ST. TERESA'S COLLEGE, ERNAKULAM

(AUTONOMOUS)

Affiliated to Mahatma Gandhi University, Kottayam

CURRICULUM FOR

B.Sc NUTRITION AND DIETETICS

Under Choice Based Credit & Semester System
& Outcome Based Education

(2020 Admissions)

BND - B.Sc. NUTRITION AND DIETETICS

PROGRAMME SPECIFIC OUTCOMES

PSO1: Review various cultures, regions, ethnicities and cuisines with respect to food and develop a culture to reduce leftovers.

PSO2: Identify the fundamentals of nutrition, dietetics and food microbiology to promote health and administer healthy eating principles throughout the community and the nation.

PSO3: Apply the principles and theoretical knowledge in nutrition, dietetics, biochemistry and physiology through practical courses and internships.

PSO4: Paraphrase the physiology of the body and science of nutrients and its biochemical effect on the body.

PSO5: Develop basic communication skills, entrepreneurial skills and research in the field of nutrition and dietetics.

SEMESTER I

Course Code	Course Title	Credits	Course Type
EN1A01B18	Fine – Tune Your English	4	Common Course I
ND1C01B20	Fundamentals of Biochemistry	3	Complementary Course I
ND1C02B20	Human Anatomy and Physiology I	3	Complementary Course II
ND1B01B20	Principles of Nutrition	4	Core Course
ND1B02B20	Food Science	4	Core Course
ND1BP01B20	Food Science Practical	2	Core Course

SEMESTER I

COMMON COURSE I

EN1A01B18– FINE-TUNE YOUR ENGLISH

Credits: 4

Total Lecture Hours: 90

Course Outcomes:

CO1: Recognize the basics of English grammar.

CO2: Choose the appropriate word classes.

CO3: Identify common errors in the use of English language in various contexts.

CO4: Apply the rules of grammar to comprehend, speak, and write grammatically correct English.

CO5: Develop skill for business communication.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	2	1	2	2	2
CO2	.1	1	2	2	2
CO3	1	1	1	1	2
CO4	2	1	1	1	3
CO5	1	2	2	1	3

Syllabus Content

Module 1 **(18 Hours)**

The Sentence and its Structure

How to Write Effective Sentences – Phrases:What are They? – The Noun Clauses – The Adverb Clause – "If All the Trees Were Bread and Cheese" – The Relative Clause – How Clauses are Conjoined

Module 2 **(18 Hours)**

Word-Classes and Related Topics

Understanding the Verb – Understanding Auxiliary Verbs – Understanding Adverbs – Understanding Pronouns – The Reflexive Pronoun – The Articles I – The Articles II – The Adjective – Phrasal Verbs – Mind your Prepositions

Module 3 **(18 Hours)**

To Err is Human

Concord – Errors – Common and Uncommon

Spelling and Pronounciation

Pronunciation: Some Tips – More Tips on Pronunciation – An awesome Mess? – Spelling Part II

Module 4 **(18 Hours)**

Tense and Related Topics

'Presentness' and Present Tenses – The 'Presentness' of a Past Action – Futurity in English – Passivisation

Interrogatives and Negatives

Negatives – How to Frame Questions – What's What? – The Question Tag

Module 5 **(18 Hours)**

Conversational English

Some time expressions – Is John There Please?

Miscellaneous and General Topics

Reading

Letter Writing

In addition there will be an essay question on a general topic.

SEMESTER I

COMPLEMENTARY COURSE I

ND1CO1B20 - FUNDAMENTALS OF BIOCHEMISTRY

Credits: 3

Total Lecture Hours: 72

Course Outcomes:

CO1: Discuss the basics of biochemistry and molecular aspects of transport.

CO2: Identify the energy currency of the cell, the chemical messengers and its utilization.

CO3: Interpret various biomolecular compounds related to genetics.

CO4: Explain on classification, biosynthesis and mechanism of action of prostaglandins and enzymes.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	2	3	1
CO2	1	2	1	3	1
CO3	1	1	2	3	1
CO4	1	2	1	3	1

Syllabus Content:

MODULE I **(18 Hours)**

Introduction to Biochemistry: Definition, Scope of biochemistry, Concept of equilibrium - Acids and bases, buffers, molarity, molality, normality, equilibrium, viscosity, surface tension, adsorption, acidosis, alkalosis.

