BHARATHIDASAN UNIVERSITY  **TIRUCHIRAPPALLI - 620 024.**

B.Sc. NUTRITION AND DIETETICS

CHOICE BASED CREDIT SYSTEM –

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS - LOCF)

(Applicable to the candidates admitted from the academic year 2022-23 onwards)

Sem.	Part	Course	Title	Ins. Hrs	Credit	Exam Hours	Marks Int.	Marks Ext.	Total
I	I	Language Course – I Tamil $ / Other Languages +		6	3	3	25	75	100
	II	English Course - I		6	3	3	25	75	100
	III	Core Course – I (CC)	Food Science	5	5	3	25	75	100
		Core Practical – I (CP)	Food Science	4	4	3	40	60	100
		First Allied Course – I (AC)	Food Microbiology	4	4	3	25	75	100
		First Allied Practical (AP)	Food Microbiology and Food Chemistry	3	-	-	-	-	-
	IV	Value Education		2	2	3	25	75	100
	TOTAL			**30**	**21**	**-**	**-**	**-**	**600**
II	I	Language Course - II Tamil $ / Other Languages +		6	3	3	25	75	100
	II	English Course - II		6	3	3	25	75	100
	III	Core Course – II (CC)	Human Physiology	5	5	3	25	75	100
		Core Practical – II (CP)	Human Physiology	4	4	3	40	60	100
		First Allied Practical (AP)	Food Microbiology and Food Chemistry	3	2	3	40	60	100
		First Allied Course – II (AC)	Food Chemistry	4	4	3	25	75	100
		Add on Course – I ##	Professional English – I	6*	4	3	25	75	100
	IV	Environmental Studies		2	2	3	25	75	100
	VI	Naan Mudhalvan Scheme (NMS) @@	Language Proficiency for Employability - Effective English	-	2	3	25	75	100
	TOTAL			**30**	**29**	**-**	**-**	**-**	**900**

III	I	Language Course – III Tamil $ / Other Languages +		6	3	3	25	75	100
	II	English Course - III		6	3	3	25	75	100
	III	Core Course – III (CC)	Principles of Nutrition	5	5	3	25	75	100
		Core Practical - III (CP)	Principles of Nutrition	4	4	3	40	60	100
		Second Allied Course – I (AC)	Fundamentals of Biochemistry	4	4	3	25	75	100
		Second Allied Practical (AP)	Fundamentals of Biochemistry and Food Processing and Preservation	3	-	-	-	-	-
		Add on Course – II ##	Professional English - II	6*	4	3	25	75	100
	IV	Non-Major Elective I @ - Those who choose Tamil in Part I can choose a non-major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either a) Basic Tamil if Tamil language was not studied in school level or b) Special Tamil if Tamil language was studied upto 10^{th} & 12^{th} std.	Nutrition For Health	2	2	3	25	75	100
	TOTAL			**30**	**25**	**-**	**-**	**-**	**700**
IV	I	Language Course –IV Tamil $ / Other Languages +		6	3	3	25	75	100
	II	English Course – IV		6	3	3	25	75	100
	III	Core Course - IV (CC)	Nutrition through Life Cycle	5	5	3	25	75	100
		Core Practical - IV (CP)	Nutrition through Life Cycle	4	4	3	40	60	100
		Second Allied Practical (AP)	Fundamentals of Biochemistry and Food Processing and Preservation	3	2	3	40	60	100
		Second Allied Course – II (AC)	Food Processing and Preservation	4	4	3	25	75	100
	IV	Non-Major Elective II @ - Those who choose Tamil in Part I can choose a non-major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either a) Basic Tamil if Tamil language was not studied in school level or b) Special Tamil if Tamil language was studied upto 10^{th} & 12^{th} std.	Nutrition For Women	2	2	3	25	75	100
	VI	Naan Mudhalvan Scheme (NMS) @@	Digital Skills for Employability	-	2	3	25	75	100
	TOTAL			**30**	**25**	**-**	**-**	**-**	**800**

V	III	Core Course - V (CC)	Dietetics I	5	5	3	25	75	100
		Core Course – VI (CC)	Food Service Management I	5	5	3	25	75	100
		Core Course – VII (CC)	Bakery and Confectionary	5	5	3	25	75	100
		Core Practical -V (CP)	Dietetics I	4	4	3	40	60	100
		Major Based Elective – I (Any one)	1. Food Standards and Quality Control 2. Functional Foods and Nutraceuticals	5	4	3	25	75	100
	IV	Skill Based Elective I	Principles of Interior Design	4	2	3	25	75	100
		Soft Skills Development		2	2	3	25	75	100
	TOTAL			**30**	**27**	**-**	**-**	**-**	**700**
VI	III	Core Course - VIII (CC)	Dietetics II	6	5	3	25	75	100
		Core Course - IX (CC)	Food Service Management II	6	5	3	25	75	100
		Core Practical – VI (CP)	Dietetics II	4	4	3	40	60	100
		Major Based Elective – II (Any one)	1. Community Nutrition 2. Food Product Development	5	4	3	25	75	100
		Project	Dietary Internship	4	3	-	20	80	100
	IV	Skill Based Elective – II	Textile Science	4	2	3	25	75	100
	V	Gender Studies		1	1	3	25	75	100
		Extension Activities*		-	1	-	-	-	-
	VI	Naan Mudhalvan Scheme (NMS) @@		-	-	-	-	-	-
		TOTAL		**30**	**25**	**-**	**-**	**-**	**700**
GRAND TOTAL				**180**	**152**	**-**	**-**	**-**	**4400**

$ For those who studied Tamil upto 10th +2 (Regular Stream).

+ Syllabus for other Languages should be on par with Tamil at degree level.

Those who studied Tamil upto 10th +2 but opt for other languages in degree level under Part- I should study special Tamil in Part – IV.

The Professional English – Four Streams Course is offered in the 2nd and 3rd Semester (only for 2022-2023 Batch) in all UG Courses. It will be taught apart from the Existing hours of teaching / additional hours of teaching (1 hour /day) as a 4 credit paper as an add on course on par with Major Paper and completion of the paper is must to continue his / her studies further. (As per G.O. No. 76, Higher Education (K2) Department dated: 18.07.2020).

* The Extra 6 hrs / cycle as per the G.O. 76/2020 will be utilized for the Add on Professional English Course.

@ NCC Course is one of the Choices in Non-Major Elective Course. Only the NCC cadets are eligible to choose this course. However, NCC Course is not a Compulsory Course for the NCC Cadets.

** Extension Activities shall be outside instruction hours.

@@ Naan Mudhalvan Scheme.

SUMMARY OF CURRICULUM STRUCTURE OF UG PROGRAMMES

Sl. No.	Part	Types of the Courses	No. of Courses	No. of Credits	Marks
1.	I	Language Courses	4	12	400
2.	II	English Courses	4	12	400
3.	III	Core Courses	9	45	800
4.		Core Practical	6	24	700
5.		Allied Courses I & II	4	16	400
6.		Allied Practical	2	4	200
7.		Major Based Elective Courses	2	8	200
8.		Add on Courses	2	8	200
9.		Project	1	3	100
10.	IV	Non-Major Elective Courses (Practical)	2	4	200
11.		Skill Based Elective Courses	2	4	200
12.		Soft Skills Development	1	2	100
13.		Value Education	1	2	100
14.		Environmental Studies	1	2	100
15.	V	Gender Studies	1	1	100
16.		Extension Activities	1	1	--
17.	VI	Naan Mudhalvan Scheme	2	4	200
	Total		45	152	4400

PROGRAMME SPECIFIC OUTCOMES:

- Develop a holistic and multidimensional understanding of the concepts and apply the principles of food science and nutrition in individual development and industrial implications.
- Offer scientific opinion to the problems that arise in a food industry pertaining to food microbiology, preservation, baking, food processing with an inherent understanding of the ethnic and local needs.
- Formulate novel food products ascertaining to the food standards without nutritional loss and scale up food production and service abiding the standard protocol and marketing strategies.
- Apply the analytical principles of food and nutrients in food safety and assurance and public health strategies in combating current spectrum of malnutrition.
- Transpire as a diet counsellor, nutrition/ health communicator for creating awareness in the society through various communication strategies in nutrition education through ICT tools.

- Plan healthy meal plan for normal and therapeutic conditions pertaining to different age groups and socioeconomic status with nutritive value calculation pertaining to RDA and offer individualised diet plan.
- Explore the therapeutic effects of food, develop nutraceutical food products that could be used as a supplement for specific diseases and nutritional diseases of public health significance.
- Inculcate scientific temperament through projects, internship and case study that would strengthen their experiential learning, skills and research insight.

PROGRAMME OUTCOMES:

- Emerge with competency in domains of nutrition, food service management and dietetics and apply the knowledge to cater to the needs of the society/industry.
- Imbibe analytical and innovative thinking skills to offer solutions to problems arising in the fields of food processing, community nutrition and clinical nutrition.
- Evaluate nutrition information based on scientific reasoning for clinical, community, and food service application.
- Acquire distinct traits and ethics with high professionalism and to gain a broader insight into the national nutritional problems and devise intervention strategies.
- Articulate academic understanding, entrepreneurship, community role and skill development by practicing in nutrition laboratory and attain empowerment through food industry, health clinics and public sectors.
- Apply technical skills, knowledge of health behavior, clinical judgment, and decision-making skills when assessing and evaluating the nutritional status of individuals and communities and their response to nutrition intervention.
- Provide culturally competent nutrition counseling and education to individuals, groups, and communities throughout the lifespan using a variety of communication strategies.
- Strengthen the competent graduates, successful entrepreneurs and skilled professionals to take up careers in academics, health care centres and food industries.

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First Year	CORE COURSE I FOOD SCIENCE	Semester I
Code:	(Theory)	Credits 5

COURSE OBJECTIVES: To enable the students to

- Understand the classification of foods according to their functions.
- Gain knowledge on the composition and nutritive value of foods.
- Know the basic methods of cooking.

UNIT - I INTRODUCTION TO FOOD SCIENCE AND COOKING METHODS:

Definitions - Food Science, Food, Nutrients, Nutritional Status, Mal-nutrition- Under – nutrition, over nutrition, Balanced diet, Hunger- Hollow Hunger, Hidden Hunger, Health, Meal, Menu. Food Groups - Basic five, My Plate, Nutritional classification of foods – Energy yielding, Body building and Protective foods. Cooking - Objectives, cooking methods- Moist and Dry heat methods of cooking, merits and demerits. Microwave cooking, ohmic cooking, induction cooking and solar cooking.

UNIT - II CEREALS AND PULSES:

Cereals and Cereal products - Structure and Nutritive value of rice and wheat, Nutritional importance of millets– maize, jowar, ragi, bajra; Milling of rice and wheat; Parboiling of rice, Products of wheat and rice, Enrichment and fortification of cereals and flours, Batters and doughs; Malting of cereals. Pulses - Nutritive value, factors affecting cooking quality of pulses, germination – process, advantages. Nuts - Composition and nutritive value-toxins in nuts and oilseeds

UNIT - III VEGETABLES, FRUITS AND MILK:

Vegetables - Classification, Nutritive value; Pigments- fat soluble, water soluble; selection of vegetables, cooking of vegetables- changes during cooking, nutrient loss, effect of cooking on the pigments. Fruits - Classification, Nutritive value; Changes during ripening of fruits, enzymatic browning and prevention, storage. Milk and Milk Products - Composition and Nutritive value, Different types of milk, effect of heat, acid and enzymes on milk.

UNIT - IV EGG AND FLESH FOODS:

Egg - Structure, Composition and Nutritive value. Factors affecting coagulation and foam formation, testing freshness in egg- candling. Meat - Structure, composition, a list of different types of meat, cuts of meat, post mortem changes in meat, and tenderness of meat. Poultry - Composition and classification. Fish- Structure, composition, nutritive value, selection of fish.

UNIT - V FATS, SUGARS AND SPICES:

Fats and oils- composition, processing and refining of fats, refined oils, plasticity, hydrogenation, winterization. Smoking point, factors that lower smoking point, absorption of fat during cooking. Sugar- nutritive value, sugar related products, stages of sugar cookery, crystallization, factors affecting crystallization.
Spices and condiments- types and uses in Indian cookery, medicinal value.

UNIT - VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Effect of cooking on the nutritive value of different foods. Food Sample Booklet. Develop games on food and nutrients

REFERENCES:

1. Srilakshmi, B., (2010), Food Science, 6th edition New Age International (P) Limited, New Delhi.
2. Sunetra, R., (2007), Food Science and Nutrition, Oxford University Press, India.
3. Chandrasekhar, U.,(2002),Food Science and Application in Indian Cookery, Phoenix Publishing House P. Ltd., New Delhi.
4. Potter, N., and Hotchkiss, J.H., (1995), Food Science, 5th edition, Chapman & Hall, New York.
5. Shakuntala, M. and Shadaksharaswamy. M., (2000), 2nd Edition, Foods, Facts and Principles, New Age International Pvt. Ltd., Publishers, New Delhi.
6. Brow, A., (2000), Understanding Food, Thomson Learning Publications,
7. Parker, R. (2000), Introduction to food Science, Delmer, Thomson Learning Co., Delma.
8. Mehas, K.Y. and Rodgers, S.L. Food Science and You, Mc Millan Mc Graw Company, New York, 2000.
9. https://www.pdfdrive.com/food-science-books.html
10. https://archive.org/details/textbookoffoodsc0000khad
11. https://himitepa.lk.ipb.ac.id/e-book/
12. www.fao.org
13. www.wfp.org

COURSE OUTCOMES:

- Identify the foods and classify them based on the basic V food group system
- Define the foods and describe its structure
- Demonstrate their ability in selecting the good food and reject those with low quality
- Analyse the different nutrients present in a food
- Compare the nutrients present in the different types of food and suggest the nutrient rich foods.

