KLE ACADEMY of HIGHER EDUCATION AND RESEACH

B.Sc. NUTRITION AND DIETETICS

Ordinance Governing

Bachelor of Science in Nutrition and Dietetics

Syllabus / Curriculum

Accredited 'A' Grade by NAAC (2nd Cycle)

Placed in Category 'A' by MHRD (GoI)

KLE ACADEMY OF HIGHER EDUCATION AND RESEARCH

JNMC Campus, Nehru Nagar, Belagavi – Karnataka, India

Phone: +91 0831-2472777, 2493779, FAX: +91 0831 – 249377

E-mail: info@kledeemeduniversity.edu.in Website: kledeemeduniversity.com

CONTENTS

SECTION I

Preamble:

Nutrition science is the study of nutrients that are essential for growth, development and maintenance of good health throughout life. In the present scenario, society needs the awareness regarding their diet and also, people are becoming more nutrition conscious. The common man is gradually switching towards nutrition scientists and dietitians for scientifically proved information on Nutrition and Dietetics. Nutrition-related chronic diseases are the most common cause of death in the world and present a great burden for society, particularly diseases such as obesity, diabetes, cardiovascular disease, cancer, dental disease, and osteoporosis. Making improvements in terms of diet and physical activity can help reduce the risk of these chronic diseases.

Currently food industry is shifting its focus from taste to nutrition. The curriculum will provide robust academic and experiential opportunities across the health spectrum to address the health of individuals and populations from prevention to palliation.

SECTION II

VISION

To be an outstanding KAHER of excellence ever in pursuit of newer horizons to build self reliant global citizens through assured quality educational programs.

MISSION

- To promote sustainable development of higher education consistent with statutory and regulatory requirements.
- To plan continuously provide necessary infrastructure, learning resources required for quality education and innovations.
- To stimulate to extend the frontiers of knowledge, through faculty development and continuing education programs.
- To make research a significant activity involving staff, students and society.
- To promote industry / organization, interaction/collaborations with regional/national/international bodies.
- To establish healthy systems for communication among all stakeholders for vision oriented growth.
- To fulfill the national obligation through rural health missions.

OBJECTIVES:

- To understand the functions and role of nutrients, their requirements and the effect of deficiency and excess (in brief)
- To understand the concept of an adequate diet and the importance of nutrients in recommended Dietary Allowances
- To provide scientific training that encompasses all aspects of the nutritional and food sciences
- To develop skills and attitudes required for working in the broad field of nutrition and dietetics.
- To train students in the field of food service management.
- Prepare students for a just and healthy society by advancing the range of roles and settings in human nutrition.
- Amplify the contribution of dietetics and nutrition practitioners and expand workforce capability and capacity.
- Collaborate to resolve the greatest nutrition and food challenges of present and the future.

SECTION III

Regulations Governing B.Sc. Nutrition and Dietetics Course (BND)

3.1 Course Duration: Three Years

3.2 Eligibility: Candidate for admission to BND course should have completed higher secondary level or Pre-University College (10+2) in any stream with as basic courses or equivalent course established under law considered equivalent thereto by KAHER, a candidate who has scored a minimum of 50% of the marks.

3.3 Yearly Intake: 20 students per year

3.4 Expected Program Outcomes : By the end of the programme students can

- Communicate effectively and professionally medical team, staff members, patients/clients, and peers
- Integrate the broad aspects of food into dietetics practice. Apply all areas of the nutrition care process and model to clinical practice.
- Programme will make students knowledgeable and competent to make a prospective career in Industry as well as in research in the area of Food, Nutrition & Dietetics.

3.5 Medium of instruction: The medium of instruction and examination shall be in English.

3.6 Requirement to Complete the Course:

B.Sc. Nutrition and Dietetics: 3 years,

Sem I	+	Sem II	+		Sem III	+	Sem IV	+	Sem V	+	Sem VI	+	Internship for 2 months in VI Semester	=	B.Sc. Nutrition and Dietetics

3.7. Training, Teaching and Learning Activities:

A candidate pursuing the course shall work in the Department as a full time candidate. No candidate shall join any other course of study or appear for any other examination conducted by this university or any other university in India or abroad during the period of study.

Every candidate shall take part in seminars, group discussions etc. Every candidate shall attend teaching and learning activities during each semester as prescribed by the Department and not absent himself /herself without valid reasons.

A list of teaching and learning activities designed to facilitate acquiring of essential knowledge and skills outlined is given below:

Books are the best teachers but experience makes man perfect. The proficient and lively theory classes shall be equally blended with various practical applications and group activities such as:

1. Assignment
2. Group Discussions
3. Role Plays
4. Workshops
5. Hospital Visits (Studies)

All these are aimed for the overall development of the emerging health workers, critical analysis and assessment of situations, creative thinking and proactive measures towards system management

Lectures: For all subjects lectures shall be conducted by the faculty.

Visits : PHC, subcenter, anganwadi, DHO office, KLE Hospital, Sewage treatment plant, Water purification plant, milk dairy, HLL Industry, Campbell factory, Pollution Control Board, CDPO office, IDSP, and other institutions of Nutrition and Dietetics importance.

3.8. Attendance and Monitoring Progress:

3.8.1 Attendance:

3.8.1.1 A candidate pursuing BND Course shall study for the entire period as full time candidate. No candidate shall join any other course of study or appear for any other examination conducted by this University or any other University in India or abroad during the period of registration.

3.8.1.2 Each semester shall be considered as a unit for the purpose of calculating attendance.

3.8.1.3 Every candidate shall attend symposia, seminars, conferences, project review meetings and lectures during each year as prescribe d by the Department/College/University and not absent himself / herself without valid reasons.

3.8.1.4 Candidate who has put in a minimum of 75% of attendance in the theory and practical assignments separately shall be permitted to appear for University examination at the end of each semester. They should also complete Internship (mini project) report submission.

3.8.1.5 Any candidate who fails to complete the course in the manner stated above will not be eligible for university Degree.

3.8.2 Monitoring Progress of Studies

3.8.2.1 *Log Book:* Every candidate shall maintain a log diary and record his/her participation in the training programs conducted by the Department such as workshop, field visits, hospital visit etc. Special mention shall be made of the scientific presentations in conference by the candidate as well as details of assessment works like essay writing, etc. submitted by the candidate. The work diary shall be scrutinized and certified by the Head of the Department

3.8.2.2 *Sessional Examination:* Records and marks obtained in sessional test shall be maintained by the Head of the Department and sent to the University, when called for.

3.8.2.3 *Records:* Records and marks obtained in sessional tests, field activities and weekly written assignments which shall be maintained by the Head of the Department and shall be made available to the University.

3.9. Internship (Mini Project):

Every candidate shall undergo hospital training for a period of two months in the sixth semester in which they will do mini project and submit the report duly signed by the Head of the Department.

3.10 Schedule of Examination

There shall be a University examination at the end of each semester for all six semesters.

3.11. Scheme of Examination

3.11.1 Sessional Examination

FORMATIVE ASSESMENT

There shall be a minimum of two sessional examinations in each subject conducted by the Department at midterms and before term end in theory and viva-voce.(formative assessments)The sessional marks shall be awarded out of a maximum of 80 for theory separately and shall be calculated out of 20 marks.

Theory

Written examination	80 marks
The total marks obtained have to be calculated out of 10.	
Reports of field visits	10 marks
Models/Essay writing/Project work	10 marks

Camps/ Group activities 10 marks

Assignments 10 marks

The total marks obtained have to be calculated out of 10.

A cumulative total will be calculated out of 20 as "Internal Assessment" (IA) marks

3.11.2 University Examinations: SUMMATIVE ASSESMENT

3.11.2.1 Theory:

There shall be six University examinations for the all core subjects in I, II, III, IV, V and VI semester examination. The examination will be conducted at the end of each semester. Internal Assessment Exam will be conducted for each Elective Subject. All core subjects will have University exam and electives will have college exam. Each theory paper shall be of 3 hours duration carrying 80 marks each. Each Semester will have one Each theory paper shall be of 3 hours duration carrying 80 marks each and Practical Exam for 3 hours for 80 Marks

Semester I			
Theory	**Subjects**	**Theory + IA**	**Total**
BND –I-1 T	Introduction to Food Science	80 + 20	100
BND –I-2 T	Principles of Nutrition	80 + 20	100
BND –I-3 T	Nutritional Biochemistry I	80 + 20	100
BND –I-4 T	English	80 + 20	100
		Total	**400**
PRACTICALS			
Practical's	**Subjects**	**Practical's + Viva Voce + IA**	**Total**
BND –I-1 P	Introduction to Food Science	60 + 20 +20	100
BND –I-2 P	Principles of Nutrition	60 + 20 +20	100
BND –I-3 P	Nutritional Biochemistry I	60 + 20 +20	100
		Total	**300**
		Grand Total (Theory + Practical)	**700 each Semester**

Semester II			
Theory	**Subjects**	**Theory + IA**	**Total**
BND –II-1 T	Human Physiology	80 + 20	100
BND –II-2 T	Nutritional Biochemistry-II	80 + 20	100
BND –II-3 T	Nutrition in the Lifecycle -I	80 + 20	100
BND –II-4 T	Environmental Studies	80 + 20	100
		Total	**400**
PRACTICALS			
Practical's	**Subjects**	**Practical's + Viva Voce + IA**	**Total**
BND –II-1 P	Human Physiology	60 + 20 +20	100
BND –II-2 P	Nutritional Biochemistry-II	60 + 20 +20	100
BND –II-3 P	Nutrition in the Lifecycle –I	60 + 20 +20	100
		Total	**300**
		Grand Total (Theory + Practical)	**700 each Semester**

Semester III			
Theory	**Subjects**	**Theory + IA**	**Total**
BND –III-1 T	Assessment of Nutritional status	80 + 20	100
BND –III-2 T	Basic Dietetics	80 + 20	100
BND –III-3 T	Nutrition in the Lifecycle –II	80 + 20	100
BND –III-4 T	Communication Skills	80 + 20	100
		Total	**400**
PRACTICALS			
Practical's	Subjects	Practical's + Viva Voce + IA	Total
BND –III-1 P	Assessment of Nutritional status	60 + 20 +20	100
BND –III-2 P	Basic Dietetics	60 + 20 +20	100
BND –III-3 P	Nutrition in the Lifecycle –II	60 + 20 +20	100
		Total	**300**

		Grand Total (**Theory + Practical)**	**700 each Semester**
Semester IV			
Theory	**Subjects**	**Theory + IA**	**Total**
BND –IV-1 T	Advanced Dietetics	80 + 20	100
BND –IV-2 T	Diet and Nutritional Counseling	80 + 20	100
BND –IV-3 T	Fundamentals of Food Microbiology	80 + 20	100
BND –IV-4 T	Law – Indian Constitution	80 + 20	100
		Total	**400**
PRACTICALS			
Practical's	Subjects	Practical's + Viva Voce + IA	Total
BND –IV-1 P	Advanced Dietetics	60 + 20 +20	100
BND –IV-2 P	Diet and Nutritional Counseling	60 + 20 +20	100
BND –IV-3 P	Fundamentals of Food Microbiology	60 + 20 +20	100
		Total	**300**
		Grand Total (**Theory + Practical)**	**700 each Semester**

