 Marks	ESE : 75 Marks

Objectives:

1. Provide knowledge of microorganisms associated with food spoilage and food borne diseases
2. Determine the presence, growth and survival of microorganism in food

Course Outcomes:

CO 1	Recall different terminology related to microorganism
CO 2	Outline the factors responsible for the microbial growth
CO 3	Identify the common pathogens and its spoilage in foods
CO 4	Make use of beneficial microbes for food formulation
CO 5	Evaluate the symptoms of food borne infections

Offered by: Dept. of Food Science and Nutrition

Course content

Hours of instruction/week: 5

Unit	Descriptions	Text Book	Chapter Number
I	Introduction to Microbiology Different terminology – Heterotrophic nutrition, autotrophic nutrition, saprophytic, holozoic, host, culture, parasite. General principles underlying spoilage-causes for spoilage, factors affecting kinds and number of microorganisms in food. Prevention and control of spoilage. Food poisoning, and food borne diseases.	3, 1	9, 1
Instructional hours			15
II	Morphology of Micro-organisms Bacteria and Mold- Nomenclature, genera of bacteria and mold, morphology, growth curve, importance in food microbiology. Yeast - Morphology, classification, importance of yeast in food, Observation of yeast cells. Algae – Morphology and importance of algae, Definition and History: Microscopy, Light, electron and other types of Microscopy	1	1
Instructional hours			15
III	Microbiology of Perishable and Non-Perishable Foods Outline on spoilage and preservation of Vegetables and Fruits, Milk and Milk Products, Meat and Meat Products, Egg and Poultry. Outline of Spoilage and Preservation of Cereal and Cereal Products and Sugar and Sugar Products		
Instructional hours			15
IV	Beneficial Effects of Microorganisms Introduction to beneficial microorganism-Fermented Foods – Curd, Cheese, Sauerkraut, Meat, Soy Based Foods, Alcoholic Beverages and Vinegar, Microbial Biomass	3	12
Instructional hours			15

V	Food Intoxication and Food Infection	3	12
	Food Borne Diseases – Classification- Intoxication – Botulism and Staphylococcal intoxication- Infection – Salmonellosis, Clostridium Perfringens illness, Bacillus cereus, Ecoli, Shigellosis, Yersinia and Streptococcus faecalis – Foods involved, Diseases outbreak, Preventive and control measures		
	Instructional hours		15
	Total Instructional hours		75

Text Books:

1. M.R. Adams and M.O. Moss, Food Microbiology, New Age International (P) Ltd., New Delhi, 2005.
2. Vijaya Ramesh, K. Food Microbiology, MJP Publishers, Chennai, 2007
3. Sivasankar, B. (2013) Food Processing and preservation 2nd edition, prentice Hall, Pvt, Ltd.

Reference books:

1. James G. Cappuccino and Natalie Sherman, Microbiology – A Laboratory Manual, Pearson Education Publishers, USA, 2008.
2. James M. Jay Modern Food Microbiology, Fourth Edition, CBS Publishers and Distributors, New Delhi, 2005.
3. Adams Tamine, Probiotic Dairy Products, Blackwell Publishing, USA, 2005.

Reference Journal:

1. International Committee on Food Microbiology and Hygiene (ICFMH) of the IUMS, ISSN: 0168-1605, 2021 Elsevier B.V.
2. International Journal of Food Microbiology, ISSN: 0168-1605, 2021 Elsevier B.V.
3. Journal of Food Safety, ISSN:1745-4565, Wiley Periodicals, LLC

CO	PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1		M	M	H	H	M
CO2		L	L	L	H	H
CO3		L	M	H	H	M
CO4		M	L	M	H	M
CO5		L	M	L	M	M

Tools for Internal Assessment (25 marks)

CIA I	CIA II	CIA III	Assignment	Mini project	Attendance	Total
5	5	6	3	3	3	25

Prepared By	Verified by	Checked By	Approved by

Course code	Title		
20U3FSP515	Core Paper XV- Dietetics Practical		
Semester : V	Credits : 2	CIA : 20 Marks	ESE: 30 Marks

Objectives:

1. Gain knowledge about principles of diet therapy and different therapeutic diets.
2. Develop aptitude for taking up dietetics as a profession.

Course outcomes:

CO1	Recall the principles of diet planning for normal and disease conditions
CO2	Identify right food choices to plan menu
CO3	Assess the nutritional and health status of individual
CO4	Demonstrate diet planning for different health conditions
CO5	Evaluate the nutrient content of prepared diet

Offered by: Dept. of Food Science and Nutrition

Course content

Hours of instruction/week : 3

Unit	Descriptions
1	Weights and measures of foods.
2	Menu planning, prescription and preparation of <ol style="list-style-type: none"> a. Normal diet, regular diet, light diet, soft diet, full liquid diet, clear liquid diet & bland diet. b. Diet for obesity c. Diet for underweight d. Diet for anaemia e. Diet for diseases of the GI tract – peptic ulcer, diarrhoea, constipation. f. Diet for Cardio-vascular diseases- atherosclerosis, hypertension. g. Diet for diseases of the kidney – nephritic and nephrotic syndrome. Diet before & after dialysis. h. Diet for diabetes – Type I & II, Diabetes with CVD disease. i. Diet in febrile conditions- Short duration – typhoid; long duration – tuberculosis j. Diet in liver diseases – Viral hepatitis and cirrhosis
3	Observation of a dietary department in a hospital.
Total Instructional hours 45	

Mapping

CO	PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1		M	H	M	L	M
CO2		M	H	H	L	L
CO3		M	H	H	M	M
CO4		M	H	H	L	L
CO5		M	H	H	L	M

H - High; M - Medium; L - Low

Tools for Assessment (20 Marks)

Test I	Test II	Observation note book	Attendance	Lab Performance	Lab results	Total
4	4	3	3	3	3	20

Prepared By	Verified by	Checked By	Approved by

Course code	Title	
20U4FSS503	Skill Based Paper III- Mini Project	
Semester : V	Credits : 1	CIA: 25 Marks

Objectives:

1. Apply and explore the theory concepts
2. Develop hands on skills on core paper concepts

Course Outcomes:

CO1	Recite the composition of food groups
CO2	Relate the nutritional requirements and health
CO3	Identify the nutritional status of the individual
CO4	Determine the appropriate food processing method
CO5	Plan and evaluate the adequacy of nutrients in food

Offered by: Dept. of Food Science and Nutrition

Hours of instruction/week : 3

Students will develop new products/optimisation of product/characterisation of product/survey in hospital/industry/research institute/on campus

Project work & Viva Voce	
CONTENTS	
I. INTRODUCTION	
II. REVIEW OF LITERATURE	
III. METHODOLOGY	
IV. RESULTS AND DISCUSSION	
V. SUMMARY	
BIBLIOGRAPHY	
APPENDICES	
Viva Voce	
Viva-Voce will be conducted at the end of the semester by both Internal (Respective Guides) and Head of the Department, after duly verifying the Project Report available in the College, for a total of 25 marks at the last day of the viva voce session.	
Total Instructional Hours	45