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First Year	**CORE PRACTICAL I**	**Semester I**
	FOOD SCIENCE	
Code:	**(Practical)**	**Credits 4**

GENERAL:

1. Different types of cereals, pulses, vegetables, fruits and nuts and oil seeds – Observation
2. Guidelines to be followed in laboratory.
3. Method of Measuring Ingredients.
4. Demonstration of Cooking Methods.
5. Estimate the percentage of edible portion of foods.

PRACTICALS:

1. Microscopic examination of food starches before and after gelatinization - Rice, wheat, corn and tapioca
2. Gluten formation in different cereal flours- Wheat, Refined wheat flour, rice flour
3. Effect of different methods of making dough with other flour mixtures- Preparation of Chappathi, phulka
4. Effect of time, temperature and water required for sprouting whole pulses and legumes-Green gram, Bengal gram, cow pea and horse gram
5. Factors affecting cooking quality of pulses- Green gram dhal
6. Effect of heat and acid on the proteins of milk.
7. Effect of cooking time on the colour, texture and acceptability of whole egg; Formation of ferrous sulphide in boiling egg and its preventive measures.
8. Coagulation property of eggs.
9. Browning reaction in fruits and vegetables and its prevention methods
10. Effect of heat on vegetables.
11. Changes in pH during cooking of vegetables and fruits.
12. Determine the smoking point ofany4 cooking oils.
13. Stages of sugar cookery.

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First Year	**FIRST ALLIED COURSE I FOOD MICROBIOLOGY**	**Semester I**
Code:	**(Theory)**	**Credits 4**

COURSE OBJECTIVES: To enable the students to

- Know the basics of food microbiology and understand the important genera of microorganisms associated with food and their characteristics.
- Identify and recognize the methods of isolation and cultivation of microbes
- Identify and differentiate the sources of Microorganisms in foods.
- Understand the role of microbes in disease progression of food borne illness
- Learn, Solve and apply the simple preservation methods.

UNIT - I INTRODUCTION TO FOOD MICROBIOLOGY:

Introduction and scope of food microbiology; Growth of microorganisms, General characteristics of bacteria, fungi, virus, protozoa, and algae; Intrinsic Factors (Substrate Limitations)-nutrient content, pH and buffering Capacity, redox potential, Eh, antimicrobial barriers and constituents water Activity;Extrinsic Factors (Environmental Limitations)-relative Humidity, temperature, gaseous atmosphere.

UNIT - II MICROBIOLOGY OF PLANT BASED FOODS:

Outline of contamination and spoilage of vegetables and fruits; cereals and cereal products; pulses, nuts and oilseeds; sugar and sugar products

UNIT - III MICROBIOLOGY OF ANIMAL BASED FOODS:

Outline of Contamination and spoilage of milk and milk products; canned foods; meat and meat products; egg, poultry and fish

UNIT - IV FOOD INTOXICATION AND FOOD INFECTION:

Food Borne Diseases – classification- intoxication – botulism and staphylococcal intoxication- infection – salmonellosis, clostridium perfringens illness, bacillus cereus, E. coli, shigellosis, Yersinia and streptococcus faecalis – foods involved, diseases outbreak, preventive and control measures

UNIT - V APPLICATIONS OF MICROORGANISMS IN FOODS:

Food Product-Alcoholic drinks, Dairy products (yoghurt, butter milk, and cheese), Bread, Vinegar, Pickled foods, Mushrooms, Single-cell protein; Products from microorganisms-Enzymes, Amino acids, Antibiotics, Citric acid; Indian fermented foods -mechanism of fermentation, effect on nutritional value; Fermentation of vegetables and fruits Fermentation of meat and fish. Cereal based fermented foods, cereal & Pulse based fermented foods

UNIT - VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Observation of spoiled foods under Microscope. Virtual tour of brewery industry.

REFERENCES:

1. MO Moss & MR Adams Food Microbiology (2008) New Age Publishers ISBN 8122410146
2. Ramesh Singh Food Microbiology (2021) MJP Publishers ISBN 8180940195
3. FOSTER W.M Food Microbiology (2020) CBS Publisher ISBN 8123928297
4. Annak.Joshua, (2001). Microbiology, Popular Book Depot. Chennai-15.
5. Frazier William C and Westhoff, Dennis C. Food Microbiology, McGraw Hill Education; Fifth edition 2017 ISBN 9781259062513
6. Jay, James M. Modern Food Microbiology, CBS Publication, New Delhi, 2000
7. Garbutt, John. Essentials of Food Microbiology, Arnold, London, 1997.
8. Banwartt: Food Microbiology
9. Pelczar MJ, Chan E.C.S and Krieg, Noel R. Microbiology, 5th Ed., TMH, New Delhi, 1993.
10. http://nuristianah.lecture.ub.ac.id/
11. https://guides.library.iit.edu/
12. https://onlinelibrary.wiley.com/
13. https://www.microbes.info/
14. www.microbeworld.org/

COURSE OUTCOMES:

- Understand different terminology related to and understand the role and significance of microbial inactivation, adaptation and environmental factors (i.e., Aw, pH, temperature) on growth and response of microorganisms in various environments
- Analyse and describe the microbial pathogens in food - Cereals and Pulses
- Recognize and realize the Microbiology of fruits and vegetables
- Discover and understand the Microbiology of Specific foods
- Learn and understand the role of microbes in industrial applications

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First Year | **FIRST ALLIED PRACTICAL FOOD MICROBIOLOGY AND FOOD CHEMISTRY (Practical)** | **Semester I & II**

Code: | **Credits 2**

FOOD MICROBIOLOGY – PRACTICAL:

1. Introduction to the Basic Microbiology Laboratory Practices and Equipment
2. Microbial slides - Gram positive cocci: staphylococcus, streptococcus, Gram Positive cocci: Neisseria; Gram Positive Bacilli: Corynebacterium, Bacillus, Clostridium Gram Negative Bacilli: Enterobacteriaceae, Pseudomonas Mycobacterium: Mycobacterium tuberculosis, Mycobacterium leprae; Spirochetes; Mycoplasma
3. Cleaning, sterilization techniques, sterilization - equipment glassware
4. Preparation and sterilization of nutrient broth
5. Preparation of slant, stab and plates using nutrient agar
6. Preparation of bacterial smear & Gram staining.
7. Culture techniques -Pour, spread & streak
8. Hanging drop method for testing motility of bacteria.
9. Methylene Blue Reductase test on Milk
10. Antibiotic assay and Disc sensitivity on microbes - Demonstration
11. Effect of temperature on the growth of microbes - Demonstration

FOOD CHEMISTRY- PRACTICAL:

1. Chemistry of Starch and Sugars
   a) Gelatinization of Starch, Microscopic Examination of uncooked and gelatinized Starch.
   b) Retrogradation and Syneresis
   c) Stages of Sugar Cookery, Preparation of Fondant, Fudge, and Toffee, Scum formation in milk.
2. Chemistry of Proteins
   a) Gluten Formation
   b) Effect of Soaking, germination and fermentation of Pulses
   c) Coagulation of egg white and egg yolk
   d) Boiled Egg, Poached Egg, Omlettes, Custardsand Mayonnaise
   e) Coagulation and precipitation of milk proteins.
   f) Changes observed in Cooking Meat, Fish and Poultry, Testing the Tenderness of meat.
3. Chemistry of Fats and Oils
   a) Smoking Temperature of Different Fats
   b) Factors Affecting Absorption of Fats
4. Chemistry of Pectic Substances and Plant Pigments.
   a) Effect of acids, alkali and heat on water soluble and fat-soluble pigments
   b) Enzymatic Browning and Methods of prevention

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First Year	CORE COURSE II HUMAN PHYSIOLOGY	Semester II
Code:	(THEORY)	Credits 5

COURSE OBJECTIVES: To enable the students to

- Understand the structure and functions of various organs of the body
- Obtain a better understanding of the principles of nutrition through the study of physiology
- To gain knowledge on the importance of hormonal and nervous regulation of the body.

UNIT – I TISSUE AND BLOOD:

Cell and tissues - Structure of Cell and functions of different organelles. Classification, structure and functions of tissues. Blood - Constituents of blood- RBC, WBC and Platelets and its functions. Erythropoiesis, Blood clotting, Different Blood groups. Haemoglobin – Structure and functions; erthropoiesis, Blood coagulation, Reticulo-Endothelial System – Definition and functions, Lymphatic System.

UNIT - II CARDIO VASCULAR AND RESPIRATORY SYSTEM:

Heart and Circulation - Structure of heart and blood vessels; Properties of cardiac muscle, cardiac cycle, origin and conduction of heart beat; measurement of arterial blood pressure. Respiratory System - Structure of Respiratory organs; Sub – divisions of lung air; Mechanism of respiration.

UNIT - III DIGESTIVE AND EXCRETORY SYSTEM:

Digestive System - General Anatomy; Digestion in the mouth, stomach and intestines. Movements of the intestine;Role of Liver and Pancreas – Structure and Functions. Excretory system - Physiology of the Urinary System- Structure of kidney and nephron; Formation of urine, micturition. Skin – Structure and function of skin.

UNIT - IV ENDOCRINE AND REPRODUCTIVE SYSTEM:

Endocrine System - Structure and functions of thyroid, pituitary, parathyroid, adrenals, islets of langerhans of pancreas. Reproductive System - Anatomy of the male and female reproductive organs; menstrual cycle, Development of Embryo; Pregnancy and parturition.

UNIT - V NERVOUS SYSTEM AND SENSE ORGANS:

Nervous System - General classification of nervous system , Structure of nerve cell and Spinal cord; Basic Knowledge of different parts of the brain – anatomy and functions of cerebrum, cerebellum and medulla oblongata. Sense Organs - Structure and function of eye, ear, physiology of taste and smell.

UNIT - VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Write an assignment on Artificial respiration and ECG. Develop E content on Structure and physiological functions of any one organ.

REFERENCES:

1. Sembulingam, K. (2000). Essentials of Medical Physiology. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.
2. Saradhasubrahmanyam and MadhavanKutty, (2020).Text book of Human Physiology. S.Chand Publication.
3. Chatterjee C.C (2004). Human Physiology. Volume I. Medical Allied Agency. Kolkata.
4. Chatterjee C.C (2004). Human Physiology/ Volume II.Medical Allied Agency. Kolkata.
5. Gillian Pocock, Christopher D. Richards, David A. Richards (2018). Human Physiology. oxford University Press.(5th ed).
6. Lauralee Sherwood (2015). Human Physiology: Cells to systems. Cengage Learning.
7. H S Ravi Kumar Patil, H. K. Makari, H. Gurumurthy, S. V. Sowmya, (2009). A text book of Human Physiology. I.K. International Publishing House Pvt. Limited.
8. Guyton and Hall (2000). Textbook of Medical Physiology. Saunders. States of America.
9. Wilson, Ross (2014). Anatomy and Physiology in Health and Illness. Reed Elsevier India Private Limited. NewDelhi.
10. Murugesh.N (2011). Anatomy and Physiology. Sathya Publishers. Madurai.
11. Chaudhri, K. (1993). Concise Medical Physiology, New Central Book Agency Ltd., Calcutta.
12. https://egyankosh.ac.in/handle/123456789/81726
13. https://tripurauniv.ac.in/
14. https://nwtc.libguides.com/
15. https://palmbeachstate.libguides.com/

COURSE OUTCOMES:

- Outline composition and functions of blood
- Interpret anatomy and physiology of circulatory and respiratory system
- Discuss regulation of digestive and excretory system
- Relate structure and functions of endocrine and reproduction system
- Explain the structure, functions of nervous system and sense organs

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First Year	CORE PRACTICAL II HUMAN PHYSIOLOGY	Semester II
Code:	(Practical)	Credits 4

COURSE OBJECTIVES: To enable the students to

- To acquire knowledge on cellular arrangements and blood components.
- To learn methods to be adopted for the measurement of various blood parameters

PRACTICALS:

1. Histology of Tissues - Columnar, cubical, ciliated, squamous, stratified squamous.
2. Microscopic structure of organs - lungs, artery, vein, stomach, ovary, testis, uterus, pancreas.
3. Histology of muscles - cardiac, striated, non -striated
4. Estimation of Haemoglobin, Bleeding time, Clotting time
5. Measurement of Blood pressure using Sphygmomanometer.
6. Determination of Pulse rate using Pulsoximeter.
7. Blood smear preparation and staining procedure
8. Determination of Bloodgroup and Rh factor.
9. Enumeration of Red blood cells.
10. Enumeration of White blood cells.
11. Demonstration of differential count of leucocyte.

REFERENCES:

1. G.K.Pal and Parvati Pal (2016). Textbook of practical physiology. Universities press(India) private limited.
2. Sembulingam, K. (2000). Essentials of Medical Physiology.Jaypee Brothers Medical Publishers (P) Ltd.New Delhi.
3. Chatterjee C.C (2004). Human Physiology Volume I. Medical Allied Agency.Kolkata
4. Saradha Subrahmanyam and K. MadhavanKutty(2020).Text book of Human Physiology.S.Chand Publication.
5. Gillian Pocock, Christopher D. Richards, David A. Richards (2018). Human Physiology.(5th ed)Oxford University Press
6. Lauralee Sherwood (2015).Human Physiology: Cells to systems.Cengage Learning.

COURSE OUTCOMES:

- Identify cells present in the body
- Describe cellular arrangement in tissues and organs
- Articulate the methods to be adapted for the measurement of various blood parameters
- Explain cellular arrangement in tissues and organs
- Appraise number of cells present in blood.

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First Year	FIRST ALLIED COURSE II FOOD CHEMISTRY	Semester: II
Code:	**(THEORY)**	**Credits: 4**

COURSE OBJECTIVES:To enable the students to

- Gain insight into the chemistry of foods
- Understand the scientific principles involved in food preparation
- Understand the physicochemical changes and various properties exhibited by foods

UNIT – I PHYSICOCHEMICAL PROPERTIES OF FOOD:

Definition and history of food chemistry. Role of food chemist in food industry; Physicochemical properties of foods - physical properties of water and ice; types of water, Water Activity in Foods and stability, packaging, sorption phenomenon, temperature dependence, Determination of Moisture Content in Foods; True Solutions, Dispersions, Sols, Gels, Foams, Colloids and Emulsions.

