

VIVEKANANDHA

COLLEGE OF ARTS AND SCIENCES FOR WOMEN

ELAYAMPALAYAM, TIRUCHENGODE –Tk, NAMAKKAL DISTRICT

(Affiliated to Periyar University, Approved by AICTE, Re-accredited with ‘A’ Grade by NAAC)

Recognized under section 2(f) & 12 (B) of UGC ACT 1956,

An ISO 9001:2008 Certificate Institution



DEPARTMENT OF NUTRITION AND DIETETICS

B.SC. NUTRITION AND DIETETICS

SYLLABUS & REGULATIONS

FOR CANDIDATES ADMITTED FROM 2020-2022 ONWARDS

UNDER AUTONOMOUS & CBCS PATTERN

VIVEKANANDHA EDUCATIONAL INSTITUTIONS

Angammal Educational Trust

Elayampalayam, Tiruchengode (Tk) Namakkal (Dt)

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B.Sc., Nutrition and Dietetics

1. SCOPE OF THE COURSE

The course of Nutrition and Dietetics is intended to prepare the students not only to be knowledgeable in the science of Nutrition and Dietetics, but also to be useful in the upliftment of the social and economic well being. Courses offered cover all areas of basic and applied areas and these prepare students for a Bachelor of Science degree in Nutrition and Dietetics.

The degree is a three-year full time programme. The programme is not only a specialist programme, but it is also designed to be relevant to the social and economic needs of the nation. In reflection to the specialized nature of the programme, emphasis is given to practical and acquisition of practical skills.

The Programme has been involved in teaching basic and applied Nutrition as well as making findings on local problems of Nutrition and Dietetics interest. The vision of the programme is therefore, to produce graduates who are not only knowledgeable in the science of Nutrition and Dietetics, but who can make significant contributions to the development the human society.

The programme is aimed at training undergraduate graduate students who would have adequate background knowledge and practical skills for application in postgraduate research, teaching, industrial production, medical, hospital and environmental management.

2. SALIENT FEATURES

- ❖ Course is specially designed for a higher level career placement.
- ❖ Special guest lecture from industries will be arranged.
- ❖ Enables students to gain a job oriented degree.
- ❖ Special industry orientations and training are parts of the degree course.

3. OBJECTIVES OF THE COURSE

The specific objectives of the programme are:

- ❖ To equip the undergraduate students with a sound knowledge of the fundamental principles involved in the study of Nutrition and Dietetics.
- ❖ To produce graduates that would make impact in the diverse fields of human endeavor considering the ubiquitous nature of food and the wide – ranging applications of the knowledge of Nutrition and Dietetics.
- ❖ To provide focus for a career in various fields of applied science including medicine, pharmacy, bio-mining, biotechnology, industrial production, environmental manage teaching, industrial production, medical, hospital and environmental management, agriculture.

4. ELIGIBILITY FOR ADMISSION

Candidates seeking admission to the first year degree course for **B.Sc., Nutrition and Dietetics** shall be required to have passed

- a) Higher secondary ^{examination} with biology as major subjects conducted by the Government of Tamil Nadu (or)
- b) These regulations shall take effect from the academic year 2017-2018 i.e. for the students who are to be admitted to the first year of the course during the academic year 2017-2018 and thereafter
- c) Any examination with biology as major subjects of any other University or Board accepted as equivalent there to by Periyar University.
- d) Academic and vocational stream candidates are eligible.

5. DURATION OF THE COURSE

- The course shall extend over a period of three academic years consisting of six semesters. Each academic year will be divided into two semesters. The first semester will consist of the period from July to November and the second semester from December to March.
- The subjects of the study shall be in accordance with the syllabus prescribed from time to time by the Board of Studies of Vivekanandha College of Arts and Sciences for Women (Autonomous) with the approval of Periyar University.
- Each subject will have six hours of lecture per week apart from practical at the end of even semester.

6. CONTINUOUS INTERNAL ASSESSMENT

The performance of the students will be assessed continuously and the Internal Assessment Marks will be as under:

Theory

1. Average of two tests	-	15 Marks
2. Assignment	-	5 Marks
3. Attendance	-	5 Marks
Total		25 Marks

Practical

1. Practical best average of two tests	-	30 Marks
2. Attendance	-	5 Marks
3. Observation note	-	5 Marks
Total		40 Marks

Break-up Details for Attendance

Below 75%	- No Marks
76 to 80%	- 1 Mark
81 to 85%	- 2 Marks
86 to 90%	- 3 Marks
91 to 95%	- 4 Marks
96 to 100%	- 5 Marks

PASSING MINIMUM

INTERNAL

There shall be no passing minimum for internal

EXTERNAL

In the end semester examinations, the passing minimum shall be 40 % out of 75 Marks (30 Marks)

7. ELIGIBILITY FOR EXAMINATION

A candidate will be permitted to appear for the end semester examination only on earning 75 % of attendance and only when his/her conduct has been satisfactory. It shall be open to grant exemption to a candidate for valid reasons subject to conditions prescribed.

8. CLASSIFICATION OF SUCCESSFUL CANDIDATES

Successful candidates passing the examination of language, core, allied, elective, skill based elective and non major elective courses and securing marks

- a) 75% and above shall be declared to have passed the examination in first class with Distinction provided they pass all the examinations prescribed for the course at first appearance itself.
- b) 60% and above but below 75% shall be declared to have passed the examinations in first class without distinction.
- c) 50% and above but below 60% shall be declared to have passed the examinations in second class.
- d) All the remaining successful candidates shall be declared to have passed the examinations in third class.
- e) Candidates who pass all the examinations prescribed for the course at the first appearance itself and within a period of three consecutive academic years from the year of admission only will be eligible for University rank.

9. ELIGIBILITY FOR AWARD OF THE DEGREE

A candidate shall be eligible for the award of the degree only if she has undergone the above degree for a period of not less than three academic years comprising of six semesters and passed the examinations prescribed and fulfilled such conditions has have been prescribed therefore.

10. PATTERN OF QUESTION PAPER

PART- A (Objective) Answer all Questions 20 x 1 = 20 Marks

PART- B (500 words) Answer all 5 Questions (either or type) 5 x 5 = 25 Marks

PART - C (1000 words) Answer any 3 Questions (three out of five) 3 x 10 = 30 Marks

11. PROCEDURE IN THE EVENT OF FAILURE

If a candidate fails in a particular subject, she may reappear for the university examination in the concerned subject in subsequent semesters and shall pass the examination.