Mapping

PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO					
CO1	H	H	M	M	M
CO2	H	H	M	M	M
CO3	H	H	H	H	H
CO4	H	H	H	L	L
CO5	H	H	M	M	M

H - High; M - Medium; L - Low

Tools for Assessment (25 Marks)

Review I	Review II	Review III	Document preparation and presentation	Total
5	5	5	10	25

Prepared By	Verified by	Checked By	Approved by

Course code	Title	
20U4FST501	Internship	
Semester : V	Credits : 1	CIA : 25 Marks

Objectives:

1. Apply and explore the theory concepts
2. Develop hands on skills on core paper concepts

Course Outcomes:

CO1	Recite the composition of food groups
CO2	Relate the nutritional requirements and health
CO3	Analyse the nutritional status of the individual
CO4	Determine the appropriate food processing method
CO5	Plan and evaluate the adequacy of nutrients in food

Offered by: Dept. of Food Science and Nutrition

Course content

Project & Viva Voce

15 days internship in Multispecialty Hospital/ Food Industry/Food R & D after 4th semester during semester break/ Report and Viva

Viva Voce

Department level Viva-Voce will be conducted at the end of the semester by both Internal (Respective Guides) and Head of the Department, after duly verifying the Internship Report available in the College, for a total of 25 marks at the last day of the viva voce session.

Mapping

CO	PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1		H	H	M	M	M
CO2		H	H	M	M	M
CO3		H	H	H	H	H
CO4		H	H	H	L	L
CO5		H	H	M	M	M

H - High; M - Medium; L - Low

Tools for Assessment (25 Marks)

Review I	Review II	Review III	Document preparation and presentation	Total
5	5	5	10	25

Prepared by	Verified by HoD	Checked By	Approved by

Course code	Title		
20U3FSC616	Core Paper XVI – Food Biotechnology		
Semester : VI	Credits : 4	CIA : 25 Marks	ESE: 75 Marks

Objectives:

1. Develop basic knowledge in food biotechnology
2. Enable learners to understand the concept of genetic engineering and its applications

Course Outcomes:

CO 1	Express the meanings of biotechnology terms
CO 2	Comprehend the applications of biotechnology in different fields
CO 3	Categorize the application of microbes in industry
CO 4	Identify the tools of genetic engineering
CO 5	Enumerate the application of genetic engineering in plant tissue culture

Offered by: Dept. of Food Science and Nutrition

Course content**Hours of instruction/week: 5**

Unit	Descriptions	Text book	Chapter Number
I	Basics of Biotechnology Biotechnology definition, history of biotechnology, traditional biotechnology, modern biotechnology, biotechnology is an interdisciplinary area, current excitement of biotechnology (healthcare, genome, agriculture, and environment). Enzyme Biotechnology Soluble enzymes, immobilization of enzymes – methods of immobilization, role of enzymes in food industry, safety assessment of transgenic crops	1, 2	1, 3
Instructional hours			15
II	Fermentation Biotechnology General structure of bioreactors and listing types, bacterial growth curve, batch and continuous culture, environmental factors, basic concepts of downstream processing, definition of biochips and biosensors	1	16
Instructional hours			15
III	Use of Microbes in Food Industry Primary metabolites, secondary metabolites, synthesis of citric acid, glutamate, xanthan gum, vitamin B12, riboflavin and Single Cell Protein – spirulina and yeast biomass	2	17
Instructional hours			15
IV	Introduction and Tools of Genetic Engineering Definition, enzymes as tools - exonucleases, endonucleases, ligases, reverse transcriptase and alkaline phosphatase, cloning vectors-plasmids, bacteriophage, cosmids and phasmids	1	4
Instructional hours			15

V	Genetic Engineering and Plant Tissue Culture	1	13
	Outline of genetic engineering in prokaryotes (microbial cells), concepts of molecular cloning, plant tissue culture, micro propagation, transgenic plants, genetically modified foods-golden rice, flavrsavr tomato and Btbrinjal; enlisting applications of genetic engineering		
	Instructional hours		15
	Total Instructional hours		75

Text Books:

1. Dubey, R.C., 1996, A Text Book of Biotechnology, S. Chand and Company Ltd., NewDelhi.
2. Anthony Pometto, Kalidas Shetty, Gopinadhan Paliyath Food Biotechnology, Taylor &Francis 2005
3. Application of Biotechnology to Traditional Fermented Foods, 1992, Published by NationalAcademy Press, Washington, DC.

Reference Books:

1. Dietrich Knorr, 2017, Food Biotechnology, Marcel Dekker Inc., New York.
2. Green, P.J., 2010, Introduction to Food Biotechnology, CRC Press, USA.
3. Owen, P. Ward, 2018, Fermentation Biotechnology, Principles, Processes and Products,Prentice Hall, Advanced Reference Series, New Jersey, 07632.

Journals

1. Journal of food biotechnology research, open access journal, <http://www.imedpub.com/journal-food-biotechnology-research>

Mapping

CO	PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1		L	M	L	M	M
CO2		H	H	M	M	H
CO3		H	H	L	M	H
CO4		H	H	L	H	H
CO5		L		L	H	H

H - High; M - Medium; L – Low

Tools for Internal Assessment (25 marks)

CIA I	CIA II	CIA III	Assignment	Group activity	Attendance	Total
5	5	6	3	3	3	25

Prepared By	Verified by	Checked By	Approved by

Course Code	Title		
20U3FSC617	Core Paper XVII - Nutraceuticals and Nutrigenomics		
Semester : VI	Credits : 4	CIA : 25 Marks	ESE : 75 Marks

Objectives

1. Gain knowledge on functional foods, nutraceuticals and nutrigenomics
2. Know the applications of nutrigenomics in wellness and disease management

Course Outcomes

CO1	Recall and define the term nutraceuticals and functional foods
CO2	Classify the role of phytochemicals in disease management
CO3	Identify the importance of microbial biota in human gut health
CO4	The inference of concept behind nutrigenomics
CO5	Evaluate gene and nutrient interaction concept in personalized nutrition

Offered by: Department of Food Science and Nutrition

Course Content

Instructional Hours / Week : 5

Unit	Description	Text Book	Chapter
I	Nutraceuticals and Functional foods Definition of Nutraceuticals, functional foods, Dietary supplements, designer foods and pharma foods, Classification of functional and nutraceuticals, Historical perspective, scope & future prospects	1	2,4
Instructional Hours			15
II	Naturally occurring phytochemicals in Health and Disease Phytochemicals in management of diseases and disorders - Antioxidants and flavonoids, omega – 3 fatty acids, carotenoids, dietary fiber, phytoestrogens Regulatory issues.	1	1
Instructional Hours			15
III	Probiotics, Prebiotics and symbiotic Human gastrointestinal tract and its microbiota, functions, concept of probiotic, prebiotics and symbiotics, Types, Usefulness in gastro intestinal health and other health benefits, Regulatory issues	1	16
Instructional Hours			15
IV	Nutrigenomics Definition of nutrigenomics, gene expression – transcription, translation, post translational modification, nutrition in the omics era- elementary concepts on epigenetics, transcriptomics, proteomics, metabolomics; genetic variation and nutritional implications	1	8,12
Instructional Hours			15
V	Gene diet interaction Transporter gene polymorphisms -interaction with effects of nutrients in humans, basic concepts of modulating effect of nutrigenomics in complex diseases – diabetes, cardiovascular disease, cancer and obesity, personalised nutrition	1	12,15
Instructional Hours			15
Total Hours			75