Molecular aspect of transport: Passive diffusion, facilitated diffusion, active transport - sodium potassium pump. Endocytosis and exocytosis.

MODULE II (18 Hours)

Biological Oxidation: High energy compounds, Electron transport chain, ATP synthesis, ATP as currency of energy, substrate level phosphorylation, non-oxidative phosphorylation, oxidative phosphorylation - mechanism, inhibitors involved in oxidative phosphorylation, OR-potential.

MODULE III (18 Hours)

Nucleic acids: Composition, functions, classification and structure of DNA and RNA. Nucleotide synthesis, DNA replication, Enzymes involved in DNA replication, DNA repair, Recombinant DNA technology, Protein synthesis, Genetic code, Gene mapping, Gene expression, operon concept, Lac, genotype and phenotype, epigenetics, Alleles, Epistasis.

MODULE IV (18 Hours)

Prostaglandins: Introduction, chemical nature, classification, biosynthesis, biological effects, clinical significance and therapeutic uses of prostaglandins.

Enzymes - Definition, classification, Apoenzymes, Coenzymes, Holoenzymes, Isoenzymes. Mechanism of action, properties, enzyme activity, factors affecting enzyme activity, enzyme kinetics, ping-pong mechanism, Enzyme inhibition. Diagnostic value of serum enzymes.

SEMESTER I

COMPLEMENTARY COURSE II

ND1C02B20 - HUMAN ANATOMY AND PHYSIOLOGY I

Credits: 3

Total Lecture Hours: 72

Course Outcomes:

CO1: Discuss the general structure and functions of various components of human body.

CO2: Explain on homeostasis and acid base balance.

CO3: Explain the digestive system and its mechanism in the body.

CO4: Describe the basics in physiology and functioning of the excretory system and its byproduct.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	1	2	2	2	1
CO2	1	2	2	3	1
CO3	1	2	1	3	1
CO4	1	2	2	3	1

Syllabus Content:

MODULE I **(18 Hours)**

Composition of the human body: Cell, cell organelles, tissues, organs, organ systems: digestive, excretory, respiratory, nervous, endocrine, circulatory, muscular, skeletal and reproductive systems. Cell junctions, Cell signaling, body fluids: ECF and ICF

MODULE II **(18 Hours)**

Homeostasis and acid base balance: Organ systems in homeostasis, components, mechanism - feed

back signals, regulation of acid-base balance. Disturbances of acid- base balance- acidosis and alkalosis.

MODULE III (18 Hours)

Digestive System: Structure and function of mouth pharynx, esophagus, stomach, intestine and intestinal villi. Digestive glands- salivary glands, gastric glands, liver, pancreas, gall bladder and intestinal glands. Hunger and thirst mechanism. Mechanism of digestion and absorption, defecation, Movements of GI tract and Gastro-intestinal reflexes.

MODULE IV (18 Hours)

Excretory system: structure and functions of kidney and nephron. Stages of urine formation, GFR, factors affecting GFR, composition of normal urine, abnormal constituents of urine, micturition. Factors affecting urine formation and urine volume, counter current mechanism.

SEMESTER I

CORE COURSE

ND1B01B20 - PRINCIPLES OF NUTRITION

Credits: 4

Total Lecture Hours: 72

Course Outcomes:

CO1: Discuss on nutritional science, food groups and RDA.

CO2: Explain the concepts of energy, energy balance, total energy expenditure, BMR and factors affecting

CO3: Describe about the major nutrient carbohydrate and its physiological role in the body.

CO4: Identify the key nutrient protein and indicate the importance of dietary sources and protein quality of food.

CO5: Recall the role of fat and list the importance of dietary sources relevant to human health.