12. COMMENCEMENT OF THESE REGULATIONS

These regulations shall take effect from the academic year 2020 - 2020 i.e. for the students who are to be admitted to the first year of the course during the academic year 2020 -2020 and thereafter.

13. TRANSITORY PROVISION

Candidates who were admitted to the UG course of Nutrition and Dietetics before 2020 – 2020 shall be permitted to appear for the examinations under those regulations for a period of three years *i.e.*, up to and inclusive of the examination of April/May 2020. Thereafter, they will be permitted to appear for the examination only under the regulations then in force.

B.Sc., NUTRITION AND DIETETICS

VISION

Empowerment through scientific and value based education for a quality life, Exemplary education for robust living and nurturing research pursuit and social commitment

MISSION

Transforming academic inputs to social benefits, nurturing the students for a holistic development, Extending community outreach for social up liftment, Facilitating academia/clinical/Industrial collaboration.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

1. To furnish the graduates with the ability to prepare to a varying situations by gaining strength to learn and apply the recent skills with competency.
2. To train the basic and vital knowledge in the field of Nutrition and Dietetics both practically and theoretically with the team setup with proper ethical practices.
3. To create the graduates to extend the spirit of empathy, humanity and commitment for Nation development.

PROGRAMME SPECIFIC OUTCOME (PSO)

B.Sc., NUTRITION AND DIETETICS

1. This program provides comprehensive knowledge and practical training in the human physiology, food science, basic nutrition, dietetics and basic biochemistry, disease and public health. **K2**
2. Students will acquire and demonstrate competency in laboratory safety and in routine and
3. To improve the personal and community health status.
4. To aware the disease condition and to gain knowledge about the diet prescribed as per disease condition.
5. Laboratory skills applicable to Nutritional research or clinical methods, including accurately reporting observations and analysis. **K3**
6. Students gain the knowledge of principles and practices in the main applications of various fields of nutrition and dietetics and to the industrial production of foods, clinical experience in hospitals, other useful products, including the use of modified nutrition and enriched and fortified food products **K3**

PROGRAMME OUTCOME (PO)

B.Sc., NUTRITION AND DIETETICS

Pos	OUTCOME	CPD
PO-1	Students shall develop the ability of understanding the basic concepts and inter relating them within diverse life science domains for developing competitive skill metrics (CSM's)	K2
PO-2	Students shall able to comprehend the assorted knowledge of various streams of life science by revealing their views and suggestions with the impartment (or) exchange and explore in precise manner with life science professionals and public	K1
PO-3	Students shall develop the capability of decisive/crucial thoughts by forming experimental ideas and assessing them to meet out specific competences and expectations in different biological sectors	K3
PO-4	Students shall able to explain by effectively observing the condition and challenges existing in different biological systems	K4
PO-5	Students shall perform well consistently by evaluating various challenges, arguments and ending up with right and accurate decision by integrating clinical, immunological, pharmaceutical domains	K5
PO-6	Students shall able to define problems, formulate & test the hypotheses, analyse and interpret the data related to plant, animal, microbial and biochemical systems	K4
PO-7	Students shall map out the tasks of fellow mates, directing them to formulate the vision of life science by improvising their managerial skill set	K5
PO-8	Students shall develop the ability to explain and conclude by critically exploring the views and ideas with qualitative and quantitative biological data for developing logical and convincing arguments	K4
PO-9	Students shall develop an acute perception of a situation and knowledge values of multiple domains of life science with the capability of effective engagement in a multicultural society	K2
PO-10	Students shall able to work effectively and access the utility of ICT with biologically diversified teams with assistance, especially by complying readily and effectively use the relevant information resources for the knowledge	K3
PO-11	Students shall develop the habit of individual working environment and able to promote confidence level for executing, managing and completing a biological assignment with effective and reproducible solutions	K6
PO-12	Students shall able to meet out their own learning needs by appreciating environment and sustainability from a range of current research and development in all aspects of work	K5
PO-13	Students shall develop the habit of avoiding unethical behaviour in terms of misinterpretation of project/research data derived, committing plagiarism, non-	K5

	adherence of Intellectual Property Rights (IPR) that are related to product development and marketing	
PO-14	Students shall apply the knowledge of basic life science and its specific transferable skills for identifying the issues and solving them with well defined solutions	K6
PO-15	Students shall able to acquire knowledge and technical skill set throughout their life by developing execution skills that meet outs the social, economic and cultural objectives which are relevant to life science related job trades	K6

SCHEME OF CURRICULUM – B.Sc., NUTRITION AND DIETETICS
(For the candidates admitted during the academic year 2020– 2022 onwards)

Part	Paper Code	Subject Title	Hours /Week	Credits	University Examination			Exam Hrs.
					Internal	External	Total	
SEMESTER I								
I	20U1LT01	Tamil I	6	3	25	75	100	3
II	20U1LE01	English I	6	3	25	75	100	3
III	20U1NDC01	Core I	5	5	25	75	100	3
III	20U1NDCP01	Core Practical I	3	-	-	-	-	
III	20U1NDA01	Allied I	4	4	25	75	100	3
III	20U1NDAP01	Allied Practical I	3	-	-	-	-	
IV	20U1VE01	Value Education	2	2	25	75	100	3
SEMESTER II								
I	20U2LT02	Tamil II	6	3	25	75	100	3
II	20U2LE02	English II	6	3	25	75	100	3
III	20U2NDC02	Core II	5	5	25	75	100	3
III	20U2NDCP02	Core Practical II	3	3	40	60	100	3
III	20U2NDA02	Allied II	4	4	25	75	100	3
III	20U2NDAP01	Allied Practical I	3	2	40	60	100	3
IV	20U2ES01	Environmental Studies	1	2	25	75	100	3

Part	Paper Code	Subject Title	Hours /Week	Credits	University Examination			Exam Hrs.
					Internal	External	Total	
SEMESTER III								
I	20U3LT03	Tamil III	6	3	25	75	100	3
II	20U3LE03	English III	6	3	25	75	100	3
III	20U3NDC03	Core III	5	5	25	75	100	3
III	20U3NDCP03	Core Practical III	2	-	-	-	-	-
III	20U3NDA03	Allied III	4	3	25	75	100	3
III	20U3NDAP02	Allied Practical II	3	-	-	-	-	-
IV	20U3NDS01	SBEC I	2	2	25	75	100	3
IV	20U3NDN01	NMEC I	2	2	25	75	100	3
SEMESTER IV								
I	20U4LT04	Tamil IV	6	3	25	75	100	3
II	20U4LE04	English IV	6	3	25	75	100	3
III	20U4NDC04	Core IV	5	5	25	75	100	3
III	20U4NDCP04	Core Practical III	2	3	40	60	100	3
III	20U4NDA04	Allied IV	4	4	25	75	100	3
III	20U4NDAP04	Allied Practical II	3	2	40	60	100	3
IV	20U4NDS02	SBEC II	2	2	25	75	100	3
IV	20U4NDN02	NMEC II	2	2	25	75	100	3