Text Books:

1. Yashwant V. Pathak, Ali M. Ardekani, Nutrigenomics and Nutraceuticals Clinical Relevance and Disease Prevention, 2018
2. Yongping Bao, Roger Fenwick, Phytochemicals in Health and Disease, by CRC Press, 2019

Reference Books:

1. <https://www.intechopen.com/books/phytochemicals-source-of-antioxidants-and-role-in-disease-prevention/introductory-chapter-phytochemicals-and-disease-prevention>
2. Raffaele Caterina Alfredo Martinez Martin Kohlmeier, Principles of Nutrigenetics and Nutrigenomics, Academic Press, (2019)

Journal

1. Journal of functional food in health and disease, ISSN 2160-3855, Functional Food Institute, USA
2. Journal of Food Science and Technology, ISSN 0975-8402, Springer

Mapping

CO	PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		H	H	M	L	H
CO2		H	H	M	M	L
CO3		M	L	L	H	H
CO4		H	M	H	M	L
CO5		H	M	L	L	H

H - High; M - Medium; L - Low

Tools for Internal Assessment (25 marks)

CIA I	CIA II	CIA III	Assignment	Case study	Attendance	Total
5	5	6	3	3	3	25

Course Designed by	Verified by HOD	Checked by	Approved by

Course code	Title		
20U3FSC618	Core Paper XVIII - Food Quality Analysis Techniques		
Semester : VI	Credits : 4	CIA : 25 Marks	ESE : 75 Marks

Objectives:

1. Provide knowledge on the Food quality parameters
2. Inbuilt skills on various food quality analysis techniques

Course Outcomes:

CO 1	Recall the basic quality parameters of food
CO 2	Apply standard procedure for nutrient analysis
CO 3	Identify the principles of different technologies
CO 4	Choose relevant techniques for different parameters
CO 5	Evaluate and interpret the food qualities

Offered by: Dept. of Food Science and Nutrition

Course content

Hours of instruction/week : 5

Unit	Descriptions	Text Book	Chapter Number
I	Introduction to food quality analysis Importance and Scope of Food Analysis and Quality Control, Food Analysis – Need and importance, Food Safety, Types of Samples, Analysed in a Quality Assurance Program for Food Products, Regulations, Nutritional labelling	1	1
Instructional hours			15
II	Determination of nutrients Determination of Total fat in foods by different methods, Analysis of oils and fats for physical and chemical parameters, Quality standards, and adulterants, different methods of determination of protein and amino acids in foods, determination of total carbohydrates, starch, disaccharides and simple sugars in foods.	1	2
Instructional hours			15
III	Spectroscopic Techniques Basic Principles- Spectrophotometric analysis of food additives and food Components -IR Spectroscopy in online determination of components in foods; AAS and ICP-AES in mineral elements and toxic metals analysis; use of fluorimeter in vitamin assay- specific use of Tintometer in vanaspathi analysis.	1	9,10
Instructional hours			15
IV	Chromatographic Techniques- Basic principles and types – Paper chromatography, thin layer column chromatography, Ion exchange chromatography, HPTLC, HPLC, UHPLC, GC,GC-MS, Types of detectors ,Uses and applications of chromatographic techniques	1	20,21,22,23
Instructional hours			15

V Electrophoresis	1	15,16
Basic Principles, application of electrophoresis in food analysis, refractive indices of oils and fats, total soluble solids in fruit juice and honey, specific rotation of sugars, estimation of simple sugars and disaccharides by polarimeter; Immunoassay techniques and its applications in foods		
Instructional hours		15
Total Instructional hours		75

Text Books

1. Pomeranz, Y. and MeLoan, C.E. (1996): Food Analysis: Theory and Practice; 3rd Edition, CBS Publishers and Distributors, New Delhi.
2. Fung, D.Y.C. and Matthews, R. (1991): Instrumental Methods for Quality Assurance in Foods, Marcel Dekker, Inc. New York.

Reference Books:

1. Skoog, D.A., Holler, F.H. and Nieman (1998): Principles of Instrumental Analysis Saunders College Publishing, Philadelphia
2. Gruenwedel, D.W.; Whitaker, J.R. (editors) (1984): Food Analysis Principles and techniques, Volumes 1 to 8, Marcel Dekker, Inc., New York.
3. Herschdoerfer, S.M. (Ed) (1968 – 1987): Quality Control in the Food Industry, Vols. 1 to Academic Press, London.
4. Wilson and John Walker, Principles and Techniques of Biochemistry and Molecular Biology (2010), Keith Wilson and John Walker, Cambridge University Press.

Mapping

CO	PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1		L	M	M	M	H
CO2		M	M	L	H	H
CO3		M	L	M	H	H
CO4		L	L	L	H	H
CO5		L	L	M	H	H

H - High; M - Medium; L - Low

Tools for Internal Assessment (25 marks)

CIA I	CIA II	CIA III	Assignment	Market survey	Attendance	Total
5	5	6	3	3	3	25

Prepared By	Verified by	Checked By	Approved by

Course code	Title		
20U3FSP619	Core Paper XIX Food Preservation and Quality Analysis – Practical		
Semester : VI	Credits : 2	CIA : 20 Marks	ESE : 30 Marks

Objectives:

1. Learn the different food processing techniques
2. Acquire knowledge on food product development

Course Outcomes:

CO1	Relate the food processing theory with practical
CO2	Demonstrate different food processing techniques
CO3	Apply relevant technology to develop innovative foods
CO4	Exhibit professional skills in processing of food
CO5	Analyze the safety and quality of processed foods

Offered by: Dept. of Food Science and Nutrition

Course content

Hours of instruction / week : 4

1. Blanching of fruits and vegetables	
2. Jam preparation	
3. Squash preparation	
4. Jelly preparation	
5. Toffee preparation	
6. Squash preparation	
7. Pickles preparation	
8. Fermented food products	
9. Moisture content of food sample	
10. pH of food sample	
11. Total solid content in jam	
12. Ash content	
Total instructional hours	60

Mapping

CO	PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1		L	M	H	M	H
CO2		M	M	H	M	H
CO3		L	L	H	M	H
CO4		L	L	H	H	H
CO5		M	M	H	H	H

H - High; M - Medium; L – Low

Tools for Assessment (20 Marks)

Test I	Test II	Observation note book	Attendance	Lab Performance	Lab results	Total
4	4	3	3	3	3	20

Prepared by	Verified by HoD	Checked By	Approved by

Course code	Title		
20U4FSS604	Skill Based Paper IV Computer Application in Food Science and Nutrition – Practical		
Semester : VI	Credits : 2	CIA : 20 Marks	ESE : 30 Marks

Objectives:

1. Gain knowledge on computer operations and applications
2. Inbuilt skills to use existing health and nutrition based software.