UNIT – II CHEMISTRY OF STARCH AND SUGARS:

Structure of important polysaccharides (starch, glycogen, cellulose, pectin, hemicellulose, gums) Modified celluloses and starches- Components of Starch, Swelling of Starch Granules, Gel Formation, Retrogradation, Syneresis; Effect of Sugar, Acid, Alkali, Fat and Surface-Active Agents on Starch; Stages of Sugar Cookery, Crystallization and factors affecting it. Chemistry of Milk Sugar, Non-Enzymatic Browning.

UNIT – III CHEMISTRY OF PROTEINS:

Nature of Food Proteins (Plant and Animal), Structure and Classification of Protein, Properties of Protein-Electrophorosis, Sedimentation, Amphoterism and Denaturation, Solubility, Viscosity, Binding, Gelation, Texturization, Emulsification And Foaming; Functional Properties of Protein Rich Foods.

UNIT – IV CHEMISTRY OF FATS AND OILS:

Classification and Characteristics of lipids. Physical properties- melting point, softening point, specific gravity, refractive index, smoke, flash and fire point, turbidity point, Chemical properties- Reichertmeissel value, Polenske value, iodine value, peroxide value, saponification value; Effect of frying on fats, Changes in fats and oils- rancidity, lipolysis, flavor reversion, Technology of edible fats and oils- Refining, Winterization, Plasticity, Hydrogenation and Interesterification, Shortening Power of Fats, Changes in Fats and Oils during Heating, Factors Affecting Fat Absorption in Foods.

UNIT – V ENZYMES, PIGMENTS AND FLAVOURS ENZYMES:

Enzymes:Introduction, classification General characteristics, Enzymes in food processing, Industrial Uses of Enzymes, Immobilized enzymes. Pigments: Types of Plant Pigments- Water Soluble and Fat Soluble, Effect of Acid, Alkaline and Heat on Pigments. Flavors: Definition and basic tastes, Chemical structure and taste, Description of food flavors, Flavor enhancers.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Prepare e-content for stages of sugar cookery. Visit to Oil mills and prepare a report for processing of fat.

REFERENCES:

1. Chandrasekhar, U. 2002. Food Science and applications in Indian Cookery, Phoenix Publishing House, New Delhi.
2. Chopra,H.K. andPanesar, P.S. 2015. FoodChemistry, NarosaPublishingHouse (P)Ltd, NewDelhi.
3. Iqbal,SyedAftab, 2011. AdvancedFoodChemistry, Discovery Publishing House,New Delhi.
4. Shakuntala Manay, Shadaksharaswamy, M. 2000. Foods, Facts and Principles, 2nd Edition New Age International Pvt Ltd Publishers.
5. Srilakshmi,B. 2016. FoodScience, New Age International Publishers,New Delhi.
6. Swaminathan, M. 2005. Food Science, Chemistry and Experimental Foods, Bappco Publishers, Bangalore.
7. Yadav,Seema, 2006. FoodChemistry, Anmol Publications (P)Ltd,New Delhi.
8. Chopra H.K, Panesar, P.S, 2010. Food Chemistry, Narosa Publishing House, New Delhi.
9. Meyer, L.H, 2004. Food Chemistry, 4th edition, CBS Publishers and Distributors.
10. Paul, P.C. and Palmer, H.H. 2000. Food Theory and Applications, Revised Edition, John Wiley and Sons, New York.
11. Satarkar,Archana, 2008. FoodScienceandNutrition ABDPublishers, Jaipur.
12. Shubhangini, A.Joshi, 2010. Nutrition and DieteticswithIndiancasestudies, McGrawHillEducation(India),Pvt.,Ltd,NewDelhi.
13. https://libraryguides.mcgill.ca/
14. https://ipa-pasca.unpak.ac.id/
15. http://ecoursesonline.iasri.res.in/
16. https://link.springer.com/

COURSE OUTCOMES:

- Infer the chemistry of underlying properties and reactions of water and basics of food chemistry
- Relate the chemistry of starch and sugars and know the major chemical reactions that limit shelf life of foods using sugars.
- Apprehend the chemistry of protein, their functional properties in food.
- Select the appropriate fats to be used in cooking and their storage and functional uses.
- Appraise the role of enzymes and flavours in Indian cookery

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Second Year	CORE COURSE III PRINCIPLES OF NUTRITION	Semester III
Code:	(Theory)	Credits 5

COURSE OBJECTIVES: To enable the students to

- Understand role of macro and micro nutrient relevant to human health.
- Introduce composition of various food groups.
- Gain knowledge on physiological role, requirement and deficiency conditions of macro and micro nutrient.
- Learn to calculate energy expenditure of humans.
- Know the importance of water to maintain homeostasis of human body.

UNIT - I INTRODUCTION TO NUTRITION:

Definition of nutrition, health, nutritional status and malnutrition. Inter-relationship between health and nutrition.
RDA– Definition, factors affecting RDA, general principles of deriving RDA, Determination of RDA of different nutrients.

UNIT - II CARBOHYDRATES AND ENERGY:

Carbohydrates – Definition, nutritional classification, functions, RDA, sources and deficiency and excess effects. Dietary Fibre – definition, Classification, components of dietary fibre, physiological and metabolic effect, role of fibre in prevention of diseases, RDA and sources.

Energy –Forms of energy, units of measurement, determination of energy value of food, total energy requirement, energy requirements during work, thermic effect of food. Basal Metabolic Rate – Factors affecting Basal metabolic rate,

UNIT - III PROTEINS AND LIPIDS:

Proteins – Definition, nutritional classification of proteins and amino acids, functions of proteins and amino acids, RDA, sources, and deficiency and excess. Evaluation of protein quality.(PER, BV, NEU, CS)

Lipids – Definition, nutritional classification of lipids, functions, RDA, sources. Essential fatty acids – Definition, functions, sources, deficiency and excess effects, omega fatty acids-functions and food sources.

UNIT - IV MICRONUTRIENTS:

Vitamins - Fat Soluble Vitamins (A, D, E &K) - Functions, RDA, sources, deficiency and excess. Water Soluble Vitamins (B&C) - Functions, RDA, sources, deficiency and excess.

Minerals - Macro Minerals (Calcium, Phosphorus, Potassium, Sodium) - Functions, RDA, sources, deficiency and excess effects.
Micro Minerals (Iron, Iodine, Fluorine) - Functions, RDA, sources, deficiency and excess effects

UNIT – V WATER AND NUTRIENT INTERRELATIONSHIP:

Definition, distribution of water, function, requirements, sources, water balance, maintenance of water balance, distribution of electrolytes, maintenance of electrolyte balance.
Macronutrients and vitamin interrelationship

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Determine energy requirements of any five individuals by factorial approach method. Record clinical symptoms of any one vitamin deficiency among the community.

REFERENCES:

1. Raheena Begum M (2009). Textbook of Foods. Nutrition and Dietetics Sterling Publishers, New Delhi
2. Mahtab S. Bamji (2017). Textbook of Human Nutrition. Oxford & IBH Publishing Co Pvt Ltd
3. Bogert, J.G.V. Briggs, D.H. Calloway (1985). Nutrition and physical fitness. (11th ed) W.B. Saunders Co., Philadelphia. London. Toranto
4. Wardlaw, G.M. Insel, P.H. (1990) Perspectives in Nutrition. Times Mirror / Mosby College Publishing Co. St. Louis. Toronto. Boston.
5. William, S.R. (1985). Nutrition and Diet Therapy. (5th ed) Mosbey Co. St. Louis.
6. M. Swaminathan (1993). Principles of Nutrition and Dietetics. Bappco 88. Mysore Road. Bangalore.
7. Maurice E. Shils, James A. Olson, Moshe Shike (1994). Modern Nutrition in health and disease.Vol. I & II (8th ed) febiger Philadelphia. A waverly Company.
8. Martin Eastwood (2013). Principles of Human Nutrition Wiley Publishing
9. Raheena Begum M (2009). Textbook of Foods. Nutrition and Dietetics Sterling Publishers, New Delhi
10. Mahtab S. Bamji (2017). Textbook of Human Nutrition. Oxford & IBH Publishing Co Pvt Ltd.
11. Mahan Kathleen L, Sylvia Escott Stump (2001). Krause's, Food nutrition and Therapy, W.B. Saunders Co.
12. https://www.anme.com.mx/libros/Principles%20of%20Human%20Nutrition.pdf
13. https://egyankosh.ac.in/bitstream/123456789/333
14. https://www.anme.com.mx/libros/Principles%20of%20Human%20Nutrition.pdf
15. https://open.umn.edu/opentextbooks/textbooks/622

COURSE OUTCOMES:

- Illustrate sources, requirements, role and deficiency of macro and micro nutrient
- Explain beneficial effects of macro and micro nutrient on human health.
- Analyze quality of nutrients present in food.
- Describe basal metabolism rate and energy expenditure of humans.
- Relate water and electrolyte balance in human body and the interrelationship of nutrients.

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Second Year	**CORE PRACTICAL III**	**Semester III**
	PRINCIPLES OF NUTRITION	
Code:	**(Practical)**	**Credits 4**

COURSE OBJECTIVES: To enable the students to

- Gain knowledge on calculate nutritive value of Indian foods.
- Know sources of macro and micro nutrient.
- Learn about the analytical methods of nutrients.

PRACTICALS:

1. Plan, prepare and calculate the nutrients of macro nutrient rich dishes of one serving
   a. Energy - High Calorie and Low Calorie
   b. Carbohydrate - High Carbohydrate and Low Carbohydrate
   c. Protein - High Protein and Low Protein
   d. Fat - High Fat and Low Fat
   e. Dietary Fibre - High Fibre and Low Fibre
2. Plan, prepare and calculate the nutrients of micro nutrient rich dishes of one serving -Vitamins: Vitamin A, Vitamin C, Thiamine, Riboflavin, Niacin, Pyridoxine, Folic Acid and Cyanocobalamine.
3. Plan, prepare and calculate the nutrients of micro nutrient rich dishes of one serving - Minerals: Calcium, Iron, Zinc, Phosphours, Sodium and Potassium
4. Demonstration on estimation of nitrogen in food using Kjeldahl method.
5. Demonstration on estimation of total fat in food using Soxhlet method

REFERENCES:

1. Gopalan.C, Rama Sastri.V.B and Balasuramanian.S.C (2016). Nutritive Value of Indian Foods National Institute of Nutrition (ICMR) Hyderabad.
2. Food Safety and Standards Authority of India (2015) Manual of Analysis of Foods Food Safety and Standards Authority of India.
3. ThangamE.Philip, (2015). Modern Cookery for Teaching and the Trade .Volume-I Orient Blackswan Private Limited. New Delhi.
4. Varley, H., Gowenlak, A.H. and Hill, M. Practical Clinical Biochemistry, William Itinmaon Medical Books, London, 2000.
5. Oser, B.L., Harke's Physiological Chemistry XIV Edition Tata McGraw Hill Publishing Company Ltd., Bombay, 2001.

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Second Year **SECOND ALLIED COURSE I** **Semester III**

FUNDAMENTALS OF BIOCHEMISTRY

Code: **(Theory)** **Credits 4**

COURSE OBJECTIVES: To enable the students to

- Review the biological system of energy metabolism.
- Study the chemical/biochemical properties and metabolic pathways of carbohydrates, lipids, and proteins.
- Examine the regulatory mechanisms of macronutrient metabolism and associated signaling pathways.
- Understand the research techniques used in basic biochemistry and nutritional biochemistry research.

UNIT - I CARBOHYDRATE:

Monosaccharides - types, characteristics and properties; disaccharides, oligosaccharides, polysaccharides – biological significance, Carbohydrate metabolism-Metabolic Pathway - Glycolysis, TCA cycle, HMP shunt, Gluconeogenesis from TCA intermediates / amino acids / acetyl-CoA, concept of Glycogenesis and glycogenolysis.

UNIT – II PROTEIN:

Amino acids - classification, structure, properties, Protein structure: peptide linkage, covalent backbone, three-dimensional conformation; quartenary structure of oligomeric proteins. Determination of -N and -C terminal amino acids, Protein functions. Metabolism – Synthesis of protein and metabolism of amino acid

UNIT – III LIPID:

Classification, structure, properties; biological significance. Bioenergetics - electron transport and oxidative phosphorylation, redox potential, high energy compounds, ATP and significance, Lipid metabolism - beta oxidation of fatty acids, Biosynthesis of fatty acids.

UNIT – IV NUCLEOTIDES AND NUCLEIC ACIDS:

Structure of Purine and pyrimidine nucleotides - double helical structure of DNA, biosynthesis and catabolism of purine and pyrimidine nucleotides.

UNIT – V ENZYMES:

Enzymes - Definition, IUPAC classification of enzymes, factors affecting enzyme activity, Line weaver burk plot, Michaelis –Menton model, rate of enzyme activity, Inhibition of enzyme activity – feedback inhibition, allosteric inhibition

UNIT - VI CURRENT CONTOURS (For continuous internal assessment only):

Learn life at the molecular level. Functions of enzyme. Prepare models for Carbohydrate/ Protein metabolism.

REFERENCES:

1. J. L. Jain, Sunjay Jain and Nitin Jain, Fundamentals of Biochemistry Publishers: S. Chand & Co Ltd, 2008.
2. Ambika Shanmugam, Fundamentals of Biochemistry for Medical Students, 7th Edition, Lippincott Williams and Wilkins, 2012.
3. Jeremy M. Berg, John L. Tymoczko, Lubert Stryer, Biochemistry, Palgrave MacMillan; 7th revised international edition,2011
4. Victor Rodwell, David Bender, Kathleen M. Botham, Peter, J.Kennelly, P.Anthony Weil, Harpers Illustrated Biochemistry, McGraw-Hill Education/ Medical; 30 edition,2015
5. DavidL, Nelson, Michael M,Cox, Lehninger's Principles of Biochemistry, W.H. Freeman; 5th edition, 2008.
6. https://labalbaha.files.wordpress.com/2014/04/fundamentals-of-biochemistry.pdf
7. http://www.freebookcentre.net/Chemistry/BioChemistry-Books-Download.html
8. https://agrimoon.com/fundamentals-of-biochemistry-pdf-book/
9. https://biochem.oregonstate.edu/content/biochemistry-free-and-easy

COURSE OUTCOMES:

- Interpret the significance of Carbohydrate metabolism
- Acquire Knowledge on role of protein in metabolism and functions.
- Infer Knowledge on lipid metabolism and biosynthesis of lipids.
- Exemplify Nucleotides and Nucleic Acids
- Understand the role of enzymes in metabolism and clinical conditions.