Semester V			
Theory	**Subjects**	**Theory + IA**	**Total**
BND –V-1 T	Ayurveda Concepts of Diet	80 + 20	100
BND –V-2 T	Community Nutrition	80 + 20	100
BND –V-3 T	Food Preservation &Adulteration	80 + 20	100
BND –V-4 T	Fundaments of Computer	80 + 20	100
		Total	**400**
PRACTICALS			
Practical's	Subjects	Practical's + Viva Voce + IA	Total
BND –V-1 P	Ayurveda Concepts of Diet	60 + 20 +20	100
BND –V-2 P	Community Nutrition	60 + 20 +20	100
BND –V-3 P	Food Preservation &Adulteration	60 + 20 +20	100
		Total	**300**
		Grand Total (**Theory + Practical)**	**700 each Semester**

KLE ACADEMY of HIGHER EDUCATION AND RESEACH

B.Sc. NUTRITION AND DIETETICS

Semester VI			
Theory	**Subjects**	**Theory + IA**	**Total**
BND –VI-1 T	Food Service and Management	80 + 20	100
BND –VI-2 T	Bakery And Confectionery	80 + 20	100
BND –VI-3 T	Institutional Food Management	80 + 20	100
BND –VI-4 T	Human Values & Professional Ethics	80 + 20	100
		Total	**400**
PRACTICALS			
Practical's	Subjects	Practical's + Viva Voce + IA	Total
BND –VI-1 P	Food Service and Management	60 + 20 +20	100
BND –VI-2 P	Bakery And Confectionery	60 + 20 +20	100
BND –VI-3 P	Internship + Mini Project	60 + 20 +20	100
		Total	**300**
		Grand Total (**Theory + Practical)**	**700 each Semester**

All Six Semester - Type of Questions and Distribution of Theory Examination

Sr.no	Question	Question Asked	Question to Attempt	Marks	Minimum Marks	Internal Assessment	Total Marks
1.	**Long Essays**	**3**	**2**	**2 X 10**	**20**	**20**	**(80 +- 20) 100**
2.	**Short Essays**	**9**	**8**	**8 X 5**	**40**		
3.	**Short Answers**	**10**	**10**	**10 X 2**	**20**		

All Practical will have University examinations.

Sr. no	Theory	Practical + IA + Viva	Grand Total
1	**Practical (Major 40 + Minor 20)**	**60 + 20 + 20**	**100**

3.12. Criteria for Declaring Pass

3.12.1 A candidate shall be declared to have passed BND if all the conditions below are fulfilled:

BND-Semester I:

- Candidate who secures Grade B or above in each subject in theory of University & Sessional examinations considered together

BND-Semester II

- Candidate who secures Grade B or above in each subject in theory of University & Sessional examinations considered together
- Candidate shall further obtain Grade B

BND -Semester III

- Candidate who secures Grade B or above in each subject in theory of University & Sessional examinations considered together

BND -Semester IV

- Candidate who secures Grade B or above in each subject in theory University & Sessional examinations considered together
- Candidate shall further obtain Grade B

BND -Semester V

- Candidate who secures Grade B or above in each subject in theory University & Sessional examinations considered together
- Candidate shall further obtain Grade B

BND -Semester VI

- Candidate who secures Grade B or above in each subject in theory University & Sessional examinations considered together
- Candidate shall further obtain Grade B

3.12.2 Carry over:

At any given point of time a candidate shall have subjects pending to clear of only previous semester in addition to the subjects of the current semester that he is appearing for. e.g:

- If the candidate has not passed semester I, he/she can appear for semester II and pending subjects of semester I simultaneously.
- Appearing for semester III he/she should have passed semester I and can appear for papers pending from semester II along with semester III subjects.
- Appearing for semester IV he/she should have passed semester II completely and can appear pending papers of semester III simultaneously.
- Appearing for semester V he/she should have passed semester III completely and can appear pending papers of semester IV simultaneously.
- Appearing for semester VI he/she should have passed semester IV completely and can appear pending papers of semester V simultaneously.

Cumulative Grade Point Average (CGPA)

Letter Grades and Grade Points equivalent to percentage of marks and performances

10 Point Grade Scale

Percentage of marks obtained	Letter Grade	Grade Point	Performance
90.00 - 100	O	10	Outstanding
80.00 -89.99	A+	9	Excellent
70.00-79.99	A	8	Good
60.00-69.99	B+	7	Fair
50.00-59.99	B	6	Average
Less than 50	F	0	Fail
Absent	AB	0	Fail

1. **Conversion of Grades in to GPA:**

   GPA= Credits x Grade Points / Total Credits

2. **Cumulative Grade Point Average (CGPA)** of all 4 Semester will be calculated as:

   Total No. GPA / No. of Semester

SECTION IV

KLE ACADEMY of HIGHER EDUCATION AND RESEACH

B.Sc. NUTRITION AND DIETETICS

Semester I					
Sl no	**Code**	**Core Subjects**	**Theory/Practical**	**Hours**	**Credits**
1	BND –I-1 T	Introduction to Food Science	Theory	30	4
2	BND –I-2 T	Principles of Human Nutrition	Theory	30	4
3	BND –I-3 T	Nutritional Biochemistry I	Theory	30	4
4	BND –I-1 P	Introduction to Food Science	Practical	15	4
5	BND –I-2 P	Principles of Human Nutrition	Practical	15	4
6	BND –I-3 P	Nutritional Biochemistry I	Practical	15	4
7.	BND –I-4 T	English (Electives)	Theory	30	4

SEMESTER I

Course Content

BND –I-1 T

THEORY

INTRODUCTION TO FOOD SCIENCE: Total 30 Hours

UNIT 1 06 Hour

Definitions: Food Science, Food, Nutrients, Nutritional Status, Malnutrition- Under – nutrition, over nutrition, Balanced diet, Hunger- Hollow Hunger, Hidden Hunger, Appetite, Satiety, Health, Meal, Menu.

Food Groups: Basic five, Nutritional classification of foods – Energy yielding, Body building and protective foods. c. Cooking: Objectives, cooking methods- Moist and Dry heat methods of cooking, merits and demerits.

UNIT II 08 Hours

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 and Nuts: Nutritive value, factors affecting cooking quality of pulses, germination – process, advantages

UNIT III 04 Hours

Vegetables: Botanical 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.

UNIT IV **06 Hours**

Milk and Milk Products: Composition and Nutritive value, Different types of milk, pasteurization of milk, milk products- dry milk, cheese.

Egg: Structure, Composition and Nutritive value. Measures of egg quality, role of egg in cookery.

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 **06 Hours**

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.

BND –I-1 P

PRACTICAL

INTRODUCTION TO FOOD SCIENCE **Total 15 Hours**

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 Food preparation, understanding the principles involved, nutritional quality and portion size
    - Cereals – Preparation of rice by steaming, absorption method, Straining and Pressure cooking. Batters and dough. Preparation of Idli, Dosa, Upma, Kichadi, Chapathi, Poori, Fried Rice, Briyani and variety rice.
    - Pulses – Factors affecting the cooking quality of pulses. Preparation of Sambar, Sundal, Bholi, Mysore-pak, Vada, Channa Masala, Thuvaiyal, Green gram payasam, Besan omlette, Sprouted salad and koottu.
    - Vegetables – Selecting, cleaning, coring, pitting and chopping of fruits and vegetables. Avial, porriyal, pugath, stew, kuruma, cutlet, fry, chips, podimas, pachadi, stuffed chapathi, koottu.
    - Fruits – Fritters, Halwa, Salad, Stuffed items, Jelly, Payasam, Thokku, Sauce and Jams.
    - Milk – Cottage Cheese, Paneer, Phirnee, Payasam, Ice cream, kova, Buttermilk curry, Basanthi and Jamun.
    - Egg – Boiled, Scrambled, Poached, Curry, Masala, Omelette.
    - Three Course, Five Course and Seven Course menu planning.
    - Score card preparation and sensory evaluation.
5. Visit to a modern rice mill
6. Visit to a Dairy farm/ Milk processing unit

Recommended Books:

1. Potter, N. and Hotchkiss, J.H. Food Science, 5th Ed., CBS Publications and Distributors, Daryaganji, New Delhi, 1998.
2. Shakuntala Manay, Shadaksharaswamy. M (2000) Foods, Facts and Principles, New Age International Pvt Ltd Publishers, 2nd Edition
3. Usha Chandrasekhar, Food Science and Application in Indian Cookery, Phoenix Publishing House P. Ltd., New Delhi, 2002.
4. Srilakshmi, B. Food Science, New Age International Publishers, New Delhi, 2010
5. Swaminathan, M, Hand Book of Food Science and Experimental Foods, BAPPCO, Bangalore, 1992
6. Brow, A., Understanding Food, Thomson Learning Publications, Wadsworth, 2000.
7. Mehas, K.Y. and Rodgers, S.L. Food Science and You, McMillan Mc Graw Company, New York, 2000. 3. Parker, R. Introduction to food Science, Delmer, Thomson Learning Co., Delma, 2000.