Part	Paper Code	Subject Title	Hours /Week	Credits	University Examination			Exam Hrs.
					Internal	External	Total	
SEMESTER V								
I	20U5NDC05	Core V	5	5	25	75	100	3
II	20U5NDC06	Core VI	6	5	25	75	100	3
III	20U5NDE01	Elective course I	6	5	25	75	100	3
III	20U5NDPC04	Core Practical IV	3	5	40	60	100	3
III	20U5NDPC05	Core Practical V	3	5	40	60	100	3
III	20U5NDE02	Elective II	5	5	25	75	100	3
IV	20U5NDS03	SBEC III	2	2	25	75	100	3
SEMESTER VI								
III	20U6NDC07	Core VII	6	5	25	75	100	3
III	20U6NDPC04	Core Practical IV	3	5	40	60	100	3
III	20U6NDPC05	Core Practical V	3	5	40	60	100	3
III	20U6NDPC03	Core Practical III	2	3	40	60	100	3
III	20U6NDC08	Core VIII	6	5	25	75	100	3
III	20U6NDE03	Elective Paper III	5	5	25	75	100	3
IV	20U6NDS04	SBEC IV	2	2	25	75	100	3
IV	20U6NDS05	SBEC V	2	2	25	75	100	3
IV	20U6NDSP01	SBEC P I	3	2	400	60	100	3
	20U6NDEX01	Extension Activities	-	1	-	-	-	-
		Total		140	1135	2865	4000	

LIST OF CORE PAPERS

- I. Human Physiology
- II. Food Science
- III. Nutritional Biochemistry
- IV. Principles of Human Nutrition
- V. Nutrition in Life Cycle
- VI. Dietetics and Counseling
- VII. Food Nutrition and dietetics
- VIII. Advanced Dietetics

LIST OF PRACTICALS

- I. Human Physiology
- II. Food Science
- III. Clinical Nutrition and Food Analysis
- IV. Nutrition in Life Cycle and Dietetics
- V. Assessment of Food Quality

Students have to choose either SET-I or SET-II for their Elective Courses and Skill Based Elective Courses. Papers from both the sets cannot be mingled. Those students who have selected SET-I for Elective Courses, will have to select SET-I for Skill Based Elective Courses also. Those students, who have selected SET-II for Elective Courses, will have to select SET-II for Skill Based Elective Courses also.

SET- I

LIST OF ELECTIVE COURSES FOR SET-I

- I. Quantity Food Service and Physical Facilities
- II. Food Product Development and Quality Control
- III. Institutional Project

LIST OF SKILL BASED ELECTIVE COURSES (SBEC) FOR SET-I

- I. Food Processing
- II. Food Packaging
- III. Bakery Science
- IV. Sanitation and Hygiene in Food Industries
- V. Entrepreneurship Development

VI. Food Preservation and Bakery (Practical)

SET-II

LIST OF ELECTIVE COURSES FOR SET- II

- I. Nutraceuticals
- II. Nutrition for Fitness and Sports
- III. Institutional Project

LIST OF SKILL BASED ELECTIVE COURSES (SBEC) FOR SET-II

- I. Food Processing
- II. Food Chemistry
- III. Bakery Science
- IV. Food Biotechnology
- V. Public Health Nutrition
- VI. Food Preservation and Bakery (Practical)

Allied Courses for B.Sc. Nutrition and Dietetics

- I Year - Allied Chemistry
II Year - Allied Computer Science

LIST OF NON MAJOR ELECTIVE COURSES (NMEC) OFFERED BY THE BOARD OF NUTRITION AND DIETETICS/ HOME SCIENCE TO OTHER MAJOR STUDENTS

- I. Basic Food Science
- II. Basic Nutrition

LIST OF ALLIED COURSES OFFERED BY THE BOARD OF NUTRITION AND DIETETICS/ HOME SCIENCE TO STUDENTS STUDYING DEGREE IN LIFE SCIENCES

SET-I

- Food Science-I
Food Science-II
Food Analysis Practical

SET-II

- Human Nutrition-I
Human Nutrition-II
Clinical Nutrition Practical

BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN		
KL	CPD	DESCRIPTION
K1	Remember	Retrieving, recognizing and recalling knowledge from long-term memory
K2	Understand	Constructing meaning from oral, written and graphic messages through interpreting
K3	Apply	Carrying out or using a procedure through executing or Implementing
K4	Analyse	Breaking material into constituent parts, determining how the parts relate to one another and to an overall structure or purpose through differentiating, organizing and attributing
K5	Evaluate	Making judgments based on criteria and standards through checking and critiquing
K6	Create	Putting elements to form a coherent or functional whole, reorganizing elements into a new pattern or structure through generating, planning or producing

Note: **KL: Knowledge Level; CPD: Cognitive Process Dimension**

BLOOM'S TAXONOMY BASED INTERNAL ASSESSMENT PATTERN FOR MODEL AND SEMESTER EXAMINATION

SECTION	CPD/GRADE	MARKS	CONTENT	CUMULATIVE
A: 20 X 1	K1 & K2	20	Multiple choice questions	75
B: 1 out of 2 (5 X 5) Either or choice	K2, K3, K5 & K6	25	Short notes	
C: 3 out of 5 X 10	K3, K4, K6	30	Essay type descriptive	

BLOOM'S TAXONOMY BASED INTERNAL ASSESSMENT PATTERN FOR CIA I & II EXAMINATIONS

SECTION	CPD/GRADE	MARKS	CONTENT	CUMULATIVE
A: 10 X 1	K1 & K2	10	Multiple choice questions	25
B: 1 out of 2 (1 X 5)	K2, K3, K5 & K6	5	Short notes	
C: 1 out of 2 (1 X 10)	K3, K4, K6	10	Essay type descriptive	

SEMESTER -I

SEMESTER – I
20U1NDC01
Credits - 5

CORE - I
Total Number of Hours: 60
5 Hours/ Week

CORE - I HUMAN PHYSIOLOGY

OUTCOME

The students will be able to

1. Summarize the structure of human systems and integrate their functions with human nutrition
2. Determine the blood parameters
3. Identify the microscopic structure of tissues in various systems

CO LEVEL	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	The students could understand the human body cells and tissues organizations	K2
CO2	The students could understand the human blood function and human enzymes, hormones	K2
CO3	The students could understand the human blood function and human enzymes, hormones	K2
CO4	The students could understand the human body functions	K2
CO5	The students could understand the human reproductive system functions	K2

UNIT - I

Cell – Structure of organelles and functions. Tissues – Structure, classification and functions.