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Second Year **SECOND ALLIED PRACTICAL** **Semester III & IV**

FUNDAMENTALS OF BIOCHEMISTRY AND FOOD PROCESSING AND PRESERVATION

Code: **(Practical)** **Credits 2**

FUNDAMENTALS OF BIOCHEMISTRY

COURSE OBJECTIVES: To enable the students to

- To understand principles, theory and calculations of each experiment.
- To gain hands on preparation of all the solutions and to standardize solutions individually.

QUALITATIVE ANALYSIS:

1. Handling of Microscope.
2. Qualitative analysis of carbohydrates (glucose, fructose, maltose, galactose, sucrose, lactose),
3. Estimation of reducing sugar by Benedict's quantitative method.
4. Identification of both monosaccharides and disaccharides in mixtures.
5. Qualitative analysis of Proteins.
6. Qualitative analysis of Lipids
7. Determination of saponification number of edible oil.
8. Estimation of Iodine value of oil.

REFERENCES:

1. Varley, H., Gowenlak, A.H. and Hill, M. Practical Clinical Biochemistry, William Itinmaon Medical Books, London,2000.
2. Oser, B.L., Harke's Physiological Chemistry XIV Edition Tata McGraw Hill Publishing Company Ltd., Bombay,2001.
3. Sadasivam, S. and Manickam, A. Biochemical Method, Second Edition, New Age International P. Ltd., Publishers, New Delhi,2003.
4. Raghuramulu, N., Madhavannair, K. and Kalyana Sundaram, National Institute of Nutrition, 2003, A Manual of Laboratory Techniques, Hyderabad,500007.
5. Dr. J. Jayaraman, Manuals in Biochemistry -New Age International Pub, Bangalore 2011. 2. Practical Biochemistry - Plummer, New Delhi: Tata Mcgraw Hill Publishing Company, 2000.
6. S.Sadasivam, V.A Manickam Biochemical methods, 2ed, New Age International Publishers, 2006.
7. Anil Kumar, Sarika Garg and Neha Garg. Vinod Vasishtha Biochemical Tests – Principles and Protocols. Viva Books Pvt Ltd, 2012.

FOOD PROCESSING & PRESERVATION

COURSE OBJECTIVES: To enable the students to

- To gain knowledge about the preparation of some basic food products
- To use the processes studied in food Processing and preservation course
- To prepare different food products
- To understand how these can be utilized to start a small-scale processing Module.
- It helps the students to gain not only theoretical but also practical knowledge

PRACTICALS

1. Preparation of jam, jelly, marmalades, preserves, candies, Tutti fruity, Glazed, Crystallized fruits, Toffees
2. Preparation of squash, fruit juice concentrate and Ready To Serve (RTS) foods
3. Preparation of Tomato sauce, Tomato ketchup.
4. Preparation of pickles (oil, vinegar and salt based)
5. Preparation of salted, dehydrated, vegetables preserves (vathals)
6. Preparation of dehydrated cereal products (vadams) -Rice, Sago, Rice flakes.
7. Preparation and preservation of any product using chemical preservation
8. Vegetable based dehydrated powders
9. Spice based dehydrated powders
10. Fermented pickle

REFERENCE:

1. Niir Board(2012), Modern Technology on Food Preservation, Asia Pacific Business Press, New Delhi

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Secnod Year **NON -MAJOR ELECTIVE I** **Semester III**

NUTRITION FOR HEALTH

Code: **(THEORY)** **Credits 2**

COURSE OBJECTIVES: To enable the students to

- Know the basic and fundamentals of nutritional science
- Obtain knowledge of different food groups, their composition and nutrients present in the foods.
- Understand the vital link between foods, nutrition and health
- Study the different methods of cooking foods
- Gain knowledge on functions, requirements and effects of deficiency of nutrients

UNIT - I INTRODUCTION TO NUTRITION SCIENCE:

Definition of Food, Nutrition, Nutrients, Dietetics, Balanced Diet, Health, Energy, Adequate Nutrition, Optimal Nutrition, Malnutrition, hunger, hidden hunger, Under Nutrition, Over Nutrition, Phytochemicals, Prebiotics, Probiotics; Physiological, Psychological & social functions of food.

UNIT - II FOOD GUIDE – BASIC FIVE FOOD GROUPS:

Basic five food groups: Cereals & grains, pulses & legumes, milk & meat products, Fruit & vegetable, Fats & sugars; Food pyramid, My plate; Meal planning, factors affecting meal planning

UNIT – III RDA AND BALANCED DIET:

Basic concept and purpose of Recommended Dietary Allowances; Factors Affecting Recommended Dietary Allowances; ICMR – RDA table; Uses of ICMR-RDA in planning a balanced diet

UNIT – IV CONSERVATION OF NUTRIENTS:

Minimizing nutrient losses during pre-preparation and preparation of cereals, pulses, fruits and vegetables, milk, oil, egg, meat, fish & poultry

UNIT – V INTERRELATIONSHIP BETWEEN NUTRITION/NUTRIENTS & HEALTH:

Functions, dietary sources and clinical manifestations of deficiency/ excess of the following nutrients: Carbohydrates, lipids and proteins; Fat soluble vitamins-A&D; Water soluble vitamins – thiamine, riboflavin and vitamin C; Minerals - calcium, Iodine and iron

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Planning balanced diet with the use of five food group system. Develop Games - related to nutrition.

REFERENCES:

1. Nutrient requirements and Recommended Dietary Allowances for Indians, ICMR,National Institute of Nutrition, Hyderabad, 2019
2. Dietary guidelines for Indians, ICMR, National Institute of Nutrition, Hyderabad, 2010
3. Swaminathan, M. Advanced Textbook on Food Science and Nutrition, Vol:2, Secondedition, Reprinted, Bangalore Printed and publishing Co Inc, Bangalore, 2008.
4. B Srilakshmi, Nutrition Science Edition 2017 ISBN 9386418886 New Age Publishers Pvt Ltd
5. Srilakshmi B. Food Science; Fourth Ed; 2010; New Age International (P) Ltd.
6. Bamji M.S, Prahlad Rao N, Reddy V.,Textbook of Human Nutrition II Edition, Oxfordand PBH Publishing Co. Pvt. Ltd, New Delhi,2004
7. Manay MS, Shadaksharaswamy. Food-Facts and Principles; 2004; New AgeInternational (P) Ltd.
8. Krause,M.V and Hunsher,M.A, Food, Nutrition and Diet Therapy, 11th edition, W.B.Saunders company, Philadelphia, London, 2004.
9. Wardlaw GM, Hampi, JS. Perspectives in Nutrition; Seventh Ed; 2007; McGraw Hill.
10. Lakra P, Singh MD. Textbook of Nutrition and Health; First Ed; 2008; AcademicExcellence.
11. https://libguides.reading.ac.uk/
12. https://www.publichealth.org/
13. https://nutrisci.wisc.edu/

COURSE OUTCOMES:

- Summarize and critically discuss and understand both fundamental and applied aspects of Food Science and nutrition Terminologies
- Able to explain functions of specific nutrients in food groups
- Identifying nutrient specific force and apply the principles from the various factors of foods to plan a balanced diet
- Identifying and different methods with critical thinking
- Learn information about the basic of nutrients and their role in the field of health, with specific nutritional needs

Second Year **CORE COURSE IV** **Semester IV**

NUTRITION THROUGH LIFE CYCLE

Code: **(Theory)** **Credits 5**

COURSE OBJECTIVES: To enable the students to

- Understand the importance of nutrition and health.
- Comprehend the basic aspects of meal planning.
- Obtain knowledge on the nutritional needs pertaining to different stages of life.
- Plan diet for various age groups.

UNIT – I MEAL PLANNING AND NUTRITION IN ADULTHOOD:

Acceptable Dietary Intake, Use of ICMR RDA in planning balanced diet, Basic principles of meal planning, RDA, food allowance for different age groups, factors influencing nutritional requirements for all age groups. Nutrition in adulthood – reference man and reference women, nutritional and food requirements of an adult man and women, body composition, nutrition and health issues, meal planning to suit different income levels.

UNIT – II NUTRITION IN PREGNANCY AND LACTATION:

Nutrition during pregnancy – stages of pregnancy, physiological changes, weight gain in pregnancy, complications, factors influencing the outcome of pregnancy, nutritional requirements and meal planning for pregnant women. Nutrition for lactating women – Physiology and psychology of lactation, hormonal control, colostrum – composition, composition of breast milk, factors affecting the volume and composition of breast milk, nutritional requirements of a nursing mother, meal planning, factors responsible for lactation failure.

UNIT – III NUTRITION IN INFANCY:

Nutrition in infancy – birth weight of infants, rate of growth, milestones in development (only stages), immunization schedule, nutritional requirements, process of breast feeding, superiority of breast milk, advantages of breast feeding, comparison of human milk with cow's milk, artificial feeding, weaning and supplementary foods, weaning problems and complications. Characteristics of low-birth weight infant, small for date babies, pre-term babies-Feeding of preterm infants.

UNIT – IV NUTRITION IN THE PRESCHOOLERS AND SCHOOL AGE CHILDREN:

Nutrition in preschool age – Growth and development, nutritional requirements, factors affecting nutritional status, food requirement, low cost supplementary foods, nutrition related problems in childhood, meal planning for the preschool child. Nutrition in the school age children – Growth pattern in school children, nutritional and food requirement, packed lunch – factors to be considered, sample menu, nutritional problems, meal plan for the school children.

UNIT – V NUTRITION IN ADOLESCENCE AND ELDERLY:

Nutrition in adolescence - growth and development, body composition, puberty, secondary sexual characteristics, psychological changes, nutritional requirements, nutritional problems, malnutrition due to early marriage, food

habits and meal plan. Eating disorders-Binge eating, anorexia nervosa, bulimia nervosa. Nutrition in elderly – definition of geriatrics, changes in body composition, physiological changes, psychological and socio- economic factors in relation to food intake, nutritional requirement, food modification in old age. Nutrition related problems.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Dissemination of nutrition knowledge for chosen target groups during. National Nutrition Month. Sensitising the nursing mothers on the importance of breast feeding during World Breast Feeding Day.

REFERENCES:

1. Mahtab, S., Bamji, Krishnasamy, K., Brahmam, G.N.V., (2012) Text Book of Human Nutrition, Third Edition, Oxford and IBH Publishing Co. P. Ltd., New Delhi.
2. Srilakshmi, B., (2013), Dietetics, New Age International (P) Ltd., New Delhi.
3. Swaminathan, M., (2012), Advanced Textbook on Food and Nutrition, Vol. 1, Second Edition, Bangalore Printing and Publishing Co. Ltd., Bangalore.
4. Shubhangini, A., Joshi (2002): Nutrition and Dietetics, 2nd edition, Tata McGraw-
5. Hill Publishing Company Limited, New Delhi.
6. Krishnasamy, K. and Sesikeran, B., (2013), Dietary Guidelines for Indians, NationalInstitute of Nutrition, ICMR, Hyderabad.
7. Gopalan, C. Rama Sastri, B.V. and Balasubramanian, (2014), Nutritive Value of Indian Foods, NIN, ICMR, Hyderabad.
8. Longvah, T., Ananthan, R., Baskarachary, K. and Venkaiah, K., (2017), Indian FoodComposition Table, NIN, ICMR, Hyderabad.
9. Krause, M.V. and Hunscher, M.A., (2000) Food, Nutrition and Diet Therapy, 14th Edition, W.B. Saunders, London.
10. Antia, F.P. (2005): Clinical Nutrition and Dietetics, Oxford University Press, Delhi.
11. Wardlaw, G.M., Hampi, J.S., DiSilvestro, R.A., (2004), Perspectives in Nutrition, 6th edition, McGraw Hill, New York.
12. Chadha, R. and Mathur, P., (2015), Nutrition: A Lifecycle Approach, Orient Blackswan, New Delhi.
13. https://www.pdfdrive.com/nutrition-through-the-life-cycle-e187862410.html
14. https://ocw.ui.ac.id/pluginfile.php/12209/mod_resource/content/1/Nutrition%20Through%20the%20Life%20Cycle%20by%20Judith%20E.%20Brown%20%28z-lib.org%29.pdf
15. http://www.freebookcentre.net/medical_text_books_journals/nutrition_ebooks_online_texts_download.html
16. https://vdoc.pub/documents/nutrition-through-the-life-cycle-3rd-edition-6krnmbdqjeq0

COURSE OUTCOMES:

- Relate the different stages of growth and nutrient requirements in the human life cycle.
- Compare the Recommended Dietary Allowance for different age groups based on gender and activity.
- Illustrate the food and nutritional requirements for specific groups of people based on their age and food habits.
- Explain the nutrition related problems common in different stages of life cycle and its impact on health.
- Recommend specific nutrients and foods for various age groups quantitatively and qualitatively.