BND –I-2 T

THEORY **Total 30 Hours**

PRINCIPLES OF HUMAN NUTRITION:

Unit 1 **03 Hours**

Introduction to Nutritional Science: Definitions, History, Nutrition research in India, Global Food History, Food Changes as Evolution of Human - stone age, Paleolithic age (old stone age), the Mesolithic age (middle stone age), and the Neolithic age (new stone age), Geographical Distribution of Food Grains in India

Unit 2 **02 Hours**

Recommended Dietary Allowances: Factors affecting RDA, general principles, determination of RDA, Requirements and RDA, Reference man and reference woman

Unit 3 **03 Hours**

Energy Metabolism and basics of nutrition: Energy requirement in humans: Basal metabolic rate (BMR), physical activity, and thermic effect of food (formerly termed specific dynamic action), Basal metabolic rate: Definition, factors affecting and measurement

Unit 4

Classification, Functions, Recommended Dietary Allowances, effects of deficiency and/ or excess consumption on health of the following nutrients: **20 Hours**

- Carbohydrates and Dietary fibers
- Lipids.
- Proteins
- Vitamins – Water and Fat Soluble
- Minerals: Calcium, Iron, Iodine and Zinc

Unit 5 **02 Hours**

Water and electrolytes in diet: Intake and output of water, Distribution of water in the body (ICF & ECF), Electrolyte composition of body fluids, Isotonic/hypotonic/hypertonic contraction and expansion of ECF

BND –I-2 P

PRACTICAL

PRINCIPLES OF HUMAN NUTRITION: **Total 15 Hours**

1. Standardized Recipes
2. Calculation of BMR -Harris Benedict Equation
3. Planning of Protein and Energy rich dish.
4. Planning of Vitamin A rich dish.
5. Planning of Vitamin B1 rich dish.
6. Planning of Vitamin B2 rich dish.
7. Planning of Vitamin B3 rich dish.
8. Planning of Vitamin C rich dish.
9. Planning of Calcium rich dish.
10. Planning of Iron rich dish.
11. Planning of Zinc Rich Dish
12. Planning of Fiber rich dish
13. Geographical Distribution of Good Grains in India
14. Identification of Staple Food from all the states from India along with their Importance

Suggested Readings:

1. Agarwal, A and Udipi, S. (2014). Text Book of Human Nutrition. Jaypee Medical Publication, Delhi.
2. Sehgal, S. and Raghuvanshi, R.S. (2007). Text Book of Community Nutrition. ICAR Publication.
3. Wardlaw and Insel MG, Insel PM (2004). Perspectives in Nutrition. Sixth Edition, McGraw Hill.
4. Srilakshmi B (2012). Nutrition Science.4th Revised Edition, New Age International Publishers.
5. Khanna K, Gupta S, Seth R, Passi SJ, Mahna R, Puri S (2013). Textbook of Nutrition and Dietetics. Phoenix Publishing House Pvt. Ltd.

BND –I-3 T

THEORY

NUTRITIONAL BIOCHEMISTRY I **Total 30 Hours**

Unit 1 **06 Hours**

Introduction to Biochemistry: Definition, objectives, scope and inter relationship between biochemistry and other biological science. Structure and functions of cell with special reference to Plasma membrane (Fluid Mosaic Model), Mitochondria, Ribosome, Endoplasmic reticulum. Nucleus (nuclear membrane, nuclear chromatin and nucleolus).Nucleotide, Brief Introduction of biological membranes to understand molecular transport, Transport of Large molecules, Receptor mediated endocytosis, exocytosis, Molecular aspects of transport; Passive diffusion, facilitated diffusion, active transport.

Unit 2 **04 Hours**

Enzymes: Definition, types and classification of enzymes, definition and types of coenzymes, Functions of coenzymes and cofactors, Specificity of enzymes, Isozymes, enzyme Kinetics including factors affecting enzyme action, velocity of enzyme catalysed reactions, regulations of enzyme activity, zymogen, allosteric enzymes, enzyme inhibition.

Unit3 **10 Hours**

Chemistry and Metabolism of Carbohydrates : Definition, Classification, Biological role. Metabolism - Digestion and absorption, Glycolysis, Krebs cycle, Electron Transport System, Gluconeogenesis, Glycogenesis, Glycogenolysis, HMP pathway, Galactose Metabolism, Fructose Metabolism. Regulation of Blood Glucose.

Unit 4 **10 Hours**

Chemistry and Metabolism of Lipids: Definition, Classification, Biological Role of Fatty Acids and Lipids Metabolism- Digestion and Absorption, Oxidation of Fatty Acids (saturated & unsaturated), Metabolism of Lipoproteins and Ketone Bodies and Their Significance,, Synthesis

and utilization of ketone bodies, Ketosis, fatty livers, Essential Fatty acids, Cholesterol and its clinical significance.

BND –I-3 P

PRACTICAL'S **Total 15 Hours**

NUTRITIONAL BIOCHMISTRY I

1. Identification of carbohydrates (Qualitative Tests)
2. Quantitative estimation of Sugars (Glucose, lactose, starch)
3. Estimation of glucose in urine by Benedict's methods
4. Urine analysis - normal & abnormal constituents of urine.
5. Estimation of blood Glucose
6. Saponification value of fats
7. Estimation of serum cholesterol

Suggested Readings

1. Test Book of Bio Chemistry Vasudevan (DM), & Jaypee Brothers, New Delhi. for Medical Students Sree Kumari (S)
2. Biochemistry U. Satyanarayan Books and Allied (P) Ltd. Kolkata-700009. India)
3. Clinical Chemistry Varley William Heinemann Medical Books Ltd & Inter Science Book.Inc. New York.
4. Clinical Chemistry TEITZ W.B. Saunders Company Harcourt (India) Pvt. Ltd. New Delhi-11004

BND –I-4 T **Total 30 Hours**

ELECTIVE

ENGLISH

Course description: It is designated to help the students to acquire a good command over English language for common and medical terminology used in medical practice.

Behavioral objectives:

Ability to speak and write proper English

Ability to read and understand English

Ability to understand and practice medical terminology.

Paragraph, Letter writing, Note making, Description. The use of paragraphs, Essay writing, Telegrams, Precise-writing and abstracting, Report writing, Medical Terminology, Use of dictionary

Scheme of examination

Theory: 80 Marks	**Duration: 3 hours**
1) Fill in the blanks -	10 marks
2) Articles (Passage/fill in the blanks) -	10 marks
3) Tense (Sentence identification/rewriting a sentence) -	10 marks
4) Voice (Rewrite) -	10 marks
5) Speech (Rewrite) -	10 marks
6) Linkers (Paragraph) -	10 marks
7) Paragraph writing -	10 marks
8) Letter writing -	10 marks

Text Books Recommended (Latest Edition)

Sl. No.	Name of the Book & Title	Author	Publisher's Name Place of Publication
1.	Sharma Strengthen your writing	V. R. Narayana	New Delhi, Orient Longman
2.	Grammer and composition	Wren and Martin	Delhi, Chand & Co.
3.	Spoken English	Shashikumar V. D'Souza P. V.	New Delhi, Tata Mergaw Hill
4.	Medical dictionary	Dorland's pocket IBH Publishing Co.	New Delhi; Oxford &

SECTION V

Semester II					
Sl no	Code	Core Subjects	Theory/Practical	Hours	Credit
1	BND –II-1 T	Human Physiology	Theory	30	4
2	BND –II-2 T	Nutritional Biochemistry-II	Theory	30	4
3	BND –II-3 T	Nutrition in the Lifecycle – I	Theory	30	4
4	BND –II-1 P	Human Physiology	Practical	15	4
5	BND –II-2 P	Nutritional Biochemistry-II	Practical	15	4
6	BND –II-3 P	Nutrition in the Lifecycle	Practical	15	4
7.	BND –II-4 T	Environmental Studies (Electives)	Theory	30	4

BND –II-1 T
THEORY
HUMAN PHYSIOLOGY **Total: 30 Hours**

Unit 1 **4 Hours**
Blood: Blood and its composition, formed elements, Blood groups, Mechanism of blood coagulation, Introduction to immune system, Erythropoiesis and anaemia,

Unit 2 **4 Hours**
Cardiovascular System: Structure and functions of heart, Cardiac cycle, cardiac output, blood pressure and its regulation.

Unit 3 **3 Hours**
Digestive System: Structure and functions of G.I. tract, Process of digestion and absorption of food, Structure and functions of liver, gallbladder and pancreas.

Unit 4 **3 Hours**
Respiratory System: Structure of Lungs and gaseous exchange (oxygen and carbon dioxide transport).

Unit 5 **2 Hours**
Musculoskeletal System: Formation and functions of muscles, bones. Mechanism of muscle contraction, isometric and isotonic muscle contraction

Unit 6 **3 Hours**
Excretory system: Structure and function of skin, regulation of temperature of the body, Structure and functions of kidney in special reference to nephron, Physiology of urine formation.

Unit 7 **4 Hours**
Reproductive system: Structure and functions of gonads, concept on menstrual cycle, Brief idea of pregnancy, parturition, lactation and menopause. Brief concept on spermatogenesis and Oogenesis process.

Unit 8 **3 Hours**
Nervous System: Functions of Various parts of Brain- Cerebellum, Basal ganglia, Hypothalamus, Thalamus, Autonomic Nervous System.

Unit 9 **4 Hours**
Endocrine system**:** Structure and functions of pituitary, thyroid, parathyroid., pancreas and adrenal gland.

BND –II-1 P
PRACTICAL'S
HUMAN PHYSIOLOGY II **Total 15 Hours**

1. Detection of Blood group (Slide method).
2. Determination of Bleeding Time (BT) and Clotting Time (CT).
3. Measurement of Haemoglobin level (Sahli`s or Drabkinmethod)
4. Determination of pulse rate in Resting condition and after exercise
5. Determination of blood pressure by Sphygmomanometer (Auscultatory method).
6. Auscultation for Heart Sounds
7. Spirometry - Description of Normal Findings
8. Artificial Respiration

Suggested Reading:

Sl. No.	Name of the Book & Title	Author	Publisher's Name, Place of Publication
1	Textbook of Physiology for MLT	Prof A. K. Jain	Avichal Publishing Company
2	Textbook of Medical Physiology	D. Venkatesh & H. H. Sudhakar	Wolters Kluwers
3	Concise Medical Physiology	Sujit K. Choudhari	New Central Books, Calcutta.
4	Textbook of Physiology	Arthur C. Guyton	Prism Publishers, Bangalore.
5	Practical Physiology	Prof. A. K. Jain	Arya Publication.

BND –II-2 T
THEORY

NUTRITIONAL BIOCHEMISTRY II — Total: 30 Hours

Unit 1 — **02 Hours**

Introduction to Nucleic acids: Structure, replication, transcription, genetic code (in brief) elementary knowledge of biosynthesis of proteins.

Unit 2 — **08 Hours**

Chemistry and Metabolism of Proteins: Definition, Classification, Biological Role of Amino Acids and Proteins. Biological Value of Protein, Metabolism -Digestion and Absorption, Transamination, Deamination, Metabolism of Ammonia, Urea Cycle, Disorders Related to Protein/Amino Acid Metabolism. Lipoproteins: Types, composition, role and significance in disease

Unit 3 — **05 Hours**

Vitamins: Definition, Classification, Absorption and Role of Vitamins in Metabolism, Chemistry and biochemical role of fat-soluble vitamins. A. D. E. and K. Water soluble vitamins – B1, B2, B6 niacin and C. Deficiency Diseases.

Unit 4: — **05 Hours**

Minerals: Definition, Types, Absorption and Function and Role of Minerals in Metabolism, Deficiency Diseases.