UNIT-II

Blood – Composition, functions, coagulation, factors affecting coagulation, blood groups. Gastrointestinal and Hepatobiliary system – Structure, physiology and functions for different organs and role of hormones and enzymes.

UNIT- III

Immune system – Innate, acquired and active immunity, cell mediated immunity, humoral immunity and complement system.

Heart and circulation – Structure, cardiac cycle, cardiac output, factors affecting cardiac output, normal ECG, heart failure, blood pressure, control and factors affecting blood pressure.

UNIT- IV

Respiratory system – Structure and functions, Lung volumes and lung capacities, Factors affecting efficacy of respiration.

Excretory system - (A) Urinary System: - Structure and functions of organs of urinary system (In brief),

Mechanism of urine formation.

(B) Skin:- Structure and functions, Regulation of body temperature.

UNIT- V

Reproductive system –(A)Female reproductive system -- Structure and functions, menstrual cycle, menarche and menopause.

(B) Male Reproductive system -- Structure and functions.

Endocrine system - Thyroid, Parathyroid, Adrenal gland, Pituitary and Sex glands – Structure and functions.

REFERENCES

1. Ross and Wilson: Anatomy and physiology in Health and Illness, 11th Edition, Church Hill Livingstone, 2011
2. West, J.B.: Best and Taylor's Physiological Basis of Medical Practice, 11th Edition, 2007
3. Chatterjee, C.C., Human Physiology: Medical Allied Agency, Calcutta. 1980
4. Gyton: Text Book of Medical Physiology, 9th Edition, Prism Books Pvt. Ltd., W.B. Sanders Company, USA. 1996
5. Keel and Neil: Samson and Wright's Applied Physiology (12th edition), Oxford University Press. London. 2004

SEMESTER – I
20UINDCP01
Credits - 3

CORE PRACTICAL - I
Total Number of Hours: 35
03 Hours/ Week

HUMAN PHYSIOLOGY PRACTICALS

OBJECTIVES:

To enable the students:

- To identify structure and functioning of the various systems of the human body
- Gain knowledge on the parts of the different physiological systems and recognize them.

COURSE OUTCOME:

CO1	Have an enhanced knowledge and appreciation of human physiology	K3
CO2	Understand the functions of important physiological systems including the cardio-respiratory, renal, reproductive and metabolic systems	K2
CO3	Understand how these separate systems interact to yield integrated physiological responses to challenges such as exercise, fasting and ascent to high altitude	K2
CO4	Be able to perform, analyze and report on experiments and observations in physiology	K4&K5
CO5	Be able to recognise and identify principal tissue structures.	K4

1. Microscopic study of tissues- epithelial, connective and muscular.
2. Collection of blood sample- Capillary blood from finger tips and venous blood.
3. Separation of blood components (Centrifugation).
4. Estimation of hemoglobin- Sahli's Acid hematin method.
5. Determination of Hematocrit (Wintrobe method).
6. Preparation and examination of stained blood smear (Wedge or glass slide method).
7. Determination of Erythrocyte Sedimentation Rate (Wintrobe method).
8. Determination of blood group.
9. Determination of bleeding time (Duke method) and coagulation time (Capillary tube method).
10. Platelet count (Rees Ecker method by hemocytometry).
11. Clinical examination of radial pulse (pulse rate).

12. Measurement of blood pressure (Sphygmomanometry).
13. Effect of exercise on blood pressure and heart rate.
14. Microscopic structure of heart, digestive system and kidney.
15. Microscopic structure of reproductive organs- ovary, uterus, mammary glands and testis.
16. Microscopic structure of endocrine glands- thyroid, pituitary and adrenal.

REFERENCE

1. G.K.Pal and Pravati pal, Text book of practical physiology, Orient Longman Ltd. 2001.

SEMESTER –II

SEMESTER – II
20U2NDC02
Credits - 5

CORE – II
Total Number of Hours: 60
5 Hours/ Week

CORE II - FOOD SCIENCE

OUTCOME

The students will be able to

1. Understand the scientific principles underlying food preparation.
2. Develop skill and techniques in food preparation with conservation of nutrients and palatability using desirable cooking methods.

CO LEVEL	COURSE OUTCOME	KNOWLEDGE LEVEL
CO1	The knowledge on food and the classifications	K1
CO2	The handling and knowledge of nutritional valuable foods	K2
CO3	Preparation of diet foods in milk and poultry based foods	K3
CO4	To understanding and knowledge of vegetables, fruits and spices food and the classifications	K3
CO5	The efficacy of fat and sugar based foods	K3

UNIT-I

Food: Definition, functional classification, groups (4,5,7 and 11), food pyramid.

Cooking: Definition and objectives Methods-Moist heat methods, dry heat methods, combination of both and micro wave cooking; Effect of cooking on nutrients.

Beverages: Classification; Coffee beverage- Constituents and method of preparation; Tea-Types, preparation; Cocoa- Composition, nutritive value and preparation of cocoa beverage; Fruit beverages-Types: Introduction to vegetable juices, milk based beverages, malted beverages, carbonated non alcoholic beverages and alcoholic beverages.

UNIT-II

Cereals and millets: Structure, composition and nutritive value of rice, wheat and oats; Nutritive value of maize, jowar, ragi and bajra. Cereal cookery: Effect of moist heat-Hydrolysis, Gelatinisation and factors affecting gelatinization, gel formation, retrogradation and syneresis; Effect of dry heat; Role of cereals in cookery.

Pulses: Composition, nutritive value, toxic constituents; Pulse cookery- Effect of cooking, factors affecting cooking quality, role of pulses in cookery, germination and its advantages.

UNIT-III

Milk and milk products: Composition and nutritive value of milk; Milk cookery- Effect of heat, effect of acid and effect of enzymes; Milk products- Non fermented and fermented products (does not include preparation); Role of milk in cookery.

Egg: Structure, composition, nutritive value; Egg cookery- Effect of heat, factors affecting coagulation of egg proteins and effect of other ingredients on egg protein; Role of egg in cookery; Home scale method for detecting egg quality.