Course outcomes:

CO1	Recall the coding, entry of data in MS office.
CO2	Prepare various types of AV aids using computers
CO3	Evaluate mean, median, mode, standard deviation, correlation
CO4	Prepare graphical presentation of data using MS Office
CO5	Exhibit skills in preparation of academic presentations

Offered by: Dept. of Food Science and Nutrition**Course content****Hours of instruction / week : 3**

<ol style="list-style-type: none"> 1. MS Office -MS Word, MS excel, MS Power point 2. Basics of Adobe photo shop, Corel draw, Adobe flash 3. Preparation of Visual Aids for a Health Education programme. 4. Preparation of video 5. Calculation of Mean. 6. Calculation of Median. 7. Calculation of Mode. 8. Calculation of Standard Deviation. 9. Determination of Correlation between the given set of data. 10. Graphical presentation of Data. 	
Total Instructional Hours	45

Mapping

CO	PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1		L	M	H	M	M
CO2		M	H	M	M	L
CO3		M	H	H	L	L
CO4		L	H	H	M	L
CO5		M	M	H	H	M

H - High; M - Medium; L - Low

Tools for Assessment (20 Marks)

Test I	Test II	Observation note book	Attendance	Lab Performance	Mini project	Total
4	4	3	3	3	3	20

Prepared By	Verified by	Checked By	Approved by

Course code	Title		
20U3FSE501	Elective I (A) – Food Safety, Sanitation and Hygiene		
Semester : V	Credits : 3	CIA : 20 Marks	ESE : 55 Marks

Objectives:

1. Keep pace with food safety standards both at national and international level
2. Study the importance of cleaning and sanitation in food establishments

Course Outcomes:

CO 1	State the National and International programmes and laws on food safety and standards
CO 2	Recognize the role of food handlers, food safety officers and health personnel
CO 3	Master the standards followed for food safety
CO 4	Demonstrate the importance of personnel and environmental hygiene
CO 5	Examine the food quality and hygiene of food establishments

Offered by: Dept. of Food Science and Nutrition**Course content****Hours of instruction/week : 4**

Unit	Descriptions	Text Book	Chapter Number
I	Introduction to Food Safety and Adulteration Food Safety - definition of food safety and food spoilage, factors affecting food safety and food spoilage: GMP, GAP, SSOP, GHP Food adulteration - definition, types of adulteration in various foods- intentional, incidental and metallic contaminants	2	4, 6
Instructional hours			12
II	Food Laws and Regulations National Legislation – Essential Commodities Act, Standard of Weight and Measures Act, ISI, Mark of BIS, Agmark and PFA, FPO, Food Safety and Standards Bill 2005, International Laws and Agreements - FAO, WHO, Codex Alimentarius, WTO, JECFA, APEDA, ISO 22000 series, Hazard Analysis Critical Control Point (HACCP): principles of HAACP, applications of HACCP	4	8,12
Instructional hours			12
III	Current Food Safety Standards in India Current Food Safety regulations 2001, Food Safety and Standards Authority of India-act, rules and regulations, objectives of developing food safety standards, enforcement of structure and procedure, role of food analyst, safety analysis, action by designated officer and report of food analyst	3	1,8
Instructional hours			12
IV	Sanitation Procedures Cleaning and sanitizing- need for efficient cleaning program, cleaning agents, equipments, methods to wash, rinse and sanitising food contact surfaces. Importance and methods of pest control; outlining methods of disposal of liquid, solid and gaseous waste	2	9, 32
Instructional hours			12

V	Importance of Personal hygiene of Food Handlers General principles of hygiene – personal and environmental hygiene, hygienic practices in handling and serving foods, planning and implementation of training programme for health personnel	3	3,9
Instructional hours			12
Total Instructional hours			60

Text Books:

1. Frazier. W., Food Microbiology, McGraw-Hill co Ltd, New Delhi.2015
2. Adams M,R and Moss M,O., Food Microbiology, New Age International (P) Ltd., New Delhi, 2015.
3. Vijaya Ramesh, Food Microbiology, MJP Publications, 2007.
4. David, A. Shapton, and Naroh F. Shapton (2011) Principles and Practices for the Safe Processing of Foods, Heineman Ltd., Oxford.

Reference Books:

1. Recommended International Code of Practice – General Principles of Food Hygiene, CAC/RCP/. Rev.3. Amd. (2012)
2. Instruction Manual – Part I and II – (Methods for detection of Adulterants), (2012), Food Safety and Standards Authority of India (FSSAI), FDA Bhavan, Kotla Road, New Delhi- 110002, India

Reference Journals:

1. Journal of Food Safety and Hygiene
2. Journal of Food: Microbiology, Safety & Hygiene
3. Journal of Food Safety

Mapping

CO	PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1		L	M	M	H	H
CO2		L	L	M	H	M
CO3		M	L	L	H	H
CO4		L	M	M	H	M
CO5		L	L	H	H	H

H - High; M - Medium; L - Low

Tools for Internal Assessment (20 marks)

CIA I	CIA II	CIA III	Assignment	Product survey	Attendance	Total
4	4	5	2	2	3	20

Prepared By	Verified by	Checked By	Approved by

Course code	Title		
20U3FSE502	Elective I (B) – Food Laws and Standards		
Semester : V	Credits : 3	CIA : 20 Marks	ESE: 55 Marks

Objectives:

1. Learn about the various food laws and regime related to food
2. Gain knowledge on food safety, processing and preservation techniques of food

Course Outcomes:

CO1	Recall on food laws and its standards
CO2	Understand the various food regulations and food Safety
CO3	Analyse on Food hazards and Food borne illness
CO4	Summarize on Food Safety and Quality
CO5	Explain about food processing and preservation techniques

Offered by Food Science and Nutrition

Hours of instructions / week: 4

Course Content

Unit	Description	Text Books	Chapter
I	Food Laws and Standards – Introduction and scope of food laws and standards	1	2
Instructional Hours			12
	Indian Food Regulatory Regime- Ertstwhile prevention of Food Adulteration Act and Rules, Essential Commodities Act, Food Safety Regulations and Rules, Sanitary and Hygienic requirement, Safety and Quality requirements for specific products (Milk and Milk products/Meat products), Packaging and Labelling, Food safety and quality requirements: HACCP, ISO AND BRC	1	5,7
Instructional Hours			12
III	Understanding food hazard, food borne illnesses, water and sanitation, GHP, GAP, HACCP, food allergies, Food Adulteration/ Food Contamination, Food Nutrition and Food Consciousness, Supplementation, Fortification, Bio-fortification, Genetically Modified Foods, Poor Diet and consequences: Stunting, wasting & anaemia, Life style diseases, Food testing and rapid detection methods, Accuracy and Precision in food testing.	1	8
Instructional Hours			12
IV	Food Safety and Quality: GMP, Auditing and inspections, Food Surveillance, Risk Analysis: Risk Assessment, Risk Communication and Management, Traceability and Recall of Food Products, Popular global cases of recall, Quality control of food at all stages of processing, Safety issues in food packaging materials, Sampling from a lot or process line, Non-destructive food quality evaluation methods, Safety issues of processed foods available in market, Global trends in Food Safety Assurance: Codex, US Food and Drug Administration and Food Safety at European Union, Harmonization of Food Safety Regulations	1	10
Instructional Hours			12