Second Year **CORE PRACTICAL IV** **Semester IV**

NUTRITION THROUGH LIFE CYCLE

Code: **(Practical)** **Credits 4**

Planning, nutritive value calculation and preparing one servingmeal for:

1. Adult man belonging to low socio-economic group.
2. Adult man belonging to middle socio-economic group.
3. Adult man belonging to low socio-economic group.
4. Adult woman.
5. Pregnant woman.
6. Lactating woman.
2. Liquid supplementary food.
3. Semisolid supplementary food.
4. Solid supplementary food.
5. Preschool child.
6. School going child.
7. Adolescent boy.
8. Adolescent girl.
9. Elderly.
10. Demonstration of Diet Software

REFERENCE:

1. Seth, V. and Singh, K., (2013), Diet Planning through the Life.

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Second Year	**SECOND ALLIED COURSE II**	**Semester: IV**
	FOOD PROCESSING AND PRESERVATION	
Code:	**(Theory)**	**Credits: 4**

COURSE OBJECTIVES: To enable the students to

- To acquire knowledge of food preservation and preservation technique.
- To know the importance and basic principles of food preservation
- To understand the principles behind the various methods of food preservation.
- To know how to use these principles to preserve different types of foods.
- To study the method of action of different preservatives.

UNIT – I INTRODUCTION TO FOOD PROCESSING:

Principles, Importance and Methods of processing - *Primary processing*: -Introduction, Classification & Method of Cleaning, Sorting, Grading, Cutting, Seeding, Chilling and freezing; *Secondary processing*: -Introduction, Classification & Method of Slicing, Pulping, Paste, Frying, Chilling and freezing, Milling *Common food processing*: - Introduction, Classification & Method of Cooking, Baking, Frying, Roasting, Toasting, Grilling, Blanching, Extrusion

UNIT – II PRESERVATION BY LOW AND FREEZING TEMPERATURE:

Food Freezing and thawing process: Introduction, freezing point and freezing rate, comparison of Freezing and thawing process; freezing methods: Air freezing, plate freezing, liquid immersion freezing and cryogenic freezing. Freezer selection. Advantages and disadvantages of freezing.

UNIT – III PRESERVATION BY THERMAL APPLICATION & DEHYDRATION

*Thermal application*Sterilization, BlanchingPasteurization UHT processing, canning, extraction cooking, dielectric heating, microwave heating, baking, roasting and frying; *Food Drying/Dehydration*: Definition, factors affecting drying, Drying methods and equipment: sun/solar drying, Cabinet drying, tunnel dryer, spray dryer, freeze dryer, fluidized bed dryer, Nutritional, physico-chemical changes during drying.

UNIT – IV PRESERVATION BY OTHER METHODS:

Preservatives -Concept and definition -Types -Natural preservatives -Synthetic preservatives; And their application; Irradiation - Concept, definition -Principles of irradiation. - Types -Application

UNIT – V PRESERVATION USING FOOD CONCENTRATE & MEMBRANE PROCESSING

Food Concentration: Evaporation- Definition, types of evaporator (single effect, double effect and multiple effect evaporator); Freeze concentration- General principles and applications, basic elements; *Membrane Processing:* General principles and advantages, Classification of membrane system: Reverse Osmosis, Nano Filtration, Ultra Filtration, Micro Filtration, Electrodialysis and Pervaporation; application in the food industries; Limitation of membrane processes.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

1. In your region / community, list the foods that are preserved at home and identify the method and preservatives used forpreservation.
2. Identify the processed food made using artificial sweeteners thatare available in your area.

REFERENCES:

1. Manay, N.S. Shadaksharaswamy, M. (2004), "Foods- Facts and Principles", New age international publishers, NewDelhi.
2. Srilakshmi, B. (2003), "Food Science", New Age International Publishers, New Delhi.
3. Subalakshmi, G and Udipi, S.A. (2001), "Food processing and preservation". New Age International Publishers, NewDelhi.
4. ShafiurRahmanM.: Hand Book of Food Preservation, Marcel Dekker Inc,New York.
5. PrakashTriveni : Food Preservation, Aadi Publication, DeSivasankar Food Processing and Preservation, Prentice Hall India Learning Private Limited (1 January 2002)
6. Gopala Rao, Chandra. "Essentials of Food Process Engineering". B.S. Publications, 2006.
7. Desrosier N. W. The Technology Of Food Preservation;BS Publishers & Distributors Pvt Ltd, India; 4th edition (1 January 2004)
8. Gould, G. W. (2012), "New Methods of food preservation", Springer Science & Business Media.
9. Ramaswamy H and Marcott M. Food Processing Principles and Applications. CRC Press, 2005
10. Norman N Potter and Joseph H. Food Science by Hotchkiss, CBS Publishers and Distributors.
11. Barbosa-Canovas, Tapia & Cano Novel Food Processing Technologies by CRC Press, 2004.
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13. Zeuthen, Peter and Bogh-Sarensen, Leif. "Food Preservation Techniques". CRC / Wood Head Publishing, 2003.
14. National Center for Home Food Preservation. http://nchfp.uga.edu/
15. Ministry of Food Processing Industries. http://mofpi.nic.in/

COURSE OUTCOMES:

- Apply the principles and methods involved in the processing of different foods
- Discuss and Compare various food processing technology
- Differentiate the mechanisms used in the various methods of preservation
- Identify novel technologies in the processing of food
- Identify high end techniques in food processing and preservation.

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Second Year **NON MAJOR ELECTIVE II** **Semester IV**

NUTRITION FOR WOMEN

Code: **(Theory)** **Credits 2**

COURSE OBJECTIVES: To enable the students to

- Know the basic concepts of nutrition
- Understand the importance of meal and the functions of the nutrients
- Gain knowledge on the deficiency disorders
- Gain knowledge on importance of planning menu during their different growth period

UNIT – I CONCEPT AND DEFINITION OF NUTRITION:

Health, Nutrients, Nutrition, food, Meal, Menu, Balanced diet over nutrition, under nutrition, malnutrition. Hunger, hidden and hollow, Nutrients and their functions.

UNIT – II CONCEPTS OF FOOD:

Basic Five Food groups, My Plate, meal planning, Balanced diet RDA, Functions and classification of food

UNIT – III MAJOR NUTRIENT DEFICIENCY DISORDER:

Signs and Symptoms, foods to be included and avoided Kwashiorkar, Marasmus, MarasmicKwashiorkar

UNIT – IV MINOR NUTRIENT DEFICIENCY DISORDER:

Signs and Symptoms, foods to be included and avoided- Vitamin A, Iron deficiency disorder, Iodine deficiency Disorder

UNIT – V NORMAL NUTRITION THROUGH LIFE CYCLE:

Nutrition in adolescence, Diet in adolescence pregnancy,eating disorders, food consumption pattern among women, Nutritional needs in elderly women, Nutrition in female athletes.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Note the processing of cooking/ cooking methods adopted in their respective households for different foods and ways to conserve nutrients. Identify the eating disorders among the peer groups and ways to rectify.

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10. Brow, A.(2000). Understanding Food. Thomson Learning Publications. Wadsworth.
11. https://www.physiology.org/journal/physrev
12. https://www.annualreviews.org/journal/food
13. https://www.eatright.org/food#Nutrition
14. www.nutrition.gov
15. http://www.nutritionsocietyindia.org/

COURSE OUTCOMES:

- Role of nutrients and food in daily life
- Understand the various factors influencing health and nutritional status of women
- Aware of foods to be included and avoided to combat nutrient deficiency disorders.
- Understand the role of nutrition in different stages of life cycle.
- Understand the implications of women's health on family, community and national development

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Third Year	CORE COURSE V DIETETICS I	Semester V
Code:	(Theory)	Credits 5

COURSE OBJECTIVES: To enable the students to

- Provide comprehensive knowledge on principles and planning of therapeutic diets.
- Acquire knowledge on nutritional needs of normal and sick persons.
- Assess the nutritional problems of community and effectively manage the nutritional needs of community.
- Develop capacity and aptitude for taking up dietetics as a profession.

UNIT – I DIETICIAN, NUTRITION CARE PROCESS AND ASSESSMENT:

Dietician: Definition; Educational Qualification of Dietician, Types and Role of dietician, Code of ethics Difference between registered dietician & Nutritionist, tools used by dietician. Introduction to Nutrition Care Process: Definition, Steps of Nutrition Care Process. Evaluation of nutrition care. Nutrition Assessment: Definition, Methods of Nutrition assessment.Nutrition Interventions: Definition, objectives, Nutrition Monitoring & Evaluation.

UNIT - II DIET THERAPY:

Definitions & Principles of Diet Therapy, Concepts &objectives of therapeutic diet, Therapeutic Adaptation of Normal Diet: Normal diet, Routine Hospital Diet: -clear liquid diet, Full fluid diet/liquid diet, semi-solid diet, soft diet, normal diet, bland diet, high & low-calorie diet, high & low protein diet, high & low fiber diet, low cholesterol diet.

UNIT – III DRUG, NUTRIENT INTERACTIONS AND SPECIAL FEEDING TECHNIQUES:

Modification of Diet according to medical prescription- Diet effects on disposition, drug effects on nutrients and interaction of drugs. Special feeding methods- Enteral nutrition- methods-nasogastric, gastrostomy and jejunostomy types of food, infusion techniques. TPN-Types of infusion, TPN formula for adults.

UNIT – IV FEBRILE CONDITION AND DIET IN ADDICTIVE BEHAVIOR:

Causes, symptoms, dietary management of-Febrile conditions: Acute & Chronic-Typhoid, influenza, malaria, tuberculosis, COVID. Definition, types, symptoms, causes, risk factor, effect, treatment, nutritional management.
Eating disorders, Alcoholism Common Nutrient Deficiencies in Recovering Addicts, nutritional planning for pre and post rehabilitation.

UNIT – V DIET IN DEFICIENCY DISORDERS & LIFE STYLE DISORDERS / DISEASES:

Diet in Deficiency Disorders- Causes, symptoms, dietary management-PEM, Kwashiorkor& marasmus, VitaminA, C & D, Mineral–Calcium,Iron. Life style disorders: Obesity, Underweight, Diabetes mellitus, Cardiovascular diseases - hypertension, atherosclerosis, congestive cardiac failure.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only)

E- content development for a particular disease. Pamphlet preparation for a particular disease

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3. Shubhangini A.Joshi.2011. Nutrition and Dietetics. 3rd edition. Tata McGraw Hill Education private limited, New Delhi.
4. SrilakshmiB.2014.Dietetics.New age international publishers, New Delhi.
5. Swaminathan M.1993. Principles of Nutrition and Dietetics. Bappco, Bangalore.
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8. Maurice E.Shils James A,Olson Moshe Shike.1994. Modern Nutrition in health and disease, eighth edition, Febiger Philadelphia, Awaverly company.
9. Micheal J. Gibney I. Mac Donald A and Helan M. Roche. 2004. Nutrition and Metabolism. Blackwell Publishing Company, Bangalore.
10. Robinson CH. Lawles M. R.Chenoweth WL. Garwick AE.1990. Normal and Therapeutic Nutrition. The Macmillan Company, New York.
11. https://youtu.be/VC8e8r3OxCs
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COURSE OUTCOMES:

- Comprehend the role and need of dieticians in nutritional care process.
- Apply knowledge on changing needs of normal and therapeutic nutrition.
- Assess, formulate and prepare diet for specific condition so life style disorders.
- Interpret the role of nutrients to combat malnutrition.
- Understand knowledge on drug addiction and need of the nutritional requirement for the addictive behaviors.

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Third Year **CORE COURSE VI** **Semester V**

FOOD SERVICE MANAGEMENT I

Code: **(THEORY)** **Credits 5**

COURSE OBJECTIVES:To enable the students to

- Gain knowledge about various types of food services.
- Comprehend about the Principles and functions of Management.
- Understand about personnel Management, financial management and legal aspects of catering.
- Realise the importance of sanitation and hygiene in food service institutions.

UNIT – I FOOD SERVICE INDUSTRY:

Food Service Industry- history and development Sectors of Food Service Industry: Classification of food service- Commercial- hotels, restaurants, Popular catering- fast foods, take away, franchising and leisure attractions. Transport catering- air, rail, sea and space. Miscellaneous- contract and outdoor catering. Non-Commercial- hospitals, schools, philanthropic establishments. Food service systems- Conventional, Cook chill/cook freeze, Commissary and Assembly service. Cloud kitchen set up and meaning.

UNIT – II MANAGEMENT AND ORGANIZATION:

Definition, Principles and techniques of management, tools of management; leadership-qualities of good leader styles of leadership; art of delegation. Organization - Organizing-present and future trends. Process of organization. Principles of organization, types of organization, tools of management. Definition, theories and types.

UNIT – III PERSONNEL MANAGEMENT:

Definition, Sources of personnel, Criteria for selection of personnel orientation, training, motivation, supervision. Importance of good human relations, employee facilities fringe benefits Labour policies and legislation - labour laws governing food service establishments. Performance appraisal of employees.

UNIT - IVFINANCIAL MANAGEMENT:

Book keeping- Single entry and double entry systems, types of accounts, advantages of double entry system. Elements of cost- food, labour and overhead costs. Break even analysis. Control- factors affecting cost control.
Budgeting, books of accounts- Journal, Ledger, subsidiary books, difference between Journal and Ledger; trial balance and balance sheet, inventories, records for control. Pricing- dish costing, meal/menu pricing, factors affecting pricing

UNIT V - HYGIENE, SANITATION AND SAFETY IN FOOD SERVICE INSTITUTIONS:

Definition, importance, environmental hygiene and sanitation; hygiene in food handling; personnel hygiene of personnel; importance of pest and rodent control in food services. Safety in food procurement, storage, handling and preparation, control of spoilage, safety of leftover foods, disposal of food waste Accidents in food service establishments, safety procedure, training, Education, legal responsibilities of food service manager.