Unit 5 — **05 Hours**

Water and Electrolyte balance: Distribution of Body Water, Electrolyte Composition of Body Fluids, Regulation of Electrolyte Balance , Dehydration and Over hydration, Acid Base balance , Role of Buffers, Role of Lungs and Kidney in Maintaining Acid Base Balance and Related Disorders

Unit 6 — **05 Hours**

Organ Function Tests: Liver Function Tests,Kidney Function Tests, Gastric Function Tests, Pancreatic Function Tests,Thyroid Function Tests,

BND –II-2 P
PRACTICALS

NUTRITIONAL BIOCHEMISTRY II **Total 15 Hours**

1. Qualitative analysis of amino acids
2. Qualitative analysis of proteins
3. Estimation of serum Protein
4. Estimation of serum creatinine
5. Estimation of serum Urea
6. Estimation of serum Iron, phosphorus, calcium

Reading References:

- Dasgupta, S. K., Biochemistry Vol. I; n & III, Mc Millan Co. of India Limited
- Das, Debajyoti, Biochemistry 2nd ed., 1980, Academic Publishers, India.
- Harper, H. A. et al, A review of physiological chemistry, Los Altos, Lange medical publications, 1985.
- Lehninger, A. L., Principles of Biochemistry
- Orten J. M. & Newhaus O. V, Human Biochemistry, C. V Mosby Co. S1. Lois, JSA 1982.
- Chatterjee Textbook of Medical Biochemistry
- Biochemistry,U Satyanarayna, U.Chakrapani 4th edition,

BND –II-3 P
THEORY

NUTRITION IN THE LIFECYCLE - I — Total 30 Hours

Unit I — 10 Hours

Nutrition during Pregnancy and lactation: Physiological stages of pregnancy , Effect of Nutritional status on Pregnancy outcome, Nutritional Requirements, Guide for eating during pregnancy) Complications of pregnancy and their dietary Implications. Lactation: Physiology, Nutritional Requirements, breast feeding an infant.

Unit 2 — 08 Hours

Nutrition during Infancy: Physiological Development, Nutritional Requirements, Milk for Infants-Composition of human and cow's milk, formulas, Complimentary foods-weaning pattern, composition, general principles in feeding infants, special feeding problems. Nutritional requirements of Toddlers (1-3years) , Nutrition in the Care of the Low-Birth weight Infant: Characteristics of low-birth weight Infant, small for date babies, pre-term babies Use of growth chart.

Unit 3 — 0 6 Hours

Nutrition In Childhood Pre-School (1 to 6 years): Growth and Development, Nutritional Requirement's, Factors influencing food intake, Nutritional Concerns

Unit 4 — 06 Hours

Nutrition in School Children: Nutritional Requirements of School Children (7-12 years). School lunch Programmes. Diet related problems.

BND –II-3 P

PRACTICALS

NUTRITION IN THE LIFECYCLE I **Total 15 Hours**

1. Planning a day's diet for Pregnant Woman
2. Planning of low cost nutritious recipe for pregnant women.
3. Planning of high cost nutritious recipe for pregnant women.
4. Planning of low cost nutritious recipe for lactating mothers
5. Planning of high cost nutritious recipe for lactating mothers
6. Planning of weaning food for Infants (6-12 months)
7. Planning of Mid day Meal for preschool children (1-6 years)
8. Planning of Mid meal for school Children (6-12 years)
9. Planning and preparation of a day's diet for a school going child with special emphasis on Packed Lunches.

Reading Reference

1. Antia, F.P. (2005): Clinical Nutrition and Dietetics, Oxford University Press, Delhi
2. Gordon M Ward law (1999) Perspectives in Nutrition 4th ed.WCB/Mcgraw Hill.
3. Chadha R and Mathur P eds. Nutrition: A Lifecycle Approach. Orient Blackswan, New Delhi. 2015
4. International edition. Mahan, L.K., Arlin, M.T. (2000): Krause's Food, Nutrition and Diet therapy, 11th edition, W.B.Saunders Company, London. Passmore, R and Davidson S
5. Shubhangini A Joshi (2002): Nutrition and Dietetics2nd edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi.
6. Srilakshmi,B.(2005):Dietetics,5th edition, New Age International(P) Limited Publishers, New Delhi

BND –II-2 P
THEORY
ENVIRONMENTAL STUDIES

The students should gain knowledge to understand the multidisciplinary nature of the environment and the awareness of the eco system, which maintains the natural environment.

OBJECTIVES:

a) KNOWLEDGE

At the end of the II Phase 1st term MBBS Course the student is expected to know:

1. The natural resources like forest, water, mineral, food, energy and land.

2. Functions of the eco system.

3. Bio-diversity and its conservation.

4. Environmental pollution & its prevention.

5. Social issues.

b) SKILLS

At the end of the IInd term Course the student is expected to:

1. Visit local areas to understand and document environmental assets like river, forest, grassland, hill and mountain.

2. Visit an industrial area or agricultural area to know about local pollutants.

3. Identify common plants, insects and birds in their local areas.

4. Identify rivers, hills and mountains in their local areas.

5. To make use of the knowledge to protect natural resources.

COURSE CONTENTS

Theory and Field work: 50 Hours

- **Theory - 45 hours**
- **Field work - 5 hours**

1: Multi-disciplinary nature of environmental studies: Definition, scope and importance, need for public awareness. 2 hours

2: Natural Resources:

Renewable and non-renewable resources:

Natural resources and associated problems.

a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

g) Role of an individual in conservation of natural resources.

h) Equitable use of resources for sustainable lifestyles **8 hours**

3: Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following

ecosystems:-

a. Forest ecosystem

b. Grassland ecosystem

c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) **6 hours**

4: Biodiversity and its conservation **8 hours**

- Introduction - Definition : genetic, species and ecosystem diversity.
- Biogeographical classification of India.
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values.
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation.
- Hot-sports of biodiversity.
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

5: Environmental Pollution **8 hours**

Definition

Cause, effects and control measures of:-

a. Air pollution

b. Water pollution

c. Soil pollution

d. Marine pollution

e. Noise pollution

f. Thermal pollution

g. Nuclear hazards

Solid waste Management : Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution.

Pollution case studies.

Disaster management : floods, earthquake, cyclone and landslides.

6: Social Issues and the Environment **7 hours**

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case Studies

- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and control of Pollution) Act.
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation.

7: Human Population and the Environment 6 hours

- Population growth, variation among nations.
- Population explosion - Family Welfare Programme.
- Environment and human health.
- Human Rights.
- Value Education.
- HIV/AIDS
- Women and Child Welfare.
- Role of Information Technology in Environment and human health.
- Case Studies.

8: Field work

- Visit to a local area to document environmental assets river/forest/grassland/hill/mountain
- Visit to a local polluted site - Urban / Rural/ Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc. (Field work Equal to 5 lecture hours)

Scheme of Examination

A. Theory: 80 Marks

- Long Essay 2 X 10 = 20
- Short Essay 8 X 5 = 40
- Short Answers 5 X 4 = 20

B. IA: 20 Marks

Recommended Books

Sl. No.	Title	Author	Edition & Year	Publisher
1	Environmental Biology	Agarwal, K.C.	2001	Nidi Publication Ltd. Bikaner
2	The Biodiversity of India	Bharucha Erach		Mapin Publishing Pvt. Ltd., Ahmedabad - 380 013
3	Environmental Encyclopedia	Cunningham W.P., Copper T.H., Gorhani E. & Hepworth M.T.	2001	Jaico Publication House, Mumbai.
4	Global Biodiversity Assessment	Heywood V. H. & Waston R.T.	1995	Cambridge University Press 1140p
5	Environmental Protection and Laws	Jadhav H. & Bhosale V. M.	1995	Himalaya Publishing House, Delhi 284p
6	Environmental Science Systems & Solutions	Mckinney M. L. & School R.M.	1996	

Semester III					
Sl no	**Code**	**Core Subjects**	**Theory/Practical**	**Hours**	**Credit**
1	BND –III-1 T	Assessment of Nutritional status	Theory	30	4
2	BND –III-2 T	Basic Dietetics	Theory	30	4
3	BND –III-3 T	Nutrition in Lifecycle II	Theory	30	4
4	BND –III-1 P	Assessment of Nutritional status	Practical	15	4
5	BND –III-2 P	Basic Dietetics	Practical	15	4
6	BND –III-3 P	Nutrition in Lifecycle II	Practical	15	4
7.	BND –III-4 T	Communication Skills (electives)	Theory	30	4

BND –III-1 T

THEORY

ASSESSMENT OF NUTRITIONAL STATUS **Total Hours 30**

Unit 1 **5 Hours**

Method and Assessment of Nutritional Status, Identification of risk groups (random and purposive). Define Anthropometry.

Requirement for measuring anthropometric data. Anthropometry and reference values for Newborn, Infant, Children, Adolescent, Adult and Elderly.

Unit 2: **5 Hours**

Nutritional Indices: Weight for Age, Height for Age, Weight for Height, BMI, BMI for Age, Mid arm circumference for age and height, Skin fold thickness, Head Circumference, Waist Hip Ratio: Various tools used, measurements, and Reference Range and Interpretations. Plotting and interpretation of growth charts for children below 5 years

Identification of clinical signs of common nutritional disorders

Unit 3: **10 Hours**

Nutritional Assessment Systems: Surveys, Surveillance, Screening Intervention, and assessment system in clinical system.

Nutritional Assessment Methods:

Nutritional Indirect assessments: Anthropometric, Laboratory methods, Clinical Methods, Dietary Factory and Ecological Methods.

Nutritional Indirect assessments- Food balance sheets and Agricultural Data. Use of growth charts.

Use of Nutritional Diagnosis at Clinic and at the community

Unit 4: **10 Hours**

Dietary assessment – Food Frequency Questionaries and 24-hour diet recall Method.

Clinical assessment and signs of nutrient deficiencies – Protein Energy Malnutrition (Kwashiorkor, marasmus)

Vitamin A deficiencies, Anaemia, Rickets, B-Complex deficiencies.

Methods of Extension used in community- a) Preparation of visual aids-charts, posters models, etc. for exhibition. b) Lecture and Method Demonstrations to target groups.

BND –III-1 P

PRACTICAL

ASSESSMENT OF NUTRITIONAL STATUS **Total 15 Hours**

1. Assessment of Nutritional status
    - Anthropometric Measurement - Height, weight, skinfold thickness, Mid - upper arm circumference.
    - Comparison and interpretation of the nutritional assessment data and its significance - body Mass Index (BMI), fat mass, Waist - Hip Ratio (WHR).
    - Estimation of food and nutrient intake - 24 hours dietary recall, food frequency
    - Planning, calculation and preparation of diets for different age groups –

        (a) Infant, with reference to weaning foods.

        (b) Children

        (c) Adolescents—boys and girls

        (d) Adults— Men and women engaged in sedentary, moderate and heavy work.

        (e) Pregnant and lactating women.