Meat: Classification, composition, nutritive value, rigor mortis, ageing and tenderizing; Meat cookery-Changes during cooking.

Poultry: Classification, composition and nutritive value.

Fish: Classification, composition, nutritive value, selection and principles of fish cookery.

UNIT-IV

Vegetables: Classification (nutritional), composition, nutritive value; Pigments in vegetables- Water soluble and water insoluble; Enzymes, flavor compounds and bitter compounds; Vegetable cookery- Preliminary preparation, changes during cooking, loss of nutrients during cooking, effect of cooking on pigments, role of vegetables in cookery.

Fruits: Classification, composition, nutritive value, ripening of fruits; Browning- Types and preventive measures.

Spices: General functions, role in cookery; Medicinal value of commonly used spices.

UNIT-V

Fats and oils: Composition and nutritive value, basic knowledge about commonly used fats and oils (lard, butter, margarine, cotton seed oil, ground nut oil, coconut oil, soya bean oil, olive oil, rice bran oil, sesame oil, rape seed oil, mustard oil and palm oil); Spoilage of fat- Types and prevention; Effect of heating, role of fats and oils in cookery.

Sugar and related products: Nutritive value, characteristics and uses of various types of sugars; Sugar cookery- Crystallization and factors affecting crystallization; Stages of sugar cookery; Role of sugar in cookery.

REFERENCES

1. Srilakshmi. B. Food Science, New Age International (P) Ltd. Publishers, 6th edition.2016.
2. Manay Shakunthala, N and Shadaksharaswamy M. Food Facts and Principles, New Age International (P) Ltd Publishers, Reprint 2005.
3. Swaminathan M., Food Science, Chemistry and Experimental foods, Bappo Publishers company Ltd, 1997.
4. Usha Chandrasekar, Food Science in Indian Cookery, Phoenix publishers House Private Limited, 2002.

SEMESTER – II
20U2NDCP02
Credits - 3

CORE PRACTICAL - II
Total Number of Hours: 35
3 Hours/ Week

FOOD SCIENCE PRACTICAL

OBJECTIVES:

To enable the students

- Different types of cereals, pulses, vegetables, fruits and nuts and oil seeds- observation
- Be familiar with various cookery terms, and use of different ingredients & recipes.
- Guidelines to be followed by laboratory.
- Methods of measuring ingredients. Know the preparation of different recipes.

COURSE OUTCOME:

CO1	Demonstrate skills on determination of edible portion, effect of cooking on volume and weight.	K1
CO2	Choose appropriate cooking method to conserve nutrients.	K2
CO3	Acquire skills on different methods of cooking	K3
CO4	Understand experimental cookery	K2 &K4
CO5	Develop recipes by applying knowledge on cooking methods and properties of food	K3

1. Grouping of foods according to ICMR classification.
2. Measurement of food materials using standard measuring cups, spoons and weighing.
3. Find the percentage of edible portion of foods.
4. Observe the microscopic structure of different starches before and after gelatinization (rice, wheat and corn).
5. Study the effect of temperature, time of heating, concentration, addition of sugar and acid on gelatinization of starch.
6. Prepare recipes using the following processes- Gelatinization, gluten formation and gel formation.
7. Demonstrate the best method of cooking rice.
8. Demonstrate the effect of soaking, hard water, sodium bi carbonate and papaya on cooking quality of pulses.
9. Prepare recipes using whole gram, dhal, pulse flours, sprouted pulses and cereal pulse combination.
10. Demonstrate the factors affecting coagulation of milk protein.
11. Prepare recipes using milk and its products.
12. Demonstrate the formation of ferrous sulphide in boiling egg and its preventive measures.

13. Demonstrate the effect of addition of acid, fat, salt, water and sugar on the texture of omelettes.
14. Prepare recipes where egg acts as – thickening agent, binding agent, emulsifying agent and enriching agent.
15. Demonstrate the effect of acid, alkali and over cooking on vegetables containing different pigments.
16. Demonstrate the effects of different amounts of water added to vegetables during cooking on flavor and appearance.
17. Demonstrate enzymatic browning in vegetables and fruits and any four methods of preventing it.
18. Prepare the following using fruits and vegetables- salads, soups and curries.
19. Determine the smoking point of any 4 cooking oils.
20. Prepare recipes using shallow fat and deep fat frying methods.
21. Demonstrate the stages of sugar cookery
22. Prepare recipes using various stages of sugar cookery and jaggery.
23. Preparation of any one beverage under the following types- refreshing, nourishing, stimulating, soothing and appetizing.

REFERENCE

1. Srilakshmi. B. Food Science, New Age International (P) Ltd. Publishers, Sixth edition. 2016.

SEMESTER -III

SEMESTER – III
20U3NDC03
Credits - 5

CORE - III
Total Number of Hours: 60
5 Hours/ Week

NUTRITIONAL BIOCHEMISTRY

OBJECTIVES

To enable the students to

- To learn the metabolism of proximate principles
- To know the role of other nutrients in metabolism
- To get a better knowledge on energy capture during metabolic processes

COURSE OBJECTIVES:

CO1	To ensure students to understand and gain theory and practical knowledge.	K2
CO2	Different food groups and their nutritive value, biological cycles involved in metabolism.	K2
CO3	Importance of biochemistry in cell like role enzyme hormones and water balance.	K4
CO4	Life regulation based on micro and macro elements,	K2
CO5	Role of vitamins in our daily diet	K2

UNIT I

No. of Hours: 12

a. Carbohydrates: Classification (Self study) –Monosaccharide- nomenclatures, structures, chemical properties; Disaccharides – structure and properties; Polysaccharides - Starch, glycogen - structure and properties, TCA cycle.

b. Metabolism of Carbohydrates: Glycolysis; glycogenesis, glycogenolysis, gluconeogenesis and HMP shunt.

c. Interrelationship between fat, carbohydrates and protein metabolism,

UNIT II

No. of Hours: 12

a. Lipids: Composition, properties (SS) classification of lipids. Phospholipids – structure of lecithin and cephalin only, triglycerides, lipoprotein (classification only).

b. Fat Metabolism: Oxidation of saturated and unsaturated fatty acid. Biosynthesis and catabolism of cholesterol.

c. Respiratory chain: biological oxidation and oxidative phosphorylation.

UNIT III

No. of Hours: 12

a. Protein: Classification based on composition and solubility. Amino acid classification based on R group reactions. Physical and chemical properties of amino acids (not for individual amino acids). Proteins structure. Denaturation of proteins

b. Protein Metabolism: Determination, transamination and decarboxylation, Urea cycle, transportation of ammonia, fate of delaminated amino acids (carbon skeleton- outline only).

c. Protein biosynthesis - Diagrammatic scheme and summary only.