UNIT VI - CURRENT CONTOURS (For Continuous Internal Assessment Only)

Application of principles of sanitation in college laboratory and hostel. Visit to catering institutions to know about organization pattern and personnel Management

REFERENCES:

1. Sethi, M., and Malhan, S. (2015), Catering Management: An integrated approach. (3rd ed). New Delhi:New age international publishers.
2. Sethi, M. (2015), Institutional Food Management, (3rd ed.). New Delhi:New age international publishers.
3. Singaravelavan, R. (2012), Food and Beverage Services, (1st ed.). India: Oxford University Press.
4. Suganthi, V., and Premakumari,C. (2019), Food Service Management, (1st ed.), Dipti Press (OPC) Pvt.Ltd, Chennai
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6. 1.Theis, M., Payne-Palacio, J. (2000), West and Wood's Introduction to Foodservice. (9th ed.). United Kingdom: Prentice Hall.
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11. https://www.fda.gov/food/hazard-analysis-critical-control-point-haccp/haccp-principles- application-guidelines
12. https://www.ccohs.ca/oshanswers/hsprograms/house.html
13. https://www.eatrightpro.org/practice/practice-resources/foodservice
14. https://www.ers.usda.gov/topics/food-markets-prices/food-service-industry.aspx#.U1leEVVdW4I
15. https://theicn.org/

COURSE OUTCOMES:

- Elucidate the origin and categorization of food service sectors.
- Employ the basic principles and tools of management for efficaciously handling an establishment
- Utilize the expertise obtained for managing human resources.
- Apply the understanding of concepts of management to book keeping and methods of pricing.
- Explore the importance of hygiene and safety in the food service units.

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Third Year **CORE COURSE VII** **Semester V**

BAKERY AND CONFECTIONARY

Code: **(Theory)** **Credits 5**

COURSE OBJECTIVES: To enable the students to

- Understand the principles & method sof baking.
- Acquire basic skills in baking and confectionery.
- Underst and the role of various food component sin baking and the interaction of the elementsused for baking.
- Expand their knowledge related to thear to f decoration of baked foods and confectionery items.

UNIT - I BASIC BAKING & EQUIPMENTS:

Baking: Meaning, process and scientific principles involved. Classification of baked products. Basic plan andlayout of abakery unit.

Equipments used in bakery: Large and small equipments andtools; types of ovens Nutritional as pects of bakery products Storage and evaluation (objective and subjective methods) of baked products.

UNIT II –BAKING IN GREDIENTS:

Ingredients usedin bakery: Functional classification of ingredients- structure builders, tenderizers, moisteners, driers and flavors. Flour: Composition ,types and quality characteristics.Sugar.

Fats: Fats used as shortenings - Butter, margarine, emulsifiedfats and flavored oils; properties and uses of shortenings. Leavening agents: Definition and classification - physical; chemical - bakingpowder and its types, baking soda; biological – yeast –types and rolein baking.; Moisturizing agents: Egg, water and milk – their rolein baking.

UNIT – III BREAD & CAKES:

Bread: Ingredientsused,stepsinbreadmakingprocess,processingmethods,characteristicsof goodbread(externalandinternal).

Cakes: Ingredients, types, cake making methods,test for doneness, characteristics of good cake (externalandinternal), cakefaults and remedies. Icing: Meaning, types, ingredients used and preparation guidelines.

UNIT IV - COOKIES&PASTRIES

Cookies: Characteristics, preparation methods and problemsin cookiemaking.

Biscuits: Stepsinvolvedinbiscuitmaking. Pastries: Types and method of preparation.

UNIT – V SUGAR CONFECTIONARIES:

Sugar confectionery – Types, role of sugar in preparation, Candies – Fondant like toffee, fudge, marshmallows, gums, jellies, chocolates– properties of these candies.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Visit to a bakery unit. Identify Faults in cakes, bread

REFERENCES:

1. AvantinaSharma.2019.TextbookofFoodScienceandTechnology.3rdedition.CBSpublishers,ISBN-10:9789386478009,ISBN-13:978-9386478009.
2. DubeySC.2002.BasicBaking.societyofIndianBakers,NewDelhi.
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7. LilianHiaglandMeyer.2004.Foodchemistry.CBSpublishersandDistributors.
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10. Vijaya Khader.2001.TextbookofFoodScience andTechnology.IndianCouncilofAgriculturalResearch,NewDelhi
11. https://guides.baker.edu/
12. https://www.nipabooks.com/
13. https://library.rrc.ca/
14. https://nios.ac.in/

COURSE OUTCOMES:

- Explain the propertiesandfunctionsofvariousingredients in bakery science.
- Understand the role and use of equipmentsinthe productionofbakedfoods.
- Apply, prepare, variety of doughs, batters, andfillings for baking with a sound understandingofmixingmethodsandbakingtechniques.
- Classifyandpreparebasicconfectionaryproducts.
- Infer knowledge on role of sugar in confectionaries

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Third Year	**CORE PRACTICAL V DIETETICS I**	**Semester V**
Code:	**(Practical)**	**Credits 4**

Planning, nutritive value calculation and preparation of a one serving diet for the following conditions:

1. Therapeutic Diet- Normal, Clear fluid, full fluid & soft diet
2. High and low caloric diet.
3. High and low Protein diet.
4. High and low Fibre diet&
5. High and low Cholesterol diet.
6. Diet in febrile conditions- Typhoid, tuberculosis.
7. Obesity.
8. Underweight.
9. Diabetes Mellitus.
10. Cardiovascular diseases– hypertension, atherosclerosis.
11. Anorexia nervosa & Bulimia nervosa.
12. Drug addiction diet.
13. Diet for Deficiency - VitaminA, D, Calcium, iron, iodine

REFERENCES:

1. Antia FP.1973. Clinical nutrition & Dietetics. Oxford University Press, Delhi, London,NewYork.
2. Davidson & Passmore R & Brock JB. 1976. Human Nutrition & dietetics. The English Languages Book Society & Churchill Livingstone.
3. Krause MV & Mahan MA. 1992. Food Nutrition and Diet Therapy. W.B. Sunders Company, Philadelphia, London.
4. Maurice E.Shils James A,Olson Moshe Shike.1994. Modern Nutrition in health and disease, eighth edition, Febiger Philadelphia, Awaverly company.
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6. Robinson CH. LawlesMR.Chenoweth WL. Garwick AE.1990. Normal and Therapeutic Nutrition. The Macmillan Company, New York.

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Third Year **MAJOR BASED ELECTIVE I** **Semester V**

1) FOOD STANDARDS AND QUALITY CONTROL

Code: **(Theory)** **Credits 4**

COURSE OBJECTIVES: To enable the students to

- Explain the importance of various issues related to food safety and quality
- Understand how food-borne illnesses occur
- Know about national and international food standards and their role in ensuring food quality and safety
- Understand the importance of food safety management systems
- Be acquainted with various career avenues / options in this area.

UNIT – I FOOD SAFETY CONCEPT:

Food safety concept: - Importance of food safety in the food processing industry Risk classification, Nutritional labeling regulation (mandatory and optional nutrients, nutritional descriptors and approved health claims); Microbial contamination (including cross-contamination/indirect contamination) Chemical contamination, Physical contamination, Allergen contamination

UNIT – II DEFINITIONS AND IMPORTANCE, GOOD MANUFACTURING PRACTICES

Food Safety Programs (GMPs), Pest Control Program, Facility Maintenance, Personal Hygiene, Supplier Control, Sanitary Design of Equipment and Infrastructure, Procedures for Raw Material Reception, Storage and Finished Product Loading, Sanitation Program. (Sanitation Standard Operating Procedures (SSOPs)., Product Identification, Tracking and Recalling Program, Preventive Equipment Maintenance Program, Education and Training Program

UNIT – III HAZARD ANALYSIS AND RISK ASSESSMENT:

Physical hazards (metals, glass, etc), Chemical hazards (food additive toxicology, natural toxins, pesticides, antibiotics, hormones, heavy metals and packaging components), Biological hazards (epidemiology of biological pathogens: virus, bacteria and fungi), Evaluation of the severity of a hazard Controlling Food Hazards. Hazard Analysis Critical Control Point (HACCP) system.

UNIT – IV QUALITY ASSURANCE AND FOOD SAFETY REGULATIONS:

Theoretical and practical considerations, description of different systems: GAP, GMP,TQM,ISO. Indian food standards- Voluntary and Obligatory standards (PFA,FPO,MMPO,AGMARK etc.) Codex Alimentarius, Structure, organization and duties of regulatory system; Duties and responsibilities of food business operator; Registration and Licensing process and requirements; Labeling of Food Products; Traceability; Import and Export of Foods; Liability for Defective Products; Food safety management systems and certifications; Regulation of special category Foods: Regulation of Irradiated foods; Regulation of Biotechnology and Genetic Modifications.

UNIT – V FOOD HYGIENE PROGRAMS AND SENSORY EVALUATION:

Food Hygiene Programs: Personal hygiene, Training programs, Personal habits, Hygiene verification, Water - uses, quality, Treatments, Cleaning and sanitation, Cleaning agents, Sanitizing agents, Equipment and systems, Evaluation of sanitation efficacy, Pest Control, Pest Classification (insects, rodents and birds), Prevention and control.
Sensory evaluation: Requirements and methods. Sensory parameters: Colour, flavour, texture, taste, aroma, general acceptability. Subjective and Objective test of sensory parameters. (Differential test, Descriptive test, Rating test, Sensitivity threshold test).

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Visit a nearby restaurant / canteen / street food vending outlet and observe their functions and record the same. Collect any fresh fruits, fresh vegetables and one food item e.g., bread/chapati/roti and list the signs of quality *viz.* Appearance, Color, Texture &odour in the tabulated format. Store them at room temperature for one week, observe the changes and prepare a chart listing the changes in quality.

REFERENCES:

1. Pulkit Mathur Food Safety and Quality Control; Orient Blackswan ISBN 9789352873791
2. Singh Gajjar, Budhrani, Usman Quality Control And Quality Assurance; S.Vikas And Company (PV) (1 January 2021)
3. JhadeSanchita, Tiwari, Usman Product Development and Technology Transfer S Vikas And Company (PV) (1 January 2021)
4. Alli, Food Quality Assurance; Taylor & Francis (1 January 2003)
5. Rakesh Sharma Devraj & V. K. Joshi Quality Control for Value Addition in Food Processing; New India Publishing Agency (15 April 2011) ISBN: 9380235577
6. SunetraRoday Food Hygiene And Sanitation 1998
7. Devendra, K. B. and Priyanka, T. 2006. An Introduction to Food Science and technology and Quality Management. Kalyani Publishers 81-272-2521-5.
8. Amerine MA, Pangborn RM &Rosslos EB. 1965. Principles of Sensory Evaluation of Food. Academic Press.
9. Early R.1995.Guide to Quality Management Systems for Food Industries. Blackie Academic.
10. Furia TE.1980. Regulatory status of Direct Food Additives. CRC Press.
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12. Krammer A & Twigg BA.1973. Quality Control in Food Industry. Vol. I, II. AVI Publ.
13. Macrae R, Roloson R &Sadlu MJ. 1994. Encyclopedia of Food Science & Technology & Nutrition. Vol. XVI. Academic Press.
14. Piggot J.R. 1984. Sensory Evaluation of Foods. Elbview Applied Science.
15. Ranganna S. 2001. Handbook of Analysis and Quality Control for Fruit and Vegetable Products. 2nd Ed. Tata-McGraw-Hill.
16. Export/Import policy by Govt. of India.

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18. https://www.researchgate.net/publication/272495266_Quality_assurance_systems_and_food_safety
19. https://www.afsc.org/sites/default/files/documents/FINALCOLOR%20AFSC%20Food%20Safety%20Manual.pdf
20. https://www.academia.edu/41208822/Food_Quality_Management_Notes

COURSE OUTCOMES:

- Deliberate in details with examples Food - Safety, Quality, QA and Current challenges to food safety
- Assess the principles of TQM, GMP, GAP and role of management in QC
- Understand the concept of HACCP, 7 principles and its implementation
- Demonstrate the role, guidelines of Food Safety and Standards Authority of India for food products
- Apply the concepts of Food Hygiene Programs and Sensory Evaluation

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Third Year **MAJOR BASED ELECTIVE I** **Semester V**

2) FUNCTIONAL FOODS AND NUTRACEUTICALS

Code: **(Theory)** **Credits 4**

COURSE OBJECTIVES: To enable the students to

- Knowledge on history, components of Functional Foods and Nutraceuticals
- To Identify and categorize the nutraceuticals based on source functions and nature
- Knowledge on the role of functional foods, nutraceuticals and dietary supplements in health and disease
- To understand the regulatory affairs of functional foods

UNIT – I FUNCTIONAL FOODS AND NUTRACEUTICALS:

Definition and History-Functional foods, traditional foods, nutraceuticals, designer foods and pharma foods, history of functional foods, components of functional foods, stages involved in development of functional foods. UNIT II - CATEGORIZATION OF NUTRACEUTICALS Classification - Based on food source, mechanism of action and chemical nature-isoprenoid, phenolic substances, fatty acids and structural lipids, carbohydrates and amino acid based derivatives, isoflavones.

UNIT – III FUNCTIONAL FOODS AND NUTRACEUTICALS OF MICROBIAL ORIGIN

Functional foods of Microbial origin- Human gastrointestinal tract and its microbiota, functions, probiotic microflora and functions- Lactobacillus and Bifidobacterium, concept of probiotics and prebiotics with examples, role of probiotics in health and disease.

UNIT – IV FUNCTIONAL FOODS AND NUTRACEUTICALS IN HEALTH AND DISEASE

Sources and role of Functional foods and Nutraceuticals- Sources of functional foods and Nutraceuticals, concept of dietary supplements, phytochemicals, phytosterols, omega 3 and 6 fatty acids, dietary fiber, role of nutraceuticals in health and disease management, non-essential nutrients as dietary supplements, FOSHU foods.

UNIT – V REGULATORY ASPECTS OF FUNCTIONAL FOODS AND NUTRACEUTICALS

Regulatory aspects- International and national regulatory aspects of functional foods in India, ICMR guidelines for probiotics.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only)

Prepare a recipe book based on functional foods and nutraceutical properties. List and identify the functional foods and nutraceutical potential of daily food commodities you consume

REFERENCES:

1. Wildman, R.E.C. (2019). Handbook of Nutraceutical and Functional Foods. CRC Press,
2. Gibson, G. R. and Williams, M. C. (2001). Functional Foods Concept to Product. CRC Press.