CO6: Discuss on vitamins and minerals with regard to functions, deficiency and toxicity and the importance of water as a nutrient in maintaining homeostasis and its role in human body.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5A**
CO1	1	3	1	1	2
CO2	1	3	2	1	2
CO3	1	3	2	3	1
CO4	1	3	2	3	1
CO5	1	2	2	2	1
CO6	1	3	2	3	1

Syllabus Content:

MODULE-I **(12 Hours)**

Introduction to Nutrition science: Basic concepts in food and nutrition, Basic terms used in study of food and nutrition Understanding relationship between food, nutrition and health, Functions of food-Physiological, psychological and social

Food guide – Basic five food groups: Cereals and grains, pulses and legumes, milk and meat products, Fruits and vegetables, Fats and sugars. Definition of RDA and DRA, factors affecting RDA and uses of RDA. Principles and need of menu planning,

MODULE-II **(10 Hours)**

Energy: Concept of energy and its balance, basal metabolism, BMR affecting factors, Requirement determination, Energy sources. Total energy expenditure determination and the components

MODULE-III **(10 Hours)**

Carbohydrate: Introduction, functions, classification, sources, RDA, Types of Fibres – crude fibre and dietary fibres – soluble and insoluble, Functions of dietary fibre, recommended intake for different age groups

MODULE-IV **(10 Hours)**

Proteins: Introduction, composition, classification, RDA, functions, food sources, essential and non-essential amino acids, protein deficiency and excess, protein quality

MODULE - V **(10 Hours)**

Fat: Introduction- Lipids, Fats and oils, Composition, Classification, RDA, food sources, essential and non-essential fatty acids- deficiency.

MODULE-VI **(10 Hours)**

Water: Water as nutrient, components of body fluids, function. Dehydration, requirements,

structure, water balance, moisture in food: hydrogen bonding, bound water, free water, water activity and food stability.

MODULE-VII **(10 Hours)**

Vitamins: Introduction of vitamins. Classification, water soluble vitamins (Vit-B1, B2, B3, B5, B6, B7, B9, B12 &Vitamin -C). Fat soluble vitamins (Vitamin -A,D,E and K).Function, RDA, food sources. Deficiency and toxicity of vitamins.

Minerals: Macro minerals – Calcium, Phosphorus, Magnesium, Sodium, Potassium and Chloride. Microminerals – Iron, Zinc, Iodine, Fluorine. Functions of macro and micro minerals, food sources, RDA, deficiency and toxicity.

SEMESTER I

CORE COURSE

ND1B02B20 - FOOD SCIENCE

Credits: 4

Total Lecture Hours: 72

Course Outcomes:

CO1: Summarise on food, food groups and various cooking methods.

CO2: Explain the nutritive value and properties of cereals and pulses.

CO3: Discuss on composition and nutritive value of milk and various milk products.

CO4: Describe composition, nutritive value, changes during storage and role in cookery of egg, fish and flesh foods.

CO5: Distinguish between fruits and vegetables, its composition, nutritive value and effect of cooking.

CO6: Discuss the types, properties, nutritive value, properties and changes in cooking of sugars, fats, oils and beverages including processing of coffee, cocoa.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	1	3	2	1	2
CO2	1	3	2	1	2
CO3	1	3	2	1	1
CO4	1	3	2	1	1
CO5	1	3	2	2	1
CO6	2	3	2	3	1

Syllabus Content:

MODULE-I **(10 Hours)**

Introduction to foods- Definition, functions, food guide pyramid, Eat well plate. Introduction to cooking: preliminary preparation and cooking. Mechanism of cooking, different cooking

methods, merits and demerits, Pressure cooking, Solar cooking and Microwave cooking.

MODULE-II (10 Hours)

Cereals and millets- structure, composition, nutritive value. Effect of cooking. Types of cereals: breakfast cereals, ready to eat, ready to cook forms.

Pulses and legumes- structure, composition and nutritive value, anti-nutritional factors and effects.

MODULE– III (10Hours)

Milk and milk products- Composition, nutritive value, types of milk, processing, effect of heating on milk. Milk products: fermented and non-fermented products.

MODULE-IV (12 Hours)

Egg, fish- structure (egg), classification of sea foods, composition, nutritive value, selection, role in cookery.

Poultry and meat- types, composition, nutritive value, cuts of meat. Post mortem changes, tenderization.