V	Food Processing and Preservation: Basic principles and methods of Food Preservation: Heat processing, pasteurization, canning, dehydration, freezing, freeze drying, fermentation, microwave, irradiation and chemical additives. Refrigerated and modified atmosphere storage. Aseptic preservation, hurdle technology, alternate-thermal technologies and non thermal processing, New/Novel food additives and preservatives. Safety issues of processed foods available in market.	2	4,5,6
Instructional Hours			12
Total instructional hours			60

Text & Reference Books

1. Food Safety and Standards Act 2006 and Regulations 2011.
2. Fellows. P, 2009, Food processing technology, Woodhead publishing
3. <https://www.fssai.gov.in/home>
4. Codex e-Learning Centre (http://www.fao.org/ag/agn/agns/capacity_elearning_codex_en.asp) Custom Act

Mapping

CO	PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		L	L	L	H	H
CO2		M	L	L	H	H
CO3		H	M	M	H	H
CO4		M	H	L	H	H
CO5		L	M	L	H	H

H - High; M - Medium; L - Low

Tools for Assessment (20 Marks)

CIA I	CIA II	CIA III	Assignment	Designing food package	Attendance	Total
4	4	5	2	2	3	20

Course Designed by	Verified by HOD	Checked by	Approved by

Course code	Title		
20U3FSE503	Elective I (C) – Food Additives		
Semester : V	Credits : 3	CIA : 20 Marks	ESE : 55 Marks

Objectives:

1. Learn about the preservatives and its applications
2. Gain knowledge on sweeteners and emulsifiers

Course Outcomes:

CO 1	To understand the principles of chemical preservation of foods
CO 2	To analyze on acidity regulators and preservatives
CO 3	To know about the emulsifiers and thickeners
CO 4	To gain knowledge on color and artificial sweeteners
CO 5	To learn about other laws and standards related to food

Offered by Food Science and Nutrition

Hours of instructions / week: 4

Course content

Unit	Description	Text books	Chapter
I	Indian Food Regulatory Regime - PFA Act and Rules, Food Safety and Quality Requirements, Food Safety and Standards Act, 2006 and Supplementary Material, Essential Commodities Act, 1955	1	2
Instructional Hours			12
II	Acidity Regulators and Preservatives - Acidity Regulators – definition, chemical structure, role and importance, pH modulation and taste, acidity profile, permitted acidity regulators, levels of usage and food applications. Preservatives of chemical and microbial origin; mode of action on spoilage organisms and pathogens, factors affecting the performance of preservatives, active forms of preservatives, necessity in a food and levels of usage; permitted preservatives and food applications.	1	4
Instructional Hours			12
III	Emulsifiers, Stabilizers and Thickeners - Emulsion, surfacetension, oil in water and water in oil emulsion, Hydrophilic and Lipophilic balance(HLB), role of emulsifiers, different classes of emulsifiers and their chemical structure, their HLB values and role in emulsion stabilization; role of different stabilizers and other substances in emulsion stability; emulsion formation process and equipment; measurement of emulsion stability; permitted emulsifiers and stabilizers and food applications. Thickeners - definition, chemical structure, role in food processing and product end characteristics, list of permitted thickeners and food applications.	1	5
Instructional Hours			12
IV	Color and Artificial Sweeteners - Color – Natural and synthetic food colors, their chemical structure, shades imparted, stability, permitted list of colors, usage levels and food application. Artificial Sweeteners – list, structure, taste profile, permitted list, usage levels and food applications.	1	7
Instructional Hours			12

IV	Export & Import Laws and Regulations - FTDR Act, 1992 and Foreign Trade Policy, Export (Quality Control and Inspection) Act, 1963, Export Related Regulations and Standards set by export promotion bodies, Plant and Animal Quarantine, Customs Act and Import Control Regulations	1	8
	Instructional Hours		12
V	Other Laws and Standards Related to Food - Other Laws Related to Food Products, Voluntary National Standards: BIS and AGMARK, National Agencies for Implementation of International Food Laws and Standards, Accreditation System for Conformity Assessment Bodies	1	9
	Instructional Hours		12
Total instructional hours			60

Text Books:

1. Mahindru, S. N. Food Additives- Characteristics Detection and Estimation, TATA McGraw Hill, 2000
2. Wilson, R. Ingredient Handbook Sweeteners, Blackwell, 2007

Reference Books:

1. Emerton, V. Food Colors, Blackwell, 2008
2. Peter A Williams and Glyn O Philips, Gums and stabilizers for the Food Industry, RSC, 2006.
3. Branen, A. L. Food Additives 2nd Edition, CRC press, 2002

Mapping

CO	PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		L	L	M	H	H
CO2		H	L	L	H	H
CO3		L	M	M	H	H
CO4		M	L	L	H	H
CO5		L	L	M	H	H

H - High; M - Medium; L – Low

Tools for Assessment (20 Marks)

CIA I	CIA II	CIA III	Assignment	Product	Attendance	Total
4	4	5	2	2	3	20

Course Designed by	Verified by HOD	Checked by	Approved by

Course Code	Title		
20U3FSE604	Elective II (A) – Nutrition for Health and Fitness		
Semester : VI	Credits : 3	CIA : 20 Marks	ESE : 55 Marks

Objectives:

1. Understand the importance of health and fitness
2. Appreciate the relationship between health and physical activity.

Course Outcomes:

CO1	Identify the approaches for keeping fit
CO2	Comprehend the nutritional guidelines for health and fitness
CO3	Explain about the importance of physical activity
CO4	Summarize the principles behind weight management
CO5	Explain about stress management and weight management techniques

Offered by: Department of Food Science and Nutrition

Course Content**Instructional Hours / Week : 4**

Unit	Description	Text Book	Chapter
I	Understanding of Fitness: Definition of fitness, health and related terms, Approaches for keeping fit	1,5	3,1
Instructional Hours			12
II	Importance of nutrition Role of nutrition in fitness, Nutritional guidelines for health and fitness, Nutritional supplements	4,2	2,3
Instructional Hours			12
III	Importance of Physical activity Importance and benefits of physical activity, Physical Activity – frequency, intensity, time and type with examples, Physical Activity Guidelines and physical activity pyramid	4	6, 7
Instructional Hours			12
IV	Weight Management Assessment, etiology, health complications of overweight and obesity, Diet and exercise for weight management, Fad diets, Principles of planning weight reducing diets	4,2	8, 9
Instructional Hours			12
V	Exercise, Stress and Health Management Stress Assessment and Management Techniques-Exercise at medium and high altitudes, Underweight, Overweight and Obesity, Relaxation Techniques	2	7, 6
Instructional Hours			12
Total Instructional Hours			60

Text Books:

1. Werner W. K Hoejer (1989), Life time Physical Fitness and Wellness, Morton Publishing Company, Colorado.
2. Mishra, S. C (2005) Physiology in Sports. Sports Publication, New Delhi
3. Greenberg, S. J and Pargman, D (1989) Physical Fitness – A Wellness Approach Prentice Hall International (UK) Limited, London
4. Swaminathan T, (2008) Essentials of Food and Nutrition Bangalore Printing Publishing Co.