3. Vattem, D.A. and MaitinV.(2016). Functional Foods, Nutraceuticals and Natural Products, Concepts and Applications. DEStech Publications, Inc
4. Gupta, R. C. (2016). Nutraceuticals: Efficacy, Safety and Toxicity. Academic Press.
5. Giuseppe Mazza; Functional Foods: Biochemical and Processing Aspects, Volume 1; CRC Press
6. Robert E.C. Wildman; Handbook of Nutraceuticals and Functional Foods, Second Edition; CRC Press 2019
7. Massimo Maffei; Dietary Supplements of Plant Origin; CRC Press
8. FereidoonSahidi, Deepthi K. Weerasinghe; Nutraceutical Beverages, Chemistry, Nutrition and Health Effects; American Chemical Society
9. Ronald R. Watson; Vegetables, Fruits, and Herbs in Health Promotion; CRC Press
10. Susan Sungsoo Cho, Mark L. Dreher; Marcel; Dekker Handbook of Dietary Fibre
11. https://odp.inflibnet.ac.in/index.php/module_details?course=functional%20foods%20and%20nutraceuticals&source=swayam&subsource=UGC
12. https://ciet.nic.in/swayam_FNHL_module20.php
13. https://www.nipabooks.com/
14. https://mail.google.com/

COURSE OUTCOMES:

- Understand the basics of nutraceutical and functional foods
- Identify and explore the types & sources of nutraceutical and functional foods
- Understand the potential of various nutraceuticals and functional foods in promoting human health
- Recognize and apply with critical knowledge in identifying functional foods
- Will identify and explain the regulatory issues involved in producing and marketing nutraceutical and functional foods

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Third Year **SKILL BADED ELECTIVE I** **Semester: V**

PRINCIPLES OF INTERIOR DESIGN

Code: **(Theory)** **Credits: 2**

COU

RSE OBJECTIVES: To enable the students to

- Understand the concept,history and significance of interior design
- Appreciate the aesthetics of planning
- Learn the elements and principles of design
- Know the theories and facts about colour
- Design interiors applying the principles of design

UNIT – I CONCEPT OF INTERIOR DESIGN:

Meaning of Interior Design and Interior Decoration, history of Interior design in India, significance of Interior Design in modern era, functions and qualities of Interior Designer.

UNIT – II DESIGN VOCABULARY:

Aesthetics of planning- beauty, expressiveness, functionalism and economy, need for developing skill in aesthetics, design concept and types, significance of Good taste.

UNIT – III DESIGN ELEMENTS AND PRINCIPLES:

Elements of Design-Meaning and importance, line and direction, shape and form, size, colour, texture, space, light and ornamentation. Principles of Design- balance, rhythm, emphasis, harmony, proportion.

UNIT – IV COLOR AND ITS THEORIES:

Sources of color, color systems-Prang, Munsell and Ostwaldcolor system, qualities of color, color schemes, modern trends in application of color in interiors.

UNIT – V APPLICATION OF ELEMENTS AND PRINCIPLES:

Designs involving various elements such as point, line, shape, colour and texture – suitable for mural, design on fabric such as curtains, draperies, wall hanging, furnishings, tiles, stained glass, block printing, collage etc.– involving all the principles of composition. Study and critical analysis of man-made objects – their purpose, functional suitability, formal appeal, etc. - evolving suggestions for improvement of the same.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Analysis design from photos,Magazines, advertisements, for their qualities. Arranging various areas using the different principles of design. Harmonious combination of colour in different areas. Visit to Hotels, Restaurant, Auditoriums, and Airports to observe the special area arrangement

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1. Raghubalan G, Raghubalan S, (2015) Hotel Housekeeping: Operations and Management, 3rdedition, Oxford University Press India.
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14. Caroline cliftenet. al., The Complete Home Decorator, Portland House New York.
15. https://study.com/academy/lesson/what-are-the-seven-elements-of-art-definition-examples.html
16. https://thevirtualinstructor.com/artfundamentals.html
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18. https://www.slideshare.net/KKIIMMII/aesthetics-13339798
19. https://www.curbed.com/2016/7/21/12228858/interior-design-decorating-principles
20. https://justdecorate.wordpress.com/2014/06/19/the-most-popular-interior-design-motifs-and-their-symbolic-meaning/

COURSE OUTCOMES:

- Acquire knowledge of the meanings, concepts, and developments of interior design.
- Cultivate an appreciation for the aesthetics of planning.
- Learn the concepts and principles of design
- Acquaint with colour theories and facts.
- Apply design fundamentals to the creation of interior spaces

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Year: III	CORE COURSE VIII DIETETICS II	Semester VI
Code:	(THEORY)	Credits 5

OBJECTIVES: To enable the students to

- Provide comprehensive knowledge on principles and planning of therapeutic diets.
- Acquire knowledge on nutritional needs of diseased persons.
- Assess the nutritional problems of diseased and effectively manage the nutritional needs.

UNIT – I DIET COUNSELING AND COMPUTERS IN NUTRITION MANAGEMENT

Dietary counseling -Clients and counselors, client responsibility, attributes of a successful counselor, steps in counseling process, counseling guidelines.
Computers in Management of Nutrition Practice- General information – data input, data output, data analysis, data communication, clinical care – communication in patient care and nutritional therapy.

UNIT – II NUTRITIONAL CARE IN RESPIRATORY, GASTRO INTESTINAL TRACT AND RENAL SYSTEM

Aetiology, symptoms, nutritional management/modification of diets. Upper respiratory infection- Common Cold, Lower respiratory infection - Bronchitis and Pneumonia Gastro intestinal disease, peptic ulcer, Irritable bowel syndrome, diarrhea and dysentery. Diseases of liver, gallbladder-hepatitis, cirrhosis Cholecystitis & Cholelithiasis Disease of kidney- Glomerulo nephritis, nephritic syndrome, acute and chronic renal failure, dialysis- urinary calculi.

UNIT – III DIET IN ENDOCRINE, EXOCRINE SYSTEM & INBORN ERRORS OF METABOLISM:

Aetiology, symptoms, nutritional management and modification of diet in Endocrine disorder- Hypo and Hyper thyroidism and Addison's disease Exocrine disorders- Cystic fibrosis, Acute & Chronic Pancreatitis InbornErrorsofMetabolism-Galactosemia (Carbohydrate metabolism), Phenylketonuria (Aminoacid Metabolism), Niemann Pickdisease (lipidstorage Metabolism)

UNIT IV- NUTRITIONAL CARE INSPECIALCONDITIONS

Aetiology, symptoms, nutritional management and modification of diet in Allergy Surgery, Burns, HIV/AIDS, Cancer.

UNIT – V NUTRITIONAL CARE FOR CHILDREN WITH SPECIAL NEEDS:

Overview of disability, Etiology, symptoms, nutritional management and modification of diet in Attention deficit hyper activity disorder Autism Cerebralpalsy Down's Syndrome

UNIT VI - CURRENT CONTOURS: (FOR CONTINUOUS INTERNAL ASSESSMENT ONLY)

Counseling session. Diet setting

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1. Gopalan S.C Balasubramanian S.V. Ramestri and Visweswara Rao Diet Atlas. 1971, ICMR, New Delhi,India.
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3. Srilakshmi B.2010. Dietetics, New Age International Publishers, NewDelhi.
4. Sumati R. Mudambi MV.Rajagopal. 2015. Fundamental of food, nutrition and diet therapy. New age international publishers, New Delhi.
5. Swaminathan M.1993. Principles of Nutrition and Dietetics. Bappeo88, Mysore Road, Bangalore.
6. Davidson & Passmore R & Brock JB. 1976. Human Nutriton& dietetics. The English Languages Bood Society & Churchill Livingstone.
7. Krause MV & Mahan MA. 1992. Food Nutrition and Diet Therapy. W.B.Sunders company, Philadelphia London.
8. Maurice E.Shils, James A.Olson, Moshe Shike.1994. Modern Nutrition in health and disease. eighth edition, VolI& II Lea &Febiger Philadelphia, A waverly company.
9. Micheal J. Gibney IA. Mac Donald and HelanM.Roche. 2004. Nutrition and Metabolism. Blackwell Publishing Company, Bangalore.
10. Robinson CH.LawlesMR.ChenowethWL.Garwic AE.1990. Normal and Therapeutic Nutrition. The Macmillan Co.
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COURSE OUTCOMES

- Predict the importance of computers in nutrition practice. Develop the capacity and attitude for taking dietetics as a profession.
- Define the causes, symptoms and complications of diseases.
- Explain the skills of dietary assessment, planning, management and evaluation
- Utilize advanced principles of dietary management, including critical thinking skills, literature searches, data collection and interpretation, necessary for the implementation of therapeutic services in clinical settings.
- Analyse the relationships between nutrition, health and food selection.

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Third Year **CORE COURSE IX** **Semester VI**

FOOD SERVICE MANAGEMENT II

Code: **(Theory)** **Credits 5**

COURSE OBJECTIVES: Students will be able to

- Develop skills in menu planning for quality preparation
- Gain knowledge regarding selection and purchase of food
- Understand the applications of basic principles to bulk production of the food and the different styles of food service in volume feeding
- Gain knowledge of food service layout
- Develop skills in handling equipment and maintenance

UNIT – I MENU PLANNING AND STYLES OF SERVICE:

Menu planning – Definition, types, menu planning for various sectors and institutions, health safety in menu planning. Menu card writing. Types of food and beverage services – Mis-en-place & Mis-en-scene, Table service – English/Silver – Gueridon, Tray, Trolley, Lounge, Room service. Single point service – Take away, Vending kiosks, food courts & bars, Automats.

UNIT – II FOOD PURCHASE AND STORAGE:

Food Purchase; Buying and Receiving methods. Food storage: Types of storage, maintenance of store records- Requisition slips, order form, stock book, invoice, goods received book, inventories. Computer applications in food service establishments

UNIT – III QUANTITY FOOD PRODUCTION AND FUELS:

Quality standards and control. Standardisation of recipes. Portion control: Utilization of left over foods. Fuels: Types of fuel, advantages of fuel in relation to economy in quantity cookery, fuel saving economy in food service institutions.

UNIT – IV FLOOR PLANNING AND LAYOUTS:

Planning of Food Service unit - Planning and organizing space relationships and arrangement of equipment with assembly line concept. Layout- Detailed layout and location of functional areas in relation to capacity, receipt, purchase & storage of food, food production, food service, removal of soiled dishes, hand washing and dishwashing. Lighting and ventilation.

UNIT - V EQUIPMENT IN FOOD SERVICE:

Classification of equipment, traditional and modern equipment, factors affecting selection of equipment. Electrical and nonelectrical equipment for food storage, preparation, service and dishwashing. Base materials and insulating material

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Visit to different types of institutions. Cost comparison of different types of fuel. Explore the different traditional and modern equipments used in food service. Eco kitchen / green kitchen concepts

REFERENCES:

1. MohiniSethi and SurjetMalhan. (2017), Catering Management, "An Integrated Approach.(3rd ed.,). Bangalore: New Age International Pvt Ltd.
2. Suganthi, V and Premakumari, C. (2017),Food Service Management. Chennai: Dipti Press (OPC) Pvt.LTD.
3. Andrews, S. (2009), Food and Beverage Service. (2nd ed.,). New Delhi: Tata McGraw hill publishing company limited.
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5. Jyoti,S.Sharma. (2006), Food Service Modern Technique and Practices. New Delhi:Akansha Publishing House.
6. Avery, A.A. (1991), Modern Guide to Food Service Equipment. C.B.I Publishing Inc.
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10. Cousins, J., Weekes, S. (2020), Food and Beverage Service. (10th ed.). United Kingdom: Hodder Education.
11. https://www.ccohs.ca/oshanswers/hsprograms
12. https://www.eatrightpro.org/practice/practice-resources
13. https://www.ers.usda.gov/topics/food-markets-prices/food-service-industry.aspx
14. https://theicn.org/
15. www.fssai.gov.in

COURSE OUTCOMES:

- Develop skills of various styles of services
- Expertise in food purchasing, storing and record maintenance
- Obtain skills in volume food production and judicial use of fuels according to the menu and event
- Understand the concepts of floor planning and layouts of the food service institution.
- Detail understanding with the different equipment utilized in the service production

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Third Year	**CORE PRACTICAL VI DIETETICS II**	**Semester VI**
Code:	**(Practical)**	**Credits 4**

Planning, Nutritive value calculation and preparation of one serving diet for the following conditions:

1. Common cold and pneumonia.
2. Pepticulcer, IBS, diarrhoea and dysentery.
3. Hepatitis, Cirrhosis.
4. Nephritis, Nephrosis, Urinary calculi.
5. Hyper and Hypothyroidism.
6. Pancreatitis.
7. Inborn Errors of Metabolism– Galactosemia and PKU.
8. Allergy, Burns, Cancer, AIDS.
9. Autism.
10. Down syndrome.

REFERENCES:

1. Srilakshmi B.2010. Dietetics, New Age International Publishers, New Delhi.
2. Sumati R. Mudambi MV. Rajagopal. 2015. Fundamental of food, nutrition and diet therapy. New age international publishers, NewDelhi.
3. SwaminathanM.1993. Principles of Nutrition and Dietetics. Bappeo88, MysoreRoad, Bangalore.

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Third Year **MAJOR BASED ELECTIVE II** **Semester VI**

1) COMMUNITY NUTRITION

Code: **(Theory)** **Credits: 4**

COURSE OBJECTIVES: To enable students to

- Understand national nutritional problems and their implications.
- Familiarize with nutrition intervention programmes.
- Know the importance of nutrition education.

UNIT – I CONCEPT AND SCOPE OF PUBLIC NUTRITION:

Definition, concept, scope and multidisciplinary nature of public nutrition.
Nutritional problems affecting the community- Etiology, prevalence, clinical features and preventive strategies for malnutrition related problem and deficiency disorders- Protein energy malnutrition, Obesity, Nutritional anemia, Vitamin A deficiency, Iodine deficiency disorders, Fluorosis, Intra burden, Double burden, Triple burden.