UNIT IV

No. of Hours: 12

a. Nucleotides and nucleosides - Purine and pyrimidine bases - structure. Structure of nucleotides.

b. Nucleic Acids: DNA – structure, properties and functions. RNA - structure, types and Functions.

c. Hemoglobin -- synthesis and catabolism.

UNIT V

No. of Hours: 12

a. Enzymes - Definition, classification, action, factors influencing rate of enzyme action. Michaelis-menton equation and Line weaver-Burke plot.

b. Co-Enzymes: Co-enzymic role of B vitamins in the metabolism of carbohydrates, proteins and fat.

c. Detoxification Reactions (examples only) – oxidation, reduction, hydrolysis and conjugation.

TEXT BOOK

1. Satyanarayana, U .Chakrapani (2008) - Fundamentals of Biochemistry, Books & Allied publishers, Calcutta
2. Alistair F.Smith, Geoffrey J.Beckkett, Simon W.Walker, Peter W.H.Rae (2005), Clinical Biochemistry, 6th edition, Replika Press pvt Ltd, India.
3. AmbigaShaninugam, (2012)., Fundamentals of Biochemistry for Medical Students, 4th edition, Wolters Kluwer (India), New Delhi.

REFERENCES

1. Harold A Harper, Victor W Rodwell and Peter A Mayes (1939) - Review of Physiological Chemistry, Large Medical Publications, California.
2. Swaminathan M (1981) - Biochemistry for Medical Students, Geetha book house, Mysore
3. Deb, A.C. 1999, Fundamentals of Biochemistry, New Central Book Agency (P) Ltd., Calcutta.

WEB REFERENCE:

1. www.anme.com.mx/libro/principlesofnutrition.pdf
2. <https://2012books.lardbucket.org/pdfs/an-introduction-to-nutritional.pdf>
3. Krishikosh.egranth.ac.in

SEMESTER – III
20U3NDCP03
Hours: 40

CORE PRACTICAL - III
Total Number of

NUTRITIONAL BIOCHEMISTRY PRACTICAL

OBJECTIVES:

To enable the students to

- Get training on analysis of blood for various parameters
- Understand the reactions of carbohydrates
- Estimation and analysis of urine for various parameter

COURSE OBJECTIVES:

CO1	To ensure students to understand and gain theory and practical knowledge.	K2
CO2	To provide practical laboratory training in the estimation of various nutritional parameters in blood and urine.	K3
CO3	To acquires skills in using laboratory instruments.	K1
CO4	To contrast the values of estimation with normal condition	K5
CO5	To apply the principles to estimate various parameters in blood and urine	K3

PRACTICALS

1. Estimation of urinary creatinine
2. Estimation of urea- diacetyl monoxime method.
3. Estimation of serum protein Biruet method.
4. Estimation of iron and heaemoglobin
5. Qualitative analysis of sugar- Glucose, Fructose, Galactose, Maltose, Lactose & Sucrose,
(i)Analysis of unknown sugar - I
6. Quantitative Estimation of Calcium
7. Quantitative Estimation of Iron
8. Quantitative Estimation of Ascorbic acid

REFERENCE:

1. Voet and prat (2004)., Fundamental of Biochemistry, 8th edition, John Wiley& sons
2. Conn, stumpt, (2001), Outline of Biochemistry, 5th edition, John Wiley & sons
3. CHAD cox, (2005), Nutritional Biochemistry, Taylor and francis group, Canada.

SEMESTER – III
20U3NDS01
Credits - 2

SBEC -1
Total Number of Hours: 45
02 Hours/ Week

SKILL BASED ELECTIVE- FOOD PROCESSING

OBJECTIVES:

To enable the students to

- Learn about the technology of cereal and pulse processing
- Know the by products of cereals, technology of oil extraction, fish and algae cultivation processing

COURSE OUTCOME:

CO1	Learn the recent concepts of food processing	K1
CO2	Relate the theoretical knowledge of processing technique with food products development	K1
CO3	Choose appropriate foods processing	K3
CO4	Understand the relevance of processing for various food commodities	K2
CO5	To understand the process of fortification and enrichment of food products	K2

UNIT I

No. of Hours: 09

Processing of Rice: Milling of Rice-Parboiled rice, raw rice, by-products of rice milling and their utilization. Manufacture of certain breakfast cereals - puffed rice, rice flakes. macaroni , noodles and pasta, instant rice. **Processing of Millets:** Corn, Ragi, Sorghum

UNIT II

No. of Hours: 09

Processing of Wheat: Milling - Cleaning, Methods of conditioning milling by-products of wheat milling.

Fortification and Enrichment: Cereals, baked products, confectioneries

UNIT III

No. of Hours: 09

Processing of Legumes: Methods of dhal milling- traditional method, improved method of pulse processing

Processing of Nuts and Oil seeds: Methods of oil extraction- Mechanical press, solvent extraction, refining and hydrogenation

Processing of Oil Seeds as Protein concentrates and Isolates: Processing of soybean, sunflower, and peanut. **Fortification and Enrichment:** Fats and oils

UNIT IV

No. of Hours: 09

Processing of Sea foods: Fish processing - fish oil, fish protein concentrate, fish meal. Algae as food - Common types of algae used as protein source, cultivation, harvesting, processing, and drying storage and nutritional significance. Mushroom - types of edible mushroom, cultivation, harvesting and processing.

UNIT V

No. of Hours: 09

Sugar Processing - Extraction and refining process.

Cocoa Processing - Composition of cocoa, processing of cocoa ? milk and plain chocolate.

Coffee Processing - chemical constituents of coffee, processing - dry and wet process, roasting and grinding, instant coffee and de-caffeinated coffee.

Tea Processing – Different types of tea processing, types chemical constituents of tea, fermentation, drying, roasting and grinding, instant tea and herbal tea.

TEXT BOOKS:

1. Sivasankar, B. (2013) Food Processing and preservation 2nd edition, prentice Hall, Pvt, Ltd.
2. Srilakshmi, N., Food Science, New Age International Private Ltd., New Delhi, 2002.
3. Swaminathan, M., Food Science, Chemistry and Experimental Foods, Bappco Publishers, Bangalore, 2004.
4. Chandrasekhar, U, Food Science and Applications in Indian Cookery, Phoenix Publishing House Private Ltd., New Delhi, 2002.