Reference Books:

1. Sreelakshmi. B (2016), Exercise physiology fitness and sports nutrition, New Age Publishers, New Delhi
2. Sreelakshmi. B (2014) Dietetics, New Age Publishers, New Delhi

Reference Journals

1. Elsevier International Journal of Behavioral Nutrition and Physical Activity
2. International Journal of Nutrition and Metabolism
3. International Journal of Nutrition and Food Sciences

Mapping

CO	PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		H	H	M	M	L
CO2		H	H	M	L	M
CO3		M	H	H	M	L
CO4		H	M	H	L	L
CO5		H	M	H	L	M

H - High; M - Medium; L - Low

Tools for Assessment (20 Marks)

CIA I	CIA II	CIA III	Assignment	Case study	Attendance	Total
4	4	5	2	2	3	20

Course Designed by	Verified by HOD	Checked by	Approved by

Course Code	Title		
20U3FSE605	Elective II (B) – Nutrition Education and Counselling		
Semester : VI	Credits : 3	CIA : 20 Marks	ESE : 55 Marks

Objectives:

1. Understand the role of dietitian in preventive, promotive and curative health care.
2. Make appropriate dietary modifications for various disease conditions and counsel the patient based on the patho physiology.

Course Outcomes:

CO 1	Explain the nutritional care for metabolic disorders
CO 2	Comprehend the nutritional care for cardiovascular system
CO 3	Summarise the nutritional care for kidney and urinary tract
CO 4	Analyse the nutritional care of allergy
CO 5	Demonstrate nutrition education and counselling

Offered by: Dept. of Food Science and Nutrition

Course Content:

Hours of instructions / week: 4

Unit	Description	Text books	Chapter
I	Nutritional care for metabolic disorders Diabetes mellitus: Types, etiology, symptoms, metabolic changes and dietary management. Gout, phenyl ketonuria, lactose intolerance, hypo and hyper thyroidism Causes, symptoms and dietary management.	1, 2	2, 5
	Instructional Hours		12
II	Nutritional care for diseases of Cardiovascular systems- Hypertension, hyperlipidaemia, atherosclerosis, coronary heart disease, congestive heart failure: Etiology, symptoms and dietary management. Relationship between dietary fat and development of cardiovascular diseases.	2, 3	3, 7
	Instructional Hours		12
III	Nutritional care for diseases of Kidney and urinary tract- Nephritis, nephrotic syndrome, nephrolithiasis, renal failure: Etiology, symptoms, dietary management and renal dialysis. Nutritional care for Cancer and AIDS.	4	8, 11
	Instructional Hours		12
IV	Food Allergy Diagnosis and treatment. Surgery, trauma and burns- Physiological changes, nutritional care and management. Use of food exchange list in diet planning.	5, 8	9, 13
	Instructional Hours		12
V	Patient education and counseling Assessment of patient needs, establishing rapport, counseling relationship, resources and aids to counseling.	2, 4	6, 9
	Instructional Hours		12
Total instructional hours			60

Text Books:

1. Raheena, Begum, A textbook of Foods, Nutrition and Dietetics, Sterling Publishers, New Delhi, 1989.
2. Joshi, S.A. Nutrition and Dietetics, Tata McGraw Hill Publications, New Delhi, 1992.
3. Srilakshmi.B., Dietetics, New Age Private Limited Publisher, 2002.
4. Dave,Indu, The basic essentials of counseling, Sterling publishers pvt. Ltd. New Delhi, 1984.

Reference Books:

1. Mahan, L.K., Arlin, M.T., Krause’s Food, Nutrition and Diet Therapy, W.B. Saunders Company, London, 8th edition, 1992.
2. Williams, S.R. Nutrition and Diet therapy, Times Mirror/Mosby College Publishing, St. Louis, seventh edition, 2000.
3. Antia, F.P., Clinical Dietetics and Nutrition, Oxford University Press, Delhi, 2001.
4. Barki,B.C., Mukhopadhyay, B., Guidance and counseling, A manual, Sterling Publishers pvt. Ltd. New Delhi, 1989.

Journals

1. Nutrition Education
2. Challenges and Perspectives in Nutritional Counselling and Nursing: A Narrative Review
3. A Problem Solving Approach to Nutrition Education and Counseling

Mapping

CO	PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		H	H	M	L	L
CO2		H	H	M	M	M
CO3		M	H	H	M	L
CO4		H	M	H	L	L
CO5		H	M	H	L	L

H - High; M - Medium; L - Low

Tools for Assessment (20 Marks)

CIA I	CIA II	CIA III	Assignment	Education material development	Attendance	Total
4	4	5	2	2	3	20

Course designed by	Verified by HOD	Checked by	Approved by

Course code	Title		
20U3FSE606	Elective II (C) - Food Service Management		
Semester : VI	Credits : 3	CIA : 20 Marks	ESE : 55 Marks

Objectives:

1. Create an awareness on the organizational aspect and functioning of different types of foods service institutions.
2. Develop managerial skills among the students.

Course Outcomes:

CO 1	Identify different types of food service industry
CO 2	Categorise the workplan of manpower in food service outlets
CO 3	Choose the appropriate equipment for quantitative cooking
CO 4	Exhibit effective resource management skills
CO 5	Develop strategies to maintain proper records

Offered by: Dept. of Food Science and Nutrition

Course content

Hours of instruction/week: 4

Unit	Descriptions	Text Book	Chapter Number
I	Food Service Industry: Definition – types of catering- Hotel, Motel, Restaurant, Cafeteria and chain hotels. Welfare – Hospital, School lunch, Residential establishment and Industrial catering. Transport – Air, Rail, Sea and Space, Miscellaneous – Contract and outdoor.	2	2, 4
Instructional hours		12	
II	Physical Plant and Food Purchase- Layout of kitchens, types of kitchens – Planning of Receiving preparation, storage and service area with relevant too spacing. Food purchase- Procedures and Factors involved in the selection of food.	1	3
Instructional hours		12	
III	Quantity food service and equipments quantity food service: Definition, objectives, styles of service waiter service, self – service, vending. Mechanics of waiter service. Equipment: Classification, factors involved in selection, use and care of major equipments, traditional and modern equipment. Menu planning: Origin of menu, importance of menu planning. Types of menu- table d’hote menu, a la carte, Dujour, theme, static, cycle. French classical menu. Use of menus, construction of menus, Menu Design, Factors affecting menu planning.	2	5, 6
Instructional hours		12	

IV	Management- definition, principles, functions and tools of management, qualities of a good leader, styles of leadership. Resource management – money, time, energy, computer applications in menu planning.	3	4, 6
	Instructional hours		12
V	Personnel management- recruitment, selection and induction. financial management- cost control- methods of food cost control, book- keeping; advantages of the double entry system. sanitation and safety – sanitation of plant and kitchen hygiene, personal hygiene, first aid principles and practice, health and safety at work	3	4, 3
	Instructional hours		12
Total Instructional hours			60

Text Books:

1. Kaufman,R. Mega planning- Practical tools for Organisational Success, Sage Publications Inc, 2000.
2. Shring Y, P. Effective Food Service Management, Anmol publications Pvt Ltd, New Delhi, 2001.
3. Stephen, B, , Williams, S, R, “Bill Jardine, and Richard, J, N, Introduction to Catering,

Reference Books

1. Ingredients for Success, Delmar- Thomson learning, 2001.
2. Yadav, C, P. Management of Hotel and Catering Industry, Anmol publications Pvt Ltd and Institute of sustainable development, Lucknow, New Delhi, 2001
3. Mohini Sethi and Surjeet Malham, “ Catering Management – an integrated approach”, 2nd edition, Wiley Eastern Limited, New Delhi, Reprint 2007.