2. Diet and nutrition survey- Identifying vulnerable and at risk groups
3. Hospital visits to observe nutritional deficiencies

Suggested Readings :

1. Wadhwa A and Sharma S (2003). Nutrition in the Community-A Textbook. Elite Publishing House Pvt. Ltd. New Delhi.
2. Park K (2011). Park's Textbook of Preventive and Social Medicine, 21st Edition. M/s Banarasidas Bhanot Publishers, Jabalpur, India.
3. Bamji MS, Krishnaswamy K and Brahmam GNV (Eds) (2009). Textbook of Human Nutrition, 3rd edition. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
4. ICMR (2011) Dietary Guidelines for Indians – A Manual. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad.
5. Jelliffe DB, Jelliffe ERP, Zerfas A and Neumann CG (1989). Community Nutritional Assessment with special reference to less technically developed countries. Oxford University Press. Oxford.
6. World Health Organization (2006). WHO Child Growth Standards: Methods and development: Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age.

BND –III-2 T

THEORY

BASIC DIETETICS **Total Hours 30**

Unit 1 **03 Hours**

Therapeutic Diets: Basic Concept, Therapeutic Adaptation of Normal Diet, Factors Considered, Routine Hospital Diets, Mode of feeding methods, Role of dietitian in the Hospital and Community, Patient Care and Counseling

Unit 2 **02 Hours**

Diet in Weight Imbalance and Counseling: Obesity and Underweight- Causes, Health risks, Dietary Treatment, Psychotherapy

Unit 3 **05 Hours**

Diet, Nutrient and Drug Interaction: Effect of drugs on ingestion, digestion, absorption and metabolism of nutrients. Effect of food, nutrients and nutritional status on drug dosage and efficacy.

Unit 4 **05 Hours**

Diet in Fever: Nutrition and Infection, Metabolic changes during Infection, Typhoid fever, Tuberculosis, HIV Infection and AIDS

Unit 5 **05 Hours**

Anemia: Resulting from Acute Hemorrhage, Nutritional anemia, Sickle cell anemia, Thalassemia, Pathogenesis and dietary management in the above conditions

Food Intolerances and Food Allergy: Adverse food reactions, Treatment and Management, Prevention

Unit 6 **05 Hours**

Diet in Diseases of Gastro Intestinal Tract: Upper GI Tract Disorders- Disorders of Esophagus, Disorders of Stomach. Lower GI Tract Disorders- Common Intestinal Disorders, Disorders of Small Intestine. Intestinal Brush Border Enzyme Deficiencies, Inflammatory Bowel Diseases, Disorders of Large Intestine

BND –III-2 P
PRACTICAL
BASIC DIETETICS **Total Hours 15**

1. To plan a Clear Liquid diet.
2. To plan a Full Liquid Diet.
3. To plan a Soft Diet.
4. To plan a diet for Obesity.
5. To plan a diet for Underweight.
6. To plan a diet for Typhoid fever.
7. To plan a diet for Tuberculosis.
8. To plan a diet for Nutritional Anemia
9. To plan a diet for Lactose Intolerance.
10. To plan a diet for Coeliac Disease.

Suggested Readings:

1. Raghuvanshi, R.S. and Mittal, M. (2014). Food Nutrition and Diet Therapy. Westvills Publication Delhi.
2. Agarwal, A and Udipi, S. (2014). Text Book of Human Nutrition. Jaypee Medical Publication Delhi.
3. Robinson. Basic Nutrition And Diet Therapy (8th Edition)
4. Mahan L. K., Escott- Stump, S. and Raymond J. L. (2012): "Krause's Food and the Nutrition Care Process", 13th Edition, Elsevier.
5. Ross, A.C., Caballero B., Cousins R. J., Tucker K.L. and Ziegler T. (2014) Modern Nutrition in Health and Disease. Wolters Kluwer Health/ Lippincott Williams and Wilkins. Ed 11th
6. Garrow, J. S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics. 10th Edition, Churchill Livingstone.

KLE ACADEMY of HIGHER EDUCATION AND RESEACH

B.Sc. NUTRITION AND DIETETICS

BND –III-3 T
THEORY
NUTRITION IN LIFECYCLE II **Total Hours 30**

Unit 1 **8 Hours**

Nutrition in Adolescents: Nutritional Problems in adolescence (Obesity, Anorexia Nervosa, Bulimia), Nutritional Requirement in Adolescence, Low Cost Balanced Diets

Unit 2 **8 Hours**

Nutrition in Adults: Nutritional need of adults, Concept of Balanced Diet, Additional requirements

Unit 3 **7 Hours**

Nutritional and Food Requirements of Elderly: Process of Ageing, Nutritional Requirements, , Nutritional Related Problems of old age, Degenerative Diseases.

Unit 4 **7 Hours**

Physical Activity in different age group (child, adolescence, adult and elderly) and specific nutritional requirement. Introduction to Lifestyle Disorders (Obesity, Type 2 Diabetes Mellitus and Hypertension). Role of nutrition and physical activity in these lifestyle disorders.

BND –III-3 P
PRACTICALS
NUTRITION IN LIFECYCLE II **Total Hours 15**

1. Planning of mid-day meal for Adolescents (13- 17 years).
2. Planning and preparation of Days Diet for Adoloscent girl and boy
3. Planning and preparation of Days for Normal Adult Men and women
4. Planning and preparation of Days Diet for Old Age Person.
5. Planning of low cost nutritious recipe for: Adolescence, Adult and Elderly.
6. Planning and preparation of Days Diet for Sedentary, Moderate and Heavily worker: Adult women and men – 6 diets)

Suggested Readings:

1.B. Srilakshmi- Dietetics(8th multicolour ed.), New Age International (P) limited, Publishers

2.Briggs, G. M. &Doirs K. Collaway: Bogery Nutrition And Physical Fitness (9th Ed.) Saunders, Philadelphia, 1979.

3.Chaney, M. S. Rose M.L. &Wischi J. C. Nutrition, Houghton Mifflim, Boston, 1979.

4.Guthrie H.: Introductory Nutrition (6th Ed.) Times Mirror/Mostry College Publishing, 1986.

5.Robinson, Lawler: Normal & Therapeutic Nutrition (17th Ed.) Macmillan Publishing Co. 1986.

6.Swaminathan S.: Advanced Textbook On Food & Nutrition Vol. 1 & N (2nd Ed. Revised _ Enlarged) Bapp Co. 1985.

7. Robinson. Basic Nutrition And Diet Therapy (8th Edition)

8.Krause' s Food and Nutrition Therapy 2010, 12th Edition

BND –III-4 P
THEORY
COMMUNICATION SKILLS **Total Hours 30**

Unit 1

- Communication, its types and significance: Communication, Process of communication its kinds, channels and role in the society.
- Methods of Communication (Oral, Written, One way, two way communication skills).
- Reading skills: - Process of reading, reading purpose, models, strategies methodologies, reading activities, structure of meaning techniques.

Unit- 2

- Précis and Communication. • Writing skills :- Elements of effective writing, writing styles, scientific and technical writing. • Grammar: - Transformation of sentences, words used as different parts of speech, one word substitution, abbreviations, technical terms etc.

Unit-3

- Listening skills: - Process of listening, barriers to listening, effective listening skills, feedback skills. • Speaking skills :- Speech mechanism, organs of speech, production and classification of speech sounds, phonetic transcription, skills of effective speaking components of an effective talk, oral presentation and the role of audio visual aids in it. • Reading of text book.

Unit 4

Barriers of communication and technique to overcome those. • Meaning of effective communication. • Technical Report writing. • Practice of writing personal resume and writing application for employment. Theory: 80 Marks IA: 20 Marks

KLE ACADEMY of HIGHER EDUCATION AND RESEACH

B.Sc. NUTRITION AND DIETETICS

SECTION VII

Semester III					
Sl no	**Code**	**Core Subjects**	**Theory/Practical**	**Hours**	**Credit**
1	BND –IV-1 T	Advanced Dietetics	Theory	30	4
2	BND –IV-2 T	Diet and Nutritional Counseling	Theory	30	4
3	BND –IV-3 T	Fundamentals of Food Microbiology	Theory	30	4
4	BND –IV-1 P	Advanced Dietetics	Practical	15	4
5	BND –IV-2 P	Diet and Nutritional Counseling	Practical	15	4
6	BND –IV-3 P	Fundamentals of Food Microbiology	Practical	15	4
7.	BND –IV-4 T	Law – Indian Constitution (electives)	Theory	30	4

BND –IV-1 T
THEORY
ADVANCED DIETETICS **Total 30 Hours**

Unit 1 **04 Hours**
Diet in liver diseases and counseling: functions of liver, hepatitis, cirrhosis of liver, hepatic coma, diseases of gall bladder, diseases of pancreas

Unit 2 **04 Hours**
Diet in kidney diseases and counseling: functions of kidney, glomerulonephritis, nephrotic syndrome, acute renal failure, chronic renal failure, end stage renal diseases, urolithiasis

Unit 3 **03 Hours**
Nutrition in eating disorders: introduction, anorexia nervosa, bulimia nervosa, binge eating disorders

Unit 4 **04 Hours**
Nutrition and neurological disorders: Parkinson's disease, Alzheimer's disease, epilepsy, migraine, multiple sclerosis, neurotrauma, spine trauma, feeding problems of patients with neurological disorders

Unit 5 **06 Hours**
Diseases of metabolic disorder and counseling: diabetes mellitus and gout

Unit 6 **05 Hours**
Diet in cardiovascular diseases and counseling: coronary heart diseases (chd) - prevalence, risk factors, pathophysiology. Dyslipidemia, atherosclerosis, hypertension, angina pectoris, myocardial infarction, congestive cardiac failure

Unit 7 **04 Hours**
Diet in cancer and counseling: risk factors, metabolic alterations and nutritional problems related to cancer, nutritional requirements of cancer patients related to cancer therapy, cancer prevention

BND –IV-1 P
PRACTICALS
ADVANCED DIETETICS **Total 15 Hours**

1. To plan a diet for Hepatitis.
2. To plan a diet for Cirrhosis of Liver.
3. To plan a diet for Hepatic coma.
4. To plan a diet for Nephrotic Syndrome.
5. To plan a diet for Acute Renal Failure.
6. To plan a diet for Diabetes Mellitus.
7. To plan a diet for Gout.
8. To plan a diet for Hypertension.
9. To plan a diet for Myocardial infarction.
10. To plan a diet for Cancer.

SUGGESTED READINGS:

1. Dietetics: B. Srilaxmi(2012). Nutrition Science.4th Revised Edition, New Age Interntional Publishers.
2. Raghuvanshi, R.S. and Mittal, M. (2014). Food Nutrition and Diet Therapy. Westvills Publication Delhi.
3. Agarwal, A and Udipi, S. (2014). Text Book of Human Nutrition. Jaypee Medical Publication Delhi.
4. Robinson. Basic Nutrition And Diet Therapy (8th Edition)
5. Mahan L. K., Escott- Stump, S. and Raymond J. L. (2012): "Krause's Food and the Nutrition Care Process", 13th Edition, Elsevier.
6. Ross, A.C., Caballero B., Cousins R. J., Tucker K.L. and Ziegler T. (2014) Modern Nutrition in Health and Disease. Wolters Kluwer Health/ Lippincott Williams and Wilkins. Ed 11th
7. Garrow, J. S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics. 10th Edition, Churchill Livingstone.
8. Nix Staci (2013) William's Basic Nutrition and Diet Therapy. Elsevier Ed. 14th.