UNIT – II COMMUNITY ASSESSMENT IN PUBLIC HEALTH:

Community assessment models, methods of data collection, Basic needs of assessment, Skills in assessment. Assessment of nutritional status- Objectives and importance, Methods of assessment: Direct -Clinical signs,anthropometry, biochemical tests, biophysical tests; Indirect -Diet surveys, 24-hour dietary recall, food frequency questionnaire, diet history , dietary record, vital statistics.

UNIT – III NATIONAL INTERVENTION PROGRAMMES:

National nutritional policy - Integrated child development scheme (ICDS), Midday Meal Program, Public Distribution System (PDS),National programs for the prevention of anemia , National Prophylaxis Programme against VitaminA Deficiency Diseases, Goitre Control Programme, National Nutrition Policy and Food Security, Poshan Abhiyan 2.0, Annapoorna Scheme.

UNIT – IV NATIONAL AND INTERNATIONAL AGENCIES IN COMBATING MALNUTRITION:

National Organization concerned with food and nutrition – Indian Council of Medical Research (ICMR), National Institute of Nutrition (NIN), National Nutrition Monitoring Bureau (NNMB), Central Food Technological Research Institute (CFTRI), Defence Food Research Laboratory (DFRL), and National Institute of Public Cooperation and Child Development (NIPCCD), Food and Nutrition Board (FNB). International Organization concerned with Food and Nutrition- Food and Agricultural Organization (FAO), United Nations International Children's Emergency Fund (UNICEF), World Bank, World Health Organization (WHO) - Sustainable development goals.

UNIT – V NUTRITION EDUCATION:

Objectives, principles and scope of nutrition and health education and promotion. Role of audio-visual aids in nutrition education- Information Electronics Communication Technology. Organization of nutrition education programmes, principles of planning, executing and evaluating nutrition education programmes, problems encountered in conducting nutrition education programmes.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Nutritional status assessment of self and peer group: 24 hour dietary recall, anthropometry, clinical assessment. Prepare flyers on awareness of any one community related nutritional problem.

REFERENCES:

1. Bamji .M.S, PrahladRao.N, Reddy V (2016). *Textbook of Human Nutrition*.Oxford and PBH Publishing Co. Pvt. Ltd, New Delhi.
2. Park K (2011). *Park's Textbook of Preventive and Social Medicine*, 21st Edition. M/s BanarasidasBhanot Publishers. Jabalpur. India
3. Wadhwa A and Sharma S (2003). *Nutrition in the Community- A textbook*. Elite Publishing House Pvt. Ltd. New Delhi.
4. Park K (2011). *Park's Textbook of Preventive and Social Medicine*, 21st Edition. M/s BanarasidasBhanot Publishers. Jabalpur. India.
5. WHO (2006). Child Growth Standards: Methods and development: height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age (http://www.who.int/childgrowth/standards/en/).
6. .M.Margaret Barth Ronny A Bell Karen Grimmer (2021).*Public Health Nutrition,Rural Urban and Global based practice*. Springer Publishing Company.
7. Bamji .M.S, PrahladRao.N, Reddy V (2016).*Textbook of Human Nutrition*.Oxford and PBH Publishing Co. Pvt. Ltd, New Delhi.
8. Swaminathan. M. (2014).*Advanced Textbook of Food and Nutrition*. The Bangalore Printing and Publishing Co. Ltd.Bangalore.
9. https://www.nhp.gov.in/healthprogramme/national-health-programmes
10. https://www.nhp.gov.in/integrated-child-development-services-icds_pg
11. https://www.nhp.gov.in/national-iron-plus-initiative-for-anemia-control_pg
12. https://apps.who.int/iris/bitstream/handle/10665/255413/WHO-NMH-NHD-17.3-eng.pdf

COURSE OUTCOMES:

- Identify ecological factors leading to malnutrition
- Explain nutritional problems of the community
- Interpret nutritional status of the community
- Apply nutrition education programme and create nutrition awareness.
- Describe role of nutrition intervention programmes

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Third Year **MAJOR BASE ELECTIVE II** **Semester VI**

2. **FOOD PRODUCT DEVELOPMENT**

Code: **(Theory)** **Credits 4**

COURSE OBJECTIVES :To enable students to

- Understand various aspects of development of a food product.
- Acquire knowledge on the importance of Consumer Research, Finance and Communication.
- Learn to perform organoleptic evaluation offoods.

UNIT – I BASICS OF PRODUCT DEVELOPMENT:

New food product development: definition, classification, characterization, phases in food product development factors influencing new product development - social concerns, health concerns, impact of technology and market place influence. Generation of new product ideas: internal and external sources of ideas, market place analysis, standardization methods involved in product development; portion size and portion control, calculation of nutritive value & cost of production, shelf life & storage stability evaluation procedure of developed food products.

UNIT – II STAGES AND PRODUCT LIFE CYCLE:

Stages of food product development, formulation of new food products for specific target groups. idea generation, screening and evaluation, business analysis, development. Product management/ product life cycle -introduction, growth, maturity and decline stages market testing and commercialization, feasibility study and promotion of new products, food product planning-modifying the product, modifying the market, repositioning the product.

UNIT – III SUBJECTIVE AND OBJECTIVE EVALUATION OF FOODS:

Sensory characteristics of food, types of evaluation, reasons for testing food quality; Overview of the subjective tests with its advantages and disadvantages. Basic guidelines for conducting objective evaluation of foods: advantages and disadvantages, types of tests and equipments. Sensory analysis softwares- Overview

UNIT – IV FOOD PACKAGING AND LABELING:

Packaging - definition, functions, packaging environment, selection of packaging; Basic packaging materials and films; Packaging methods - traditional food packaging, retortable, lined cartons, bag in box, aseptic, modified atmosphere, vacuum, gas packaging, controlled atmospheric, microwave packaging, active, intelligent, edible packaging, nano packaging, green packaging, antimicrobial packaging, shrink and stretch packaging. Labeling - definition, purpose, types, materials, adhesives; food and nutritional labeling; barcoding, labeling laws and regulations.

UNIT – V INTELLECTUAL PROPERTY RIGHTS AND PATENT:

Research and new product development- patents- patent laws. International code for intellectual property rights, branding, licensing and acquisition franchising, product warranty.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Case study of microenterprise preparing and marketing food products. Case study of the self help groups preparing and marketing food products

REFERENCES:

1. Srilakshmi.B.,(2010), Food Science, New Age International Publishers, New Delhi.
2. Earle, R., & Anderson, A. (Eds.).,(2001), Food product development: Maximizing success, CRC press, New Delhi.
3. CharisGalanakis.,(2016), Innovation Strategies in the Food Industry,1stEdition, Academic Press, Cambridge.
4. Robertson, G.L. (2006), Food Packaging: Principles and Practice, 2nd edition, CRC Press, Taylor &Francis.
5. NIIR, (2003), Food Packaging Technology Handbook, National Institute ofIndustrial Research Board, Asia Pacific Business Press Inc, New Delhi.
6. Ahvenainen, R. (Ed.) (2003), Novel Food Packaging Techniques, CRC Press, New Delhi.
7. Fuller, G. W. New Food Product Development from Concept to Marketplace, CRC Press, Boca Raton.
8. Carpenter, R. P., Lyon, D. H., &Hasdell, T. A. (2012), Guidelines for sensory analysis in food product development and quality control, Springer Science & Business Media.
9. MacFie, H. (Ed.).,(2007), Consumer - led food product development, Elsevier, Cambridge.
10. Food Packaging Technology Handbook, (2003), NIIR Board of Consultants and Engineers, National Institute of Research, New Delhi.
11. Modern Packaging Industries, (2004), NIIR Board of Consultants and Engineers, National Institute of Industrial Research, New Delhi.
12. Robertson, G.L., (2012), Food Packaging: Principles and Practice,3rd Edition, CRC Press, New Delhi.
13. Han, J.H., (2014), Innovations in Packaging, Elsevier Academic Press, Cambridge.
14. https://guides.library.iit.edu/
15. https://open.umn.edu/
16. https://www.destechpub.com/
17. https://nzifst.org.nz/

COURSE OUTCOMES:

Define and identify new product development concepts

- Demonstrate and evaluate the sensory attributes of the developed food product
- Interpret the step involved in standardization of food product
- Analyse the stages of new product development
- Evaluate the product innovation and feasible aspects of the product.
- Validate patent rights of new products and process.

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Third Year **PROJECT** **Semester VI**

DIETARY INTERNSHIP

Code: **Credits 3**

Hospital internship UG- multispecialty reputed hospital for three weeks:

1. Observe different sections in the dietary department
2. Observe and prepare organization set up
3. Prepare a layout of the dietary department
4. Take up hospital rounds with the senior dietitian to assist patient dietary requirement
5. Read and comprehend case sheets of patients in critical care, paediatric care, diabetes care, dialysis ward, CVD ward, maternity ward etc.
6. Screening of patients for nutritional status & take diet history of patients
7. Prepare a diet and Calculate nutritive value
8. Develop normal dietary approaches considering the nutraceutical properties of food groups
9. Setting up diet tray in the dietary kitchen department
10. Follow up of patient's case sheet and diet history
11. Experience and practice outpatient diet counselling and group counselling
12. Preparation of diet counselling materials like charts PowerPoint models and videos
13. Maintenance of dietary internship logbook & Internship report writing
14. Student feed back

Internship will be carried out during the summer vacation of the 5th semester of final year and marks should be sent to the college by the concerned hospital and the same will be included in the 6thSemester Marks Statement as University external component (UE).

The candidate shall be required to take up a Project Work by group or individual and submit it at the end of the final year. The Head of the Department shall assign the Guide who, in turn, will suggest the Project Work to the students in the beginning of the final year. A copy of the Project Report will be submitted to the University through the Head of the Department on or before the date fixed by the University.

The Project will be evaluated by an internal and an external examiner nominated by the University. The candidate concerned will have to defend his/her Project through a Viva-voce.

ASSESSMENT/EVALUATION/VIVA VOCE:

1. PROJECT REPORT EVALUATION (Both Internal & External)

I.	Plan of the Project	- 20 marks
II.	Execution of the Plan/collection of Data / Organisation of Materials / Hypothesis, Testing etc and presentation of the report.	- 45 marks
III.	Individual initiative	- 15 marks
2.	Viva-Voce / Internal & External	- 20 marks
	TOTAL	**- 100 marks**

PASSING MINIMUM:

	Vivo-Voce 20 Marks	**Dissertation 80 Marks**
Project	40% out of 20 Marks (i.e. 8 Marks)	40% out of 80 marks (i.e. 32 marks)

A candidate who gets less than 40% in the Project must resubmit the Project Report. Such candidates need to defend the resubmitted Project at the Viva-voce within a month. A maximum of 2 chances will be given to the candidate.

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Third Year	**SKILLED BASED ELECTIVE II TEXTILE SCIENCE**	**Semester VI**
Code:	**(Theory)**	**Credits 2**

COURSE OBJECTIVES: Toenable students to

- Obtain a broad understanding of textiles
- Develop understanding of technical terms involved in textiles.
- Get acquainted with the properties and uses of various textile fibers.
- Develop the skills for identification of fibers and fabrics
- Understand different types of yarns, weaves and finishes.

UNIT – I FIBER:

Definition, meaning, classification of textiles fibers- natural fiber-cotton, flax, silk, wool- origin, manufacturing process, properties and end uses; minor textile fibers- properties and uses; regenerated fibers-rayon and acetate-origin, manufacturing process, properties and end uses.

UNIT – II SYNTHETIC FIBERS:

Nylon, dacron, orlon and acrylic- origin, manufacturing process, properties and end uses. Spinning: definition, meaning, types of spinning; yarn and Twist- definition, counts of yarns, meaning and classification natural manmade of yarns and novelty yarns, blends and mixtures.

UNIT - III FABRIC STRUCTURE:

Weaving- definition, meaning, parts and functions of simple loom. Types of weaves- basic weaves and fancy weaves-mock leno, honeycomb, Huck-a-back, backed cloth, dobby, jacquard; Non-woven, knitting- definition, meaning, classification of knitting, knotting, lacing, braiding, bonding and felting.

UNIT – IV TEXTILE FINISHING:

Basic finishes-singeing, desizing, scouring bleaches, mercerizing, napping, sanforizing; special finishes- antimicrobial, water-repellent and waterproof finishes, flame Resistant, stain Resistant, finishes suitable to natural and manmade fibers.

UNIT – V DYEING:

Definition, meaning and concept of dyes, classification of dyes, dyes suitability to various fibers. Methods of dyeing- stock dyeing, yarn dyeing, piece dyeing, cross and union dyeing; Printing- definition, styles of printing-direct, discharge, resist and colour Fastness.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment Only)

Visit to a textile unit

REFERENCES:

1. Dantyagi,S. (1996). Fundamentals of Textiles and Their Care. New delhi. Orient longman limited.
2. Deepali Rastogi and Sheetal Chopra (2017) Textile Science, Direct Black swan private ltd, Hyderabad.
3. Corbman, B.P and Potter.M.D. (1983) Textiles fiber to fabric, International Edition, McGrawhill book Co, New York.
4. Joseph M, Introductory Textile science-(2003) Fort worth Harcourt, Brace Jovanioch college publishers, 6th Ed.
5. E.P.G. Gohl, L.D. Velensky,(2003) "Textile Science" CBS Publishers and Distributors.
6. AJ. Hall. "The standard hand book of Textiles"(2004), Wood head Publishing 8th edition.
7. P.V. Vidyasagar,(2005) "Hand Book of Textiles", A. Mittal Publications.
8. Sara J. Kadolph,(2007) "Textiles", Prentice Hall, 10th edition.
9. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=8x0nJkh/R0vHkX1U70Z/CQ==
10. https://fitnyc.libguides.com/
11. https://nift.ac.in/
12. https://www.fitnyc.edu/

COURSE OUTCOMES:

- Develop an understanding of concepts and basics of textiles.
- Understands and define the key textile terms.
- Develop critical understanding of the techniques of yarn and fabric manufacture.
- Identify the fibres, yarn and fabrics for its appropriate use.
- Explain different dyeing and printing techniques

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