REFERENCE BOOKS

1. Adams, M.R. and Moss, M.O., Food Microbiology, New Age International (P) Ltd., New Delhi, 2005.
2. Fellow, P., Food Processing Technology – Principles and Practices, 2nd Edition, CRC Press Woodland Publishers, England, 2000.
3. Sommers, C.H. and Xveteng Fan, Food Irradiation Research and Technology, Blackwell Publishing, 2006

WEB REFERENCES:

1. www.uoguelbhca.in
2. <https://ifst.onlinelibrarywily.com>
3. www.sanfoundary.com

SEMESTER – IV

SEMESTER – IV
20U4NDC04
Credits - 5

CORE - IV
Total Number of Hours: 60
5 Hours/ Week

PRINCIPLES OF HUMAN NUTRITION

OBJECTIVES:

To enable the students to,

- Understand the nutritional demands in various stages of life cycle.
- Acquires skills in planning adequate meals in different stages of life cycle.
- To determine physiological changes at different stage of life span.

COURSE OBJECTIVES:

CO1	To define the nutritional needs of each age groups.	K1
CO2	To understand the importance of nutrition and health.	K2
CO3	To co-relate the physiological and psychological changes adhering to all the age groups.	K4
CO4	To interpret the nutritional problems pertaining to different age groups.	K4
CO5	To infer the appropriate theories to distinguish the development milestones	K4

UNIT-I

Science of Nutrition, Concept of Nutrition- Definition of nutrition, health, nutritional status and malnutrition. RDA- Definition, factors affecting RDA and methods used for deriving RDA.

Carbohydrates- Definition ,composition, functions, maintenance of blood sugar levels, requirement, sources, digestion and absorption; Dietary fiber- Definition, classification, physiological effects and sources.

UNIT-II

Proteins- Definition, composition, nutritional classification of proteins and amino acids, functions, sources, requirements, digestion and absorption. Evaluation of protein quality: PER, BV, NPU and Chemical score. Lipids- Definition, composition, functions, sources, requirements, digestion and absorption. Essential fatty acids – Definition, functions, sources and effects of deficiency.

UNIT- III

Energy- Definition, units of measurement, direct and indirect calorimetry; Determination of energy value of food, Total Energy requirement, Factors affecting physical activity, Factors

affecting Basal Metabolic Rate, factors affecting Thermic effect of food, Recommended Dietary Allowances and Sources

UNIT- IV

Macro Minerals- Calcium and Phosphorous: Functions, requirements, sources and effects of deficiency.

Micro minerals- Iron, Iodine, Copper, Fluorine and Zinc: Functions, sources, requirements and effects of deficiency. Sodium and Potassium : Functions, sources, requirements and effects of imbalances.

UNIT- V

Fat soluble Vitamins – Vitamin A, D, E and K: Functions, requirements, sources and effects of deficiency.

Water Soluble Vitamins – Thiamine, riboflavin, niacin, ascorbic acid, folic acid, vitamin B6 and vitamin B12: Functions, requirements, sources and effects of deficiency.

References

- 1 Sumathi R. Mudambi, Rajagopal, M.V., Fundamentals of Foods and Nutrition, New Age International (P)Ltd, Publishers, Third edition, 1997.
2. Srilakshmi B., Nutrition Science, New Age International (P) Ltd, Publishers, Fifth multi colour edition, 2016.
3. Mangala Kango, Normal Nutrition, Curing diseases through diet, CBS Publications, First edition, 2005.
4. Paul.S., Text Book of Bio-Nutrition, Fundamental and Management, RBSA Publishers, 2003.
5. Sue Rodwell Williams, Nutrition and Diet Therapy, C.V. Melskey Co., 6 th edition, 2000.
6. Mahtab. S. Bamji, Kamala Krishnaswamy and G.N.V Brahman, Text Book of Human Nutrition, Oxford and IBH Publishing Company, Third Edition. 2009.

SEMESTER – IV
20U4NDC04
Credits - 3

CORE PRACTICAL - IV
Total Number of Hours: 35
3 Hours/ Week

PRINCIPLE OF HUMAN NUTRITION

OBJECTIVES:

- The biological determinants of nutrient requirements and the assessment of nutrient status in individuals and populations.
- The role of nutrition in growth and health through the life cycle.
- The rationale for the development of dietary guidelines and of nutrition policies in different countries..

COURSE OBJECTIVES:

CO1	Provide an overview of the major macro and micronutrients relevant to human health.	K2
CO2	Discuss the scientific rationale for defining nutritional requirements in healthy individuals and populations, with reference to specific conditions such as pregnancy, lactation, and older age.	K1
CO3	Present current evidence for the role of key nutrients in the prevention of chronic diseases.	K4
CO4	Discuss major nutrition-related diseases in a global context.	K5
CO5	Dietary sources, intake levels, physiological role, and requirement of major nutrients	K4

PRACTICALS:

1. Qualitative tests for sugars – Glucose, Fructose, Lactose, Maltose, Sucrose
2. Quantitative estimation of glucose
3. Qualitative tests for protein
4. Demonstration of estimation of nitrogen
5. Qualitative Tests for Minerals
6. Quantitative Estimation of Iron
7. Quantitative Estimation of Calcium

8. Quantitative Estimation of Phosphorus
9. Quantitative Estimation of Ascorbic Acid
10. Demonstration of fibre and total fat estimation

TEXT BOOKS :

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

REFERENCE BOOKS :

1. Sadasivam, S. and Manickam, A. Biochemical Method, Second Edition, New Age International P. Ltd., Publishers, New Delhi, 2003.
2. Raghuramulu, N., Madhavannair, K. and Kalyana Sundaram, National Institute of Nutrition, 2013, A Manual of Laboratory Techniques, Hyderabad, 500007

SEMESTER – IV
20U4NDS02
Credits - 2

SBEC-II
Total Number of Hours: 30
02 Hours/ Week

SKILL BASED ELECTIVE- FOOD PRESERVATION

OBJECTIVES

To enable the students to

- Know the principles of preservation
- Understand the various methods of preserving foods.
- Get an idea about the various processed foods available in the market.

COURSE OUTCOME:

CO1	Understand the role micro organisms in food spoilage	K2
CO2	Learn the concept of preservation	K4
CO3	Understand the ambient temperature processing	K2
CO4	Classify the various types of food spoilage	K4
CO5	Apply the knowledge to develop new products with minimal processing for better of essential nutrients	K3

UNIT -I

No. of Hour: 06

Preservation by use of high temperatures

General principles & methods of food preservation - Jam, jelly, marmalade, preserves, squash, RTS.

Canning process – Processing and Spoilage of canned foods.