BND –IV-2 T
THEORY
DIET & NUTRITIONAL COUNSELLING **Total 30 Hours**

Unit 1
Basics of Diet Counseling: **10 Hours**

- Diet Counselling-meaning, significance, process, types
- Goals of counselling, individuals, group and family counselling
- Basic sequence in counselling.
- Materials needed for counselling –models, charts, posters, AV aids, Handouts etc
- Communication process in counselling and linguistics in clinical dietary practices, problems in communication
- Role of Counsellor & Counselee
- Techniques of obtaining relevant information- 24 Hour Dietary recall, List of food likes and dislikes, Lifestyle
- Dietician as a part of medical team and research team
- Impact of counselling on health and disease of individuals – discussion of hospital case studies

Unit 2 **10 Hours**

Diet Counseling at Hospital and Community Level

- Role of counselling in hospital
- Role of counselling in community
- Organizing health camps and patient feedback – at hospital level
- Organizing health camps and patient feedback – at community level
- Diet counselling for obese people
- Diet counselling for Diabetics
- Diet counselling for CVD
- Diet counselling for mother and child care

- Diet counselling for adolescent
- Patient follow up / home visit

Unit 3:

Introducing to Psychology and Counseling **06 Hours**

- Introduction to psychology – Definition, Nature and Scope
- Attention and perception – Types of attention and factors influencing attention, principles of perceptual organization and abnormalities in perception
- learning and memory- Types of learning, Types of memory, Forgetting and its causes
- motivation and emotion- Types of motives, types of emotions, emotional expression
- Personality- nature and definition, factors influencing personality, Psycho analytic theory of personality
- Nature and goals of counseling
- Principles of counseling
- Characteristics of a good counselor
- Ethical principles of counselling
- Special areas of counselling: Educational, Family, Health, Community and Counselling of Alcoholic and Drug Addicts

Unit 4. **04 Hours**

Counseling Skills

- Approaches to counselling – Psycho analytic approach, Behaviouristic Humanistic approach
- Pre – Helping phase: Rapport building skills, Attending and listening skills.
- Stage I skills: Empathy, respect, Genuineness and concreteness.
- Stage II skills: Advanced empathy, self-disclosure, Immediacy and Confrontation.
- Stage III skills : Goal setting, Action plan Programme and Brainstorming

BND –IV-2 P
PRACTICAL
DIET & NUTRITIONAL COUNSELLING **Total 15 Hours**

1. Motivational Interviewing
2. Communication Influencers
3. Cases -Identifying need to a change
4. Cases -Identifying Barrier to a change
5. Behavioral Modification
6. Mindful Characteristics of a Counsellor
7. Mock Counselling – Minimum 10 Cases

Suggested Readings:

- Counselling Skills for Dietitians: Blackwell Publication, Judy Gable (2nd edition)
- Gibson, R.L., Mitchell, M.H. (2005). Introduction to counselling and guidance (6th Ed)
- Gelso, C.J., Fretz, B.R. (1995). Counselling Psychology, Bangalore, Prism Books Pvt Ltd.
- Sharma, T.C. (2002). Modern Methods of Guidance and Counseling, New Delhi, sarup & sons.
- Beena and Parweshwaran- Invitation to Psychology, Neel Kamal Publications.

BND –IV-3 T
THEORY
FUNDAMENTALS OF FOOD MICROBIOLOGY **Total 30 Hours**

Unit 1 **05 Hours**

Introduction to Microbiology and Structure of Microorganisms Definition and History: Microscopy, Light and electron Microscopy, Listing other Types. General Morphology of Microorganisms Bacteria, Fungi, Algae, Yeast and Virus Bacteriophage

Unit 2 **05 Hours**

Growth and Multiplication Growth Care, Definition of Batch and Continuous culture, Factors Affecting Growth: Intrinsic Factors, Nutrient Content, pH, Redox Potential, Antimicrobial Barrier and Water Activity. Extrinsic Factors: Relative Humidity, Temperature and Gaseous Atmosphere Unit

Unit 3 **05 Hours**

Microbiology of Perishable Foods Outline of Contamination- Spoilage and Preservation of Vegetables and Fruits, Milk and Milk Products and Canned Foods, Meat and Meat Products, Egg and Poultry

Unit 4 **05 Hours**

Microbiology of Non-Perishable Foods Outline of Contamination- Spoilage and Preservation of Cereal and Cereal Products and Sugar and Sugar Products Unit V Beneficial Effects of Microorganisms Fermented Foods – Curd, Cheese, Sauerkraut, Meat, Soy Based Foods, Alcoholic Beverages and Vinegar, Microbial Biomass

Unit 5: **02 Hours**

Microbiology of water**:** Bacterial flora of water**,** Indicators of faecal pollution and their advantages**,** Bacteriological determination of water- Standard plate count, Total plate count**,** Qualitative test- Standard multiple tube fermentation & IMVIC test**,** Quantitative test- Most probable number test.

Unit 6: **05 Hours**

Food-Borne illness: Bacterial and Non-bacterial

- Food Borne Intoxications – Staphylococcal poisoning, Botulism
- Food Borne Infections – Salmonellosis, Shigellosis
- Food Borne Toxic Infections – Cholera, Listeriosis
- Mycotoxins – Aflatoxin, Patulin, Ochratoxin
- Food – Borne Parasites – Trichinosis
- Seafood Toxicants – Shellfish Poisoning, Scombroid Food Poisoning

Unit 7: **03 Hours**

Food Fermentations

- Role of micro-organisms in fermentation
- Fermented Meat & Fish Products – Sausages, Fermented Fish
- Fermented Fruit & Vegetable Products – Sauerkraut, Kimchi, Vinegar, Citric acid
- Fermented Cereal Products – Idli, Vada, Dosa, Bhatura, Dhokla, Miso, Tempeh, Soy Sauce
- Economically important fermented foods- Beer, Ale, Wine, Distilled Liquor Products

BND –IV-3 P
PRACTICAL
FUNDAMENTALS OF FOOD MICROBIOLOGY **Total 15 Hours**

1. Instrumentation in Microbiology laboratory and their function (Microscope, Autoclave, Hot air oven)
2. Preparation of Culture media
3. Pure culture techniques (spread plate, streak plate and pour plate methods)
4. Staining techniques-simple and differential.
5. Microbiological evaluation of milk and milk products.
6. Microbiological analysis of water and air.
7. Isolation of spoilage organisms from different food commodities

Suggested Readings:

1. M.R. Adams and M.O. Moss, Food Microbiology, New Age International (P) Ltd., New Delhi, 2005.
2. Vijaya Ramesh, K. Food Microbiology, MJP Publishers, Chennai, 2007
3. James G. Cappuccino and Natalie Sherman, Microbiology – A Laboratory Manual, Pearson Education Publishers, USA, 2008.
4. James M. Jay Modern Food Microbiology, Fourth Edition, CBS Publishers and Distributors, New Delhi, 2005.
5. Adams Tamine, Probiotic Dairy Products, Blackwell Publishing, USA, 2005.

BND –IV-4 T
THEORY
LAW AND CONSTITUTION **Total 30 Hours**

Unit-I: Meaning of the team 'Constitution' making of the Indian Constitution 1946-1940.

Unit-II: The democratic institutions created by the constitution Bicameral system of Legislature at the Centre and in the States.

Unit-III: Fundamental Rights and Duties their content and significance.

Unit - IV: Directive Principles of States Policies the need to balance Fundamental Rights with Directive Principles.

Unit - V: Special Rights created in the Constitution for: Dalits, Backwards, Women and Children and the Religious and Linguistic Minorities.

Unit-VI: Doctrine of Separation of Powers legislative, Executive and Judicial and their functioning in India.

Unit - VII: The Election Commission and State Public Service commissions.

Unit - VIII: Method of amending the Constitution.

Unit - IX: Enforcing rights through Writs:

Unit - X: Constitution and Sustainable Development in India.

Books:

1. J.C. Johari: The Constitution of India- A Politico-Legal Study-Sterling Publication, Pvt. Ltd. New Delhi.

2. J.N. Pandey: Constitution Law of India, Allahbad, Central Law Agency, 1998.

3. Granville Austin: The Indian Constitution - Corner Stone of a Nation-Oxford, New Delhi, 2000.

KLE ACADEMY of HIGHER EDUCATION AND RESEACH

B.Sc. NUTRITION AND DIETETICS

SECTION VIII

Semester V					
Sl. no	**Code**	**Core Subjects**	**Theory/Practical**	**Hours**	**Credit**
1	BND –V-1 T	Ayurveda Concepts of Diet	Theory	30	4
2	BND –V-2 T	Community Nutrition	Theory	30	4
3	BND –V-3 T	Food Preservation and Adulteration	Theory	30	4
4	BND –V-1 P	Ayurveda Concepts of Diet	Practical	15	4
5	BND –V-2 P	Community Nutrition	Practical	15	4
6	BND –V-3 P	Food Preservation and Adulteration	Practical	15	4
7.	BND –V-4 T	Fundaments of Computer (Electives)	Theory	30	4

BND –V-1 T
THEORY
AYURVEDA CONCEPTSOF DIET **Total Hours 30**

Unit 1 **07 Hours**

Concept of Prakruti(Constitution), Tridosha and Panchamahabhoota theory in Ayurveda

Types of Tastes as per Ayurveda and Modern science and Shadrasas and its importance

Concept of Whole some and unwholesome diet. Incompatibility of food as per classics

Classification of food as per Ayurveda Classics and their relevance

Vegetarian and Non vegetarian food as per Ayurveda classics and their importance

Unit 2 **07 Hours**

Concept of Agni (Digestive capacity), Relation of food and Agni

Asta vidhi ahara vidhi visheshayatana – Ayurveda classical dietetics

Daily consumable foods as per classics and their nutritional relevance

Standards of Quantity of serving as per Ayurveda and Food serving standards

Concept of balanced diet in Ayurveda classics

Unit 3 **08 Hours**

Seasonal foods mentioned in classics and its importance

Understanding the chemical composition, physical and chemical properties, nutritive value, bioavailability of Classical mentioned foods

Food processing in Ayurveda

Ayurveda Pathya Kalpana – krutanna varga, Manda, peya vilepi, yusha, yavagu and krushara kalpana and their nutritive importance

Unit 4 **08 Hours**

Nutraceutics in Ayurveda

Nutritional assessment in Ayurveda classics

Diet planning in Ayurveda

BND –V-1 P
PRACTICALS
AYURVEDA CONCEPTSOF DIET **Total Hours 15**
Practical's

Sl no	Topic
1	Identification, nutritional importance of foods as per classics
2	Preparation of selected food items as per classics
3	Visit to Pathyahara section (Diet section) of Ayurveda Hospital and observing preparation and serving protocol
4	Diet history taking and Diet counselling techniques
5	Preparation of balanced diet by various available food stuffs