Mapping

CO	PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		H	M	M	M	L
CO2		H	L	M	L	M
CO3		L	M	H	M	L
CO4		H	M	H	M	L
CO5		M	L	H	M	M

H - High; M - Medium; L - Low

Tools for Assessment (20 Marks)

CIA I	CIA II	CIA III	Assignment	Group activity	Attendance	Total
4	4	5	2	2	3	20

Prepared by	Verified by	Checked By	Approved by

Course code	Title		
20U3FSE607	Elective III (A) – Food Packaging and Labelling		
Semester : VI	Credits : 3	CIA : 20 Marks	ESE: 55 Marks

Objectives:

1. Gain knowledge about packaging of foods, packaging materials and systems.
2. Provide an insight into the aspects of labelling, testing and evaluation of packaged foods.

Course outcomes:

CO 1	Identify the various packaging materials available in the market
CO 2	Describe the properties of packaging materials
CO 3	Comprehend different methods of packaging
CO 4	Discuss packaging of different products and equipments used
CO 5	Apply labelling standards on food packaging

Offered by Department of Food Science and Nutrition**Course content****Hours of instruction/week : 4**

Unit	Descriptions	Text Book	Chapter Number
I Introduction to food Packaging:	Introduction, Principles and Functions of Packaging, Application, Basic Packaging Materials – Paper, Wood, Plastics, Glass, Metals Containers Packaging Films – Polyethylene, Cellophane, Aluminium foil, Laminates, Etc. New Polymeric Packaging Films, BOPP Shrink Film, Cling and Wrap Film, Edible Film Testing of Packaging materials	1	21
Instructional hours			12
II Properties of Packaging Materials:	Mechanical properties- tensile strength, bursting strength, tearing resistance, puncture resistance. Barrier properties of packaging materials- permeability, water vapor transmission rate.	1	2,3,4
Instructional hours			12
III Packaging Methods and Systems:	Traditional Food Packaging, Modern food packaging methods, Reportable, Lined Cartons, Bag in Box, Aseptic, Modified Atmosphere Packaging, Controlled Atmosphere packaging, Vacuum and as Packaging, Bio Based Packaging Eco-friendly and Safe Packaging for Exports, Nano Packaging Oven able Packages, Transport Packages	2	1,2,3,
Instructional hours			12
IV Packaging of Food Products and packaging equipment:	Bakery Products, Dairy Products, Fats and Oils, Fresh Foods, Beverages, Processed Foods Meat and Sea Foods Packaging Equipment – Filling, Cartoning, Vacuum packaging, Conveyors, Sealing, Coding and Marking,	2	3
Instructional hours			12

V Food labelling and standards:	1	7
Labelling: Need for labelling, labelling procedures, global labelling standards, Limitations of labelling safety issues.		
Food labelling standards -Nutritional labelling, importance of nutritional labelling		
Food product labelling -Irradiated products, organic produce, genetically modified foods, care in labelling for food allergens, barcoding.		
Instructional hours		12
Total Instructional hours		60

Text Books:

1. Potter, N.M., Food Science, The AVI Publishing Company Inc., West Post, Connecticut, USA 2015,
2. Frank A. Paine (Ed.) 2015, Modern Processing, Packaging and Distribution System for Food, Blackie, Glasgow and London.

Reference Books:

1. Food Packaging Technology Handbook, 2013, NIIR Board of Consultants and Engineers, National Institute of Research, New Delhi.
2. Modern Packaging Industries, 2014, NIIR Board of Consultants and Engineers, National Institute of Industrial Research, New Delhi

Journal

1. Food packaging and shelf life, Elseivers, science direct.com/journal.

Mapping

CO	PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1		H	L	L	H	H
CO2		L	L	M	H	H
CO3		M	M	L	H	H
CO4		M	M	L	H	H
CO5		M	L	L	H	H

H - High; M - Medium; L - Low

Tools for Assessment (20 Marks)

CIA I	CIA II	CIA III	Assignment	Group activity	Attendance	Total
4	4	5	2	2	3	20

Prepared By	Verified by	Checked By	Approved by

Course code	Title		
20U3FSE608	Elective III (B) - Unit operations		
Semester : VI	Credits : 3	CIA : 20 Marks	ESE: 55 Marks

Objectives:

1. Gain Knowledge on the principles of food process engineering and its significance in food industry.
2. Understand the units, dimensions and formulas related to food processing

Course Outcomes:

CO1	List and explain the principles of different types of evaporators and their application
CO2	Analyse the different mechanical separation techniques
CO3	Appraise the significance of size reduction and energy requirements in food processing
CO4	Illustrate the mechanism of crystallization and distillation
CO5	Employ different processing techniques to transform the raw materials to quality food products

Offered by: Dept. of Food Science and Nutrition

Course content

Hours of instruction/week : 4

Unit	Descriptions	Text Book	Chapter Number
I	Introduction - Introduction to unit operations in food processing, Units and Dimensions; Basic principles, Total mass balance and energy balance,	2	2, 4
Instructional hours			12
II	Size reduction processes - Size reduction: Principles, Theory, size reduction methods- compression, impact, shearing and cutting, standard sieves, cereal grinding, degree of grinding	1	4, 5
Instructional hours			12
III	Separation processes - Definition and introduction to separation, types of separator –disk, indented cylinder, spiral, specific gravity, destoners, Mechanical separation, sedimentation, Centrifugation, Filtration	3	5, 6
Instructional hours			12
IV	Evaporation - Basic principle, need for evaporation, thermodynamics of evaporation; boiling point elevation ,heat transfer during evaporation, heat transfer coefficients, design of evaporation system; retention time	3	4, 5
Instructional hours			12
V	Distillation: Theory and principles, liquid vapor equilibrium, distillation of binary mixtures, simple distillation, steam distillation, vacuum distillation, and fractional distillation	1	4, 6
Instructional hours			12
Total Instructional hours			60

Text Books:

1. Rao D.G. (2010) Fundamentals of food engineering. PHI learning private limited.
2. Sahay, K. M. and K.K.Singh Unit operation of Agricultural Processing Vikas Publishing House Pvt. Ltd., New Delhi 2004
3. Earle, R.L. Unit Operations in Food Processing Pergamon Press. Oxford. U.K 2003

Reference books:

1. Unit operations in food engineering, Albert Ibarz, CRC press

Reference Journals

1. Journal of food processing engineering

Mapping

CO	PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1		H	L	L	L	L
CO2		M	M	L	M	M
CO3		M	M	M	M	M
CO4		M	M	L	M	H
CO5		H	L	L	M	H

H - High; M - Medium; L - Low

Tools for Assessment (20 Marks)

CIA I	CIA II	CIA III	Assignment	Group activity	Attendance	Total
4	4	5	2	2	3	20

Prepared By	Verified by	Checked By	Approved by

Course code	Title		
20U3FSE609	Elective III (C) – Technology of Plantation Crops and Spices		
Semester : VI	Credits : 3	CIA : 20 Marks	ESE: 55 Marks

Objectives:

1. Learn the basic processing of plantation crops.
2. Develop skills in spices processing

Course Outcomes:

CO1	Enumerate the processing of cash crops
CO2	Categorise the varieties of tea and coffee
CO3	Comprehend the pre and post harvest factors affecting spice processing
CO4	Identify the equipments needed for processing
CO5	Examine the quality of raw materials for processing

Offered by: Dept. of Food Science and Nutrition

Course content

Hours of instruction/week : 4

Unit	Descriptions	Text Book	Chapter Number
I	Coffee Processing: Harvesting, grading, processing of coffee, wet and dry method, process equipments, packaging, soluble /Instant coffee, use of chicory in coffee, decaffeinated coffee	2	2, 4
Instructional hours			12
II	Tea Processing: Harvesting; types of tea – green, oolong and CTC; technology of CTC tea; manufacturing process for green tea and black tea.	1	4, 5
Instructional hours			12
III	Cocoa Processing: Processing of cocoa bean; cocoa powder; cocoa butter, cocoa liquor manufacture; preparation of chocolates	3	6
Instructional hours			12
IV	Spice Processing: Types, production, pre-harvest and post-harvest factors in processing, equipments for processing, drying, storage and packaging, health benefits, flavoring components.	3	5
Instructional hours			12
v	Major Spice Processing: Processing of pepper, cardamom, ginger, chilli, tamarind and turmeric, extraction of oleoresins and essential oils, spice powder and paste, spice based food products and storage.	2	4
Instructional hours			12
Total Instructional hours			60

Text books:

1. NIIR. 2004. Handbook on Spices. National Institute of Industrial Research Board, Asia Pacific Business Press Inc.
2. Banerjee B. 2002. Tea Production and Processing. Oxford Univ. Press.

Reference books:

1. Minifie BW (1999). Chocolate, Cocoa and Confectionery Technology.3rd Ed Aspen Publishers.
2. Sivetz M & Foote HE (1963). Coffee Processing Technology. AVI Publishers

Mapping

CO	PSO	PSO1	PSO 2	PSO3	PSO4	PSO5
CO1		H	L	L	L	L
CO2		L	L	H	M	M
CO3		M	H	M	M	M
CO4		L	M	L	M	H
CO5		H	L	H	M	H

H - High; M - Medium; L - Low

Tools for Assessment (20 Marks)

CIA I	CIA II	CIA III	Assignment	Group activity	Attendance	Total
4	4	5	2	2	3	20

Prepared By	Verified by	Checked By	Approved by

Course Code	Title
20UFSSS01	Technology of Fruits, Vegetables and Plantation Crops

Objectives:

- Impart knowledge of different methods of fruits and vegetable processing.
- Learn about processing of various spices, tea, coffee and cocoa.

CO1	Enlist processing techniques for different crops
CO2	Identify appropriate techniques for each product
CO3	Demonstrate preparation of different products
CO4	Analyse the quality parameters of the products
CO5	Exhibit technical skills in product production

Course content

Unit	Description
I	Introduction, canning and bottling of fruits and vegetables Importance of fruits and vegetable, canning and bottling of fruits and vegetables - Selection of fruits and vegetables, process of canning, factors affecting the process-time and temperature, containers of packing, lacquering, syrups and brines for canning, spoilage in canned foods.
Instructional Hours	
II	Fruits beverages ,jams, jellies and marmalades Introduction, Processing of fruit juices (selection, juice extraction, deaeration, straining, filtration and clarification), squashes, cordials, nectars, Jam, Marmalade: Types, processing & technology, defects.
Instructional Hours	
III	Pickles , tomato products and dehydration of fruits and vegetables Processing , selection of tomatoes, pulping& processing of tomato juice, tomato puree, paste, ketchup, sauce and soup; packing and storage
Instructional Hours	
IV	Spices Processing and properties of major and minor spices, essential oils & oleoresins, adulteration.
Instructional Hours	
V	Tea, coffee and cocoa Selection of raw ingredients, Processing techniques, Variety and Products.

References:

1. Girdharilal, Siddappaa, G.S and Tandon, G.L.1998. Preservation of fruits & Vegetables, ICAR, New Delhi
2. W B Crusess.2004. Commercial Unit and Vegetable Products, W.V. Special Indian Edition, Pub: Agrobios India
3. Manay, S. & Shadaksharaswami, M.2004. Foods: Facts and Principles, New Age Publishers
4. Ranganna S.1986. Handbook of analysis and quality control for fruits and vegetable products, Tata Mc Graw-Hill publishing company limited, Second edition.
5. Srivastava, R.P. and Kumar, S. 2006 . Fruits and Vegetables Preservation- Principles and Practices. 3rd Ed. International Book Distributing Co.

Course Code	Title
20UFSSS02	Meat and Poultry Processing Technology

Objectives:

- Understand the handling, processing, preservation of meat and poultry.
- Study the egg processing and meat plant sanitation

Course Outcomes:

CO1	Recall the classification of meat and poultry
CO2	Identify appropriate techniques for each product
CO3	Demonstrate preparation of different products
CO4	Analyse the nutritional qualities of the product
CO5	Exhibit hygienic practices in handling products

Course content

Unit	Description
I	Introduction Nutritive value of meat, factors affecting quality of fresh meat, cuts of meat, structure of muscle, postmortem and biochemical changes in meat leading to rigormortis.
II	Meat preservation methods Low temperature, thermal processing, dehydration, curing and smoking. Byproducts from slaughter house. Processed meat products- ham and bacon, sausage, salami, meat loaves, luncheon meat, corned meat, meat bars
III	Poultry Processing Nutritive value of poultry meat, hygienic processing of poultry, poultry cuts, slaughtering and evaluation of poultry carcasses poultry products
IV	Egg processing Composition and nutritive value of eggs, grading and preservation of eggs, manufacture of egg powder.
V	Meat hygiene and Meat plant sanitation Selection of raw ingredients, Processing techniques, Variety and Products.

Text books

1. Fidel Toldrá, A John (2010). Handbook of Meat Processing, Wiley & Sons, Inc., Publication.
2. Hui Y.H., A John (2010). Handbook of Poultry Science and Technology, Primary Processing, Wiley & Sons, Inc., Publication.

Reference book

1. Gunter Heinz, Peter Hautzinger (2007). Meat Processing Technology for Small- To Medium-Scale Producers, Food and Agriculture Organization of the United Nations, Bangkok.