Bottling process -Principles of preparation of Tomato sauce & pickle. Sauerkraut and mango pickle.

Innovative heat processes.

UNIT -II

No. of Hour: 06

Preservation by use of low temperature

Refrigeration - Principles and methods, preparation of food for cold storage and cold storage defects.

Freezing -- Principles, Air blast, immersion freezing;

Freeze- dehydration and dehydro- freezing. Defects in frozen foods, Refrigeration and freezing - egg, meat, fish and poultry

UNIT -III

No. of Hour: 06

Preservation by drying and dehydration

Principles and methods: sun, solar mechanical. (cabinet, drum, spray and vacuum). Dehydration of egg and whole milk powder.

No. of Hour: 06

UNIT - IV

Preservation with chemicals and radiation

Preservatives: Benzoate, sorbates and acetates, SO₂, antibiotics, mold inhibitors and antioxidants and permissible level, Sources of radiation, units of radiation, dosimetry, mode of action of irradiation, Preservation of semi moist/intermediate foods- Principles, and preparation.

UNIT -V

No. of Hour: 06

Preservation with fermentation

Manufacture of fermented beverages -wine, beer Manufacture of cheese and yoghurt.
Cereal based fermentation, milk based fermentation.

TEXT BOOKS:

1. Fellow, P., (2009) Food Processing Technology – Principles and Practices, 3rd Edition, CRC Press Woodland Publishers, England.
2. Dhir singh and Dheer singh (2021), Food processing and preservation, Sri Publisher, New Delhi.

REFERENCE:

1. Adams, M.R. and Moss, M.O., (2005), Food Microbiology, New Age International (P) Ltd., New Delhi.
2. Sommers, C.H. and Xveteng Fan, (2006), Food Irradiation Research and Technology, Blackwell Publishing.
3. Subalakshmi. G and Shobha Udibi, (2006), Technology of Food Processing and Preservation, New age international publisher., New delhi.

WEB REFERENCE:

1. www.lic.gov
2. www.cond.org.gr
3. <https://nchfp.uga.edu>

SEMESTER – III
20U3NDN01
Credits - 2

NMEC-1
Total Number of Hours: 30
02 Hours/ Week

BASIC FOOD SCIENCE

OBJECTIVES:

The students will be able to

- Know the composition of various foods.
- Understand the effects of cooking on nutritive value.

COURSE OUTCOME:

CO1	Understand the food groups and their functions	K2
CO2	Learn the composition of various food	K2
CO3	To gain knowledge of nutrients and nutritive value	K3
CO4	Understand the principles of food science	K2
CO5	Acquire knowledge on different methods of cooking	K4

UNIT – I

No. of Hours: 06

Introduction to Food Science- Functions of food; food guide based on basic five food groups, My plate by NIN, cooking – objectives and methods.

UNIT – II

No. of Hours: 06

Cereals- Composition and nutritive value of rice and wheat. Best method of cooking, loss of nutrients during cooking; Advantages of par boiling.

UNIT – III

No. of Hours: 06

Pulses - Composition, nutritive value, best method of cooking, loss of nutrients during cooking, germination and its advantages.

UNIT – IV

No. of Hours: 06

Vegetables – Classification, nutritive value, loss of nutrients during cooking and methods of reducing nutrient loss during cooking.

Fruits- Classification, nutritive value and changes during ripening.

UNIT – V

No. of Hours: 06

Fleshy foods- Meat, Poultry fish, egg and milk: Nutritive value and composition, Classification, Selection of Fish and eggs

TEXT BOOKS:

1. Srilakshmi. B (2018). , Food Science- 7th Edition, New Age International Publishers, New Delhi.
2. Elizabeth W. Christian and Vickie A. Vaclavik (2014), Essentials of Food Science – 4th Edition, Springer New York Heidelberg Dordrechr Publisher, London.
3. Usha Chandrasekhar, (2002) Food Science and Application in Indian Cookery., Phoenix Publishing house P Ltd, New Delhi.

REFERENCE BOOKS:

1. Brow, A., (2000) Understanding of foods, Thomson Learning Publications, Wadsworth.
2. Mehas, K.Y and Rodgers, S.L., (2000), Food science and you, McMillia McGraw Company New York.
3. Parker, R., (2000)., Introduction to food science, Delmer, Thomson Learning Co., Delma.

WEB REFERENCE:

1. [https://guides.librariespsu.edu/food science](https://guides.librariespsu.edu/food%20science)
2. <https://www.nal.usda.gov/fnic/food-science-and-technology>
3. <https://foodinfo.ifis.org>

SEMESTER – IV
20U4NDN02
Credits - 2

NMEC- II
Total Number of Hours: 30
02 Hours/ Week

BASIC DIETETICS

OBJECTIVES:

The students will be able to

- Understand the principles of nutrition
- Learn about the nutrients and deficiency

COURSE OUTCOME:

CO1	Learn the concept of Nutrition	K2
CO2	Understand the role of macronutrients.	K2
CO3	Learn the basic metabolism of macronutrients	K2
CO4	To relate metabolism of macro nutrients with health	K4
CO5	Gain basic knowledge of the different nutrients and their role in maintaining health of the community.	K4

UNIT – I

No. of Hours: 06

Carbohydrate – Classification, functions and sources. Importance and sources of fiber.

Energy: Definition, Units for measuring energy, Energy value of foods and RDA.

UNIT – II

No. of Hours: 06

Lipids – Composition, classification, functions and sources. Role of lipids causing heart diseases.

UNIT – III

No. of Hours: 06

Protein - Composition, classification (nutritional and biological), functions, sources and RDA.

UNIT – IV

No. of Hours: 06

MINERALS

Calcium, Phosphorus, Iron, Zinc and Iodine– Functions, sources, requirement and effect of deficiency.

UNIT – V

No. of Hours: 06

VITAMINS

Vitamin A, D, E, K, B1, B2 & Vitamin C - Functions, sources, requirement and effect of deficiency.

TEXT BOOK:

1. B. Srilakshmi, (2014), Nutrition Science, New Age International (P) Ltd, New Delhi.

REFERENCE:

1. Mangala Kango, (2003) Normal Nutrition (Fundamental & Management) RBSA Publishers S.M.S Highway Jaipur – 302003 L, 2003.

2. M. Raheena Begum, (2005) Text book of Foods, Nutrition and Dietetics, Second Revised Edition, Sterling Publishers Private Ltd, New Delhi.

WEB REFERENCE:

1. www.nutrition.gov
2. www.nab.edu
3. www.who.int