Reference Books:-

S No.	Name of the Author / Commentators	Title of the book	Edition	Name of the publication
1	Agnivesh	CharaksamhitawithChakrapani commentary	RP-2011	Rashtriya Sanskrit Sansthan New Delhi
2	Sushruta	Sushrutasamhita with Dalhan commentary	IST -2012	ChoukhambaSurabharati
3	Vagbhata	AshtangHrudaya with Arunadatta&Hemadri commentary	3RD -2012	Choukhamba Sanskrit seriesi
4	VruddhaVagbhata	AshtangSamgraha with Indu commentary	RP-2000	Krishnadas Academy Varanasi
5	Sharangadhara	Sharangadharasamhita	IST -2010	ChoukhambaSurabharati
6	Bhavamishra	Bhavaprakasha	IST -2006	ChoukhambaOrientalia
7	Vijayarakshit	Madhavanidana		
8	VaidyaPtRajesvarDuttaShastri	SwasthavrittaSamuchaya	4^{th-} 2005	SanjeevaniAushadhalaya
9	Dr.B.G.Ghanekarshastri	SwasthyaVignyana	6th-2005	Choukhamba Sanskrit series
10	Dr.L.P.Gupta	Positive Health	1st 2000	Choukambha Sanskrit Pratishthan

BND –V-2 T
THEORY
COMMUNITY NUTRITION **Total Hours 30**

Unite 01 **06 Hours**

Community Nutrition: Concept, Scope, Future Projections, Health Care, Role of Public Nutritionists In Health Care Delivery

Nutritional Problems in India: Protein Energy Malnutrition, Micronutrient Deficiencies: Iron Deficiency Anaemia (IDA), Iodine Deficiency Disorders (IDD), Zinc Deficiency, Flurosis Vitamin A Deficiency

Unit 2: **04 Hours**

Social health problems : Smoking , Alcoholism, Drug addiction and AIDS including AIDS Control Programme

Unit 3 **08 Hours**

Nutrition Monitoring And Nutrition Surveillance: Nutrition Monitoring And Its Current Programmes Nutrition Surveillance System

Nutrition Policy and Programmes: Integrated Child Development Services (ICDS) Programme, Nutrient Deficiency Control Programme, Supplementary Feeding Programme, Food Security Programme, Self-Employment and Wage Employment Schemes

Unit 4 **08 Hours**

Strategies to Combat National Nutritional Problems: Introduction, Diet Or Food Based Strategies, Nutrient Based Strategies, Immunization. Nutrition and Health Education: Definition, Importance, Nutrition Education Methods, Teaching aids used in Nutrition Education, Mass communication media used in Nutrition Education, Nutrition Education through Educational Institutions, Role Of Nutrition Education Programs In Eradication Of Malnutrition

Unit 5 **04 Hours**

Nutrition for special conditions : Feeding problems in children with special needs , Considerations during natural and man-made disasters e.g. floods, war.- basic guidelines in disaster management.

BND –V-2 P
PRACTICAL
COMMUNITY NUTRITION **Total Hours 15**

1. Visit to local health centre to identify clinical signs and symptoms of nutritional problems.
2. Visit to an ICDS Block (Integrated Child Development Services)
3. Planning and preparation of snacks for PEM,
4. Planning and preparation of snacks Vitamin A Deficiency
5. Planning and preparation of snacks Iron Deficiency Anemia
6. Visit to any national Program and Make a Report
7. Creative Work on development of Nutrition and health Education messages
8. Development of nutrition education material
9. Development of suitable teaching aids for community
10. Planning, implementation and evaluation of nutrition education for a target group.

Suggested Readings:

1. Sehgal, S. and Raghuvanshi, R.S. (2007) Text Book of Community Nutrition. ICAR, New Delhi.
2. Beaton GH and Bengoa JM. Nutrition in Preventive Medicine. WHO (1976).
3. FAO/WHO. Preparation and use of food based dietary guidelines. Report of a joint FAO/WHO consultation: Nicosia, Cyprus. Nutrition Programme, WHO, Geneva (1996).
4. Gibney M. J., Margetts B. M., Kearney J. M. and Arab L. Public Health Nutrition. Blackwell Publishing Company (2013).
5. National Nutrition Policy. Department of Women and child Development. Ministry of Human Resource Development, New Delhi, Government of India, 1993.
6. Park.K. (2017) Park's Textbook of Preventive and Social Medicine, 24th ed. M/s Banarsida Bhanot, Jabalpur.
7. Jelliffe, D. B and Jelliffe, E.F.P. (1989) Community Nutritional Assessment, Oxford University Press.
8. Wadhwa, A. and Sharma, S. (2003) Nutrition in the Community - A text book SCN News, UN ACC/SCN Subcommittee on Nutrition

BND –V-3 T
THEORY
FOOD PRESERVATION & ADULTERATION **Total Hours 30**

Unit 1 **05 Hours**

Food preservation: Definition, objectives and principles of food preservation. Different methods of food preservation.

Unit 2 **10 Hours**

Food Preservation using food spoilage, method of preservation by low temperature, high temperature, dehydration, food irradiation technology. Preserved Products: Jam, Jelly, Marmalade, Sauces, Pickles, Squashes, Syrups-types, composition and manufacture, selection, cost, storage, uses and nutritional aspects. Preservation by addition of external ingredient, Preparation of Various Food

Unit 3 **06 Hours**

Food Adulteration, Health hazards of food adulterants, Effect of food adulteration- food quality and nutritive value of foods.

Unit 3 **09 Hours**

Food Standards: Bureau of Indian Standards (ISI), Agmark, Govt. of India, Food Products Order by Ministry of Food processing Industry (FPO), The Meat Product Order (MPO), Prevention of Food Adulteration (PFA), Food Safety and Standards Authority of India (FSSAI) and International Standardization Organization (ISO)

BND –V-3 P
PRACTICALS
FOOD PRESERVATION & ADULTERATION **Total Hours 15**

1. Different methods of Food preservation – Drying, Freezing, Frying, canning, bottling etc.
2. Aseptic handling: Sources of contamination of foods.
3. Preparation of
    - Pickles
    - Tomato sauce
    - Chili sauce
    - Jelly
    - Tomato puree
    - Squashes
4. Detection of Vanaspati in Ghee/Butter.
5. Detection of Khesari flour in besan.
6. Detection of Metanil yellow in turmeric/colourd sweet products.
7. Detection of Argemon oil in edible oil
8. Detection of artificially colour / foreign matter in tea (dust/leaves).
9. Detection of adulterants in milk 10. Visit to canning industry and dairy firm etc

Suggested Readings:

1. Subalakshmi, G and Udipi, SA(2006):Food processing and preservation, 1st Ed. New Age International (P)Ltd.
2. SrilakshmiB(2018): Food Science, 7th Colour Ed. New Age International (P) Lt
3. Potter NN and Hotchkiss JH(1999): Food science,5th Ed , Spinger.
4. Srivastava RPO and Kumar S (2014): Fruit and Vegetable Preservation Principles a nd Practices, 3rd Ed. International Book distribution Company.
5. McWilliamsM and Paine H(1984): Modern Food preservation. Surjeet Publications,.
6. CruessWV(2004):Commercial Fruits and Vegetable Products, Agrobios India.
7. Desrosier NW and Desrosier JN(2006):The Technology Of Food Preservation, 4th Ed. CBS Publishers and Distributors, New Delhi.
8. Adams M and NoutMJR(2001): Fermentation and Food Safety, Spinger

BND –V-4 T
THEORY

FUNDAMENTALS OF COMPUTER **Total Hours 30**

- Introduction to computer: introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages. Input output devices: input devices(keyboard, point and draw devices, data scanning devices, digit izer, electronic card reader, voice recognition devices, vision-input devices),output devices(monitors, pointers, plotters, screen image projector, voice response systems).
- Processor and memory: The Central Processing Unit (CPU), main memory. Storage Devices: sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices. Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge. Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs. Introduction to power-point: introduction, creating and manipulating presentation, views formatting and enhancing text, slide with graphs.
- Introduction of Operating System: introduction, operating system concepts, types of operating system. Introduction to MS-DOS: History of DOS, features of MS-DOS, MS-DOS Commands (internal and external). Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).

- Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree hybrid), components of network. Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet. Application of Computers in various fields: Medical, Education, Railway, Defense, Industry, Management, Sports, Commerce, Internet. Introduction to installation of different software and introduction about different software related to MLS.
- Learning to use MS Office: MS WORD, MS EXCEL & MS PowerPoint
- Examination: 80 Marks and IA : 20 Marks

SECTION IX

Semester VI					
Sl. no	**Code**	**Core Subjects**	**Theory/Practical**	**Hours**	**Credit**
1	BND –VI-1 T	Food Service and Management	Theory	30	4
2	BND –VI-2 T	Bakery And Confectionery	Theory	30	4
3	BND –VI-3 T	Institutional Food Management	Theory	30	4
4	BND –VI-1 P	Food Service and Management	Practical	15	4
5	BND –VI-2 P	Bakery And Confectionery	Practical	15	4
6	BND –VI-3 P	Internship + Mini Project	Practical	15	4
7.	BND –VI-4 T	Human Values and Professional Ethics (Electives)	Theory	30	4

BND –VI-1 T
THEORY
FOOD SERVICE AND MANAGEMENT **Total 30 Hours**

Unit 1 **04 Hours**

Organization of food service management: Definition, Various types of Food Service institutions, their characteristics and functions

Unit 2 **06 Hours**

Planning a food service unit, layout design, planning of different work areas – preparation, cleaning, storing, serving and dining areas. Lighting and ventilation, working heights in relation to equipment.

Unit 3 **04 Hours**

Institutional Menu Planning: Factors influencing menu planning, principles of menu planning, different kinds of menus.

Unit 4 **06 Hours**

Menu Planning, Delivery and Service of Foods, Food service systems. Quality food Service – types-Centralized, de-centralized objectives. Styles of service.

Unit 5 **05 Hours**

Importance of sanitation and hygiene in food, kitchen hygiene, Hygienic handling of Food, employee's health, hygiene of food service unit. Food Purchase, Selection and Storage

Unit 6 **05 Hours**

Personnel Management- selection, training and supervision of personnel, criteria for selection of Dietitian and Food Service staff

BND –VI-1 P

PRACTICAL

FOOD SERVICE AND MANAGEMENT **Total 15 Hours**

1. Preliminary Planning Survey of types of units, identifying clientele, menu, operations and delivery
2. Planning the set up:
    a) Identifying resources
    b) Developing Project plan
    c) Determining investments

3. Market survey for food items both raw and processed, Survey of food service units

4. Standardization of a recipe

5. Preparing Quick Foods for scaling up for quantity production

6. Planning menus for the following:

    a) Packed meals for office employees
    b) Nutritious tiffins for school children
    c) School/college canteens

7. Develop a checklist for good hygiene practices

Suggested Reading

1.Khan MA (1987):Food Service Operations, Avi Publication Co.

2.Tompkins D(1969):Table Layout and Decoration, Ward Lock Co. Ltd.

3.Kinton R and CaseraniV(1989): The Theory of Catering, 6th Ed. ELBS.

4.Edward K(1997): Food Service Facilities Planning 3rd Ed, John Wiley & Sons.

5. Sethi M (2015):Catering Management: An Integrated Approach,3rd Ed. New Age International(P) Ltd.

6.RodayS(2017): Food Hygiene and Sanitation with Case Studies, 2nd Ed. McGraw Hill Education.

BND –VI-2 T
THEORY
BAKERY AND CONFECTIONERY **Total 30 Hours**

Unit 1 **04 Hours**

Introduction to bakery. Classification of Baked Foods.

Principles of Baking

Structure and Composition of the Wheat Kernel, Steps and By Products of Wheat Milling, Enrichment of Flour and Bread. Methods of making batters and doughs and Nutritive Values.

Unit 2 **06 Hours**

Baking ingredients Role of Ingredients – Flour, Water, Yeast, Sugar, Shortening, Milk, Egg, Butter, Salt, Chemical Leavening Agents, Spices, Flavorings, Fruits and Nuts, Food Colors, Setting Materials, Cocoa and Chocolate, recipe balance, storage of baked products, selection of packaging materials.

Unit 3 **10 Hours**

Leaving agents: Definition, physical, chemical and biological leavening agents, role of these in baking and their Nutritive Values:

a. Sugars: Types of sugars, role in baking. Fats: Types of fats in baking, role in baking.
b. Milk and Milk products: Role and nutritional contribution in baking Salt, flavorings and spices: Role in baking.
c. Bread: Ingredients, procedures for bread making, types of bread, common defects in bread making, bread improvers.Cakes: Ingredients, types of cakes, preparation of cakes, causes of variation in cake quality.
d. Biscuits: Ingredients, essentials to get good biscuits, preparation of biscuits, nutritive values.
e. Pastries: Ingredients, types, nutritive values, essentials in making a good pastry, preparation of pastry
f. Cookies: Ingredients, types, preparation of sandwiches, nutritive values.

Unit 4 **05 Hours**

Icings and filling: Ingredients, types

Sandwiches: Ingredients, types. Preparation of sandwiches, nutritive values

Baking ovens: Side-flue and similar ovens, steam-pipe ovens, hot air ovens, advantages and disadvantages, maintenance of sanitation and hygiene in a bakery unit

Unit 5 **05 Hours**

Confectionery Processing of Raw Materials-Cocoa and Chocolate. Making of Toffee, Chocolates, Fruit Drops, Hard Boiled Candies(clear, hard, pulled, grained, filled), Soft candies (basic fondant, modified fondant like toffee, fudge, marshmallows, gums, jellies, chocolates) Bars, Chewing Gums, Special Confectionery Foods, role of major components, factors affecting quality of the product.

BND –VI-2 P
PRACTICALS
BAKERY AND CONFECTIONERY **Total 15 Hours**

1) Quality testing of flour and yeast

2) Preparation of simple cake (with egg and eggless) and labelling nutritive value

3) Preparation of Chocolate Muffins and labelling nutritive value

4) Preparation of Marie Biscuits and labelling nutritive value

5) Preparation of White bread and labelling nutritive value

6) Preparation of Buns and labelling nutritive value

7) Preparation of Simple cookies and labelling nutritive value

8) Preparation of Drop cookies and labelling nutritive value

9) Formulation of Khoa Burfi and labelling nutritive value

10) Preparation of Kalakand and labelling nutritive value

SUGGESTED READINGS

1. Vijaya khader, Text book of food science and technology, Indian council of Agricultural Research, New Delhi, 2001

2. Kumud Khanna etal, The art and science of cooking, A student manuam, 3rd edition,. Published by Pr.Ouseph for phoenix, publishing House Pvt Ltd, 1998

3. Earl R.Palan, Judith A.Studler, preparing for the service industry, An introductory approach, AVI publishing co Ltd, 2000

4. William C practical in baking, 2000

5. Lilian Hiagland Meyer, Food chemistry CBS publishers and Distributors, 2004

6. Dubey, S.C. (2007). Basic Baking 5th Ed. Chanakya Mudrak Pvt. Ltd. • Raina et.al. (2010). Basic Food Preparation-A Complete Manual. 4rd Ed. Orient Black

7. Swan Ltd. • Khanna K, Gupta S, Seth R, Mahna R, Rekhi T (2004). The Art and Science of Cooking: A Practical Manual, Revised Edition. Elite Publishing House Pvt Ltd.

BND –VI-3 T
THEORY
INSTITUTIONAL FOOD MANAGEMENT **Total 30 Hours**

Unit 1 **04 Hours**

Institutional Food Management: Evolution of food service industry, Principles of Management, Functions of Management, Organization Chart, Leadership

Unit 2 **06 Hours**

Management of Spaces: Kitchen Spaces, Storage Spaces, Service Spaces
Classification of equipment, factors involved in selection of equipments; purchase of equipment, operational know-how, care and maintenance of equipments; dining room furnishings. b. Materials Used: Base materials used in the manufacture of equipments, materials used for finishes, materials used in the manufacture of dining room furnishings.

Unit 3 **04 Hours**

Food Management: Characteristic of foods: Food Purchasing, Menu Planning. Principles involved in menu Planning: Indian and Western, menu planner; techniques in writing menu card.

Unit 4 **06 Hours**

Financial Management: Definition and Scope, Cost Concepts, Cost Control, Pricing. Principles of food cost control, why good cost control, elements of cost-food cost, labour cost and over head expenses; factors responsible for losses in a food service industry; methods of controlling foods costs leading to profit; costing of dishes, meals and events; methods of pricing items.

Unit 5 **06 Hours**

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. Definition, application of Management Accounts of

catering operators, cost concepts, book keeping and accounting – systems of book keeping, book of account maintenance of account books, balance sheets and inventor budgetary control.

Unit 6 **04 Hours**

Hygiene, Sanitation and Safety and Food Standards in India

BND –VI-3 P
PRACTICAL
DIETARY INTERNSHIP **Total 15 Hours**

It is compulsory for all the students to complete the 2 given institutional training programs in KLE Dr.. Prabhakar Kore Charitiable Hospital and research Centre for a period of 15 days each. At the end of the Sixth Semester, each student has to submit a report of the training and undergo a viva voce examination. Marking system is as follows:

Internal Marking	a. 10 marks- Performance appraisal report given by training institution b. 10 Marks for Log Book	20 Marks
External Marking (University Exam)	Evaluation of given case study a. Major Case Study: 40 Marks b. Major Case Study: 20 Marks c. Viva voce: 20 marks	80 Marks
	Total	**100 Marks**

Aspects to be covered in the institutional training programs

i. Visits to the different wards to observe patients requiring special diets.

ii. Experience in calculating and planning modified diets.

iii. Supervising and handling the food preparation and service in the dietary department of the hospital

iv. Case study- Selecting and observing 5 patients requiring a therapeutic diet in relation to Patient's dietary history - income, occupation, food habits and social factors.

v. Calculating the diet according to medical prescription.

vi. Accompanying the doctor while visiting the patient.

vii. Counselling and patient education Preparation of the report should include

- History of the hospital
- Location
- Facilities provided
- Layout of the kitchen
- Work organization and Organization structure
- Duties of the dietitian
- Special dietary preparation
- Storage of food
- Handling of leftovers and shortages xiii. Sanitation and hygiene

Suggested Readings:

1. Park, A. Park's Textbook of Preventive and Social Medicine, XIX Edition M/S Banarasidas, Bharat Publishers, 1167, Prem Nagar, Jabalpur, 428 001(India), 2007.

2. Bamji M.S, Prahlad Rao N, Reddy V., Textbook of Human Nutrition, II Edition, Oxford and PBH Publishing Co. Pvt. Ltd , New Delhi, 2004.

3. Bhatt D.P, Health Education, Khel Sahitya Kendra, New Delhi, 2008.

4. Gibney, M.J., Margetts, B.M., Kearney, J.M., Arab, L., Public Health Nutrition, Blackwell Publishing Co. UK, 2004.

BND –VI-4 T
THEORY
INSTITUTIONAL FOOD MANAGEMENT **Total 30 Hours**

1. Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

- Understanding the need, basic guidelines, content and process for Value Education.
- Self Exploration–what is it?- its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration.
- Continuous Happiness and Prosperity- A look at basic Human Aspirations Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
- Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

2. Understanding Harmony in the Human Being - Harmony in Myself!

- † Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- † Understanding the needs of Self ('I') and 'Body' - Sukhand Suvidha
- † Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- † Understanding the characteristics and activities of 'I' and harmony in 'I'
- † Understanding the harmony of I with the Body: Sanyamand Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail
- †Programs to ensure Sanyamand Swasthya

3. Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

- † Understanding harmony in the Family- the basic unit of human interaction

- † Understanding values in human-human relationship; meaning of Nyayaand program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship
- † Understanding the meaning of Vishwas; Difference between intention and competence
- † Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship
- †Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitvaas comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj),
- Universal Order (Sarvabhaum Vyawastha)- from family to world family

4. Understanding Harmony in the Nature and Existence - Whole existence as Co- existence

- † Understanding the harmony in the Nature
- † Interconnectedness and mutual fulf illment among the four orders of nature- recyclability and self-regulation in nature
- † Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space
- † Holistic perception of harmony at all levels of existence

5. Implications of the above Holistic Understanding of Harmony on Professional Ethics

- † Natural acceptance of human values
- † Definitiveness of Ethical Human Conduct
- † Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competence in professional ethics:
- Ability to utilize the professional competence for augmenting universal human order
- Ability to identify the scope and characteristics of people-friendly and eco- friendly production systems
- Ability to identify and develop appropriate technologies and management patterns for above production systems.

- Case studies of typical holistic technologies, management models and production systems
- Strategy for transition from the present state to Universal Human Order:
- At the level of individual: as socially and ecologically responsible engineers, technologists and managers
- At the level of society: as mutually enriching institutions and organizations

Text Book:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Value Education.
2. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, US.
3. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
4. A Nagraj, 1998, JeevanVidyaekParichay, Divya Path Sansthan, Amarkantak
5. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
6. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.
7. A.N. Tripathy, 2003, Human Values, New Age International Publishers
8. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
9. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
10. E G Seebauer& Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press
11. M Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd
12. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
13. B L Bajpai, 2004, Indian Ethos and Modern Management, New