MODULE– V (10 Hours)

Vegetables and fruits- classification, composition, nutritive value. Pigments: water soluble and water insoluble. Effects of cooking on colour, texture, flavor, appearance and nutritive value, ripening.

MODULE-VI (10Hours)

Sugar and sugar cookery -Properties of sugar, different forms of sugar (sugar, jaggery, honey syrup), composition, nutritive value. Stages of sugar cooking. Crystallisation : factors affecting crystallisation. Crystalline and non-crystalline candy.

Fats and oils- Types of fats and oils (animal and vegetable), processing and changes (hydrogenation, rancidity, smoking point, emulsification), uses and nutritive value. Nuts and oilseeds: Nutritive value and toxins.

MODULE-VII (10 Hours)

Tea, coffee & cocoa- Classification of beverages, structure of coffee beans, cocoa, types, processing and nutritive value.

SEMESTER I

CORE COURSE

ND1BP01B20 - FOOD SCIENCE PRACTICAL

Credits: 2

Total Lecture Hours: 72

Course Outcomes:

CO1: Estimate the weights and volumes using standards and its importance in food preparation.

CO2: Apply the fundamentals of food science to observe the changes in foods during and after cooking of cereals and pulses.

CO3: Prepare recipes using milk and milk products, egg and also determine the changes during cooking.

CO4: Identify the chemical changes due to cooking on pigments and nutrients in vegetables and fruits and changes in fats and sugars in various controlled conditions.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	1	2	1	2
CO2	1	2	3	1	2
CO3	1	2	3	1	2
CO4	1	2	2	1	1

Syllabus Content:

MODULE-I **(10Hours)**

1. Measurement of weights and volumes for each food group both raw and cooked (using standard measuring cups, spoons and weighing scale.)

2. Different cooking methods with examples

MODULE II (13Hours)

Cereals and Pulses:

1. Effect of temperature, time of heating, concentration, addition of sugar and acid on gelatinization of starch.
2. Prepare recipes using the following processes- Gelatinization, gluten formation and gel formation. Preparation of white sauce
3. Demonstrate the effect of soaking, hard water, sodium bi carbonate and papaya on cooking quality of pulses.
4. Prepare recipe using cereal pulse combination.

MODULE–III (10 Hours)

Milk

1. Demonstrate the factors affecting coagulation of milk protein.
2. Prepare recipes using milk and its products.

MODULE-IV (15 Hours)

Egg

1. Demonstrate the formation of ferrous sulphide in boiling egg and its preventive measures.
2. Demonstrate the effect of addition of acid, fat, salt, water and sugar on the stability of egg white.
3. Prepare recipes where egg acts as – thickening agent, binding agent, emulsifying agent and enriching agent.

MODULE V (14 Hours)

Fruits and Vegetables

1. Demonstrate the effect of acid, alkali and over cooking on vegetables containing different pigments.
2. Demonstrate the effects of different amounts of water added to vegetables during cooking on flavour and appearance.
3. Demonstrate enzymatic browning in vegetables and fruits and any four methods of preventing it.
4. Prepare soups, salads and sauces.

MODULE VI **(10 Hours)**

Fats and Sugar

1. Determine the smoking point of any 4 cooking oils.
2. Prepare recipes using shallow fat and deep fat frying methods observe the fat turnover
3. Demonstrate the stages of sugar cookery including syrups.

SEMESTER II

Course Code	Course Title	Credits	Course Type
EN2A03B18	Issues that Matter	4	Common Course I
ND2C03B20	General Biochemistry	2	Complementary Course I
ND2CP01B20	Biochemistry Practical I	2	Complementary Course I
ND2C04B20	Human Anatomy and Physiology II	2	Complementary Course II
ND2CP02B20	Human Physiology Practical I	2	Complementary Course II
ND2B03B20	Nutrition Through Life Cycle	4	Core Course
ND2B04B20	Food Standards and Quality Control	3	Core Course
ND2BP02B20	Nutrition Through Life Cycle Practical	2	Core Course

SEMESTER II

COMMON COURSE I

EN2A03B18 - ISSUES THAT MATTER

Credits: 4

Total Lecture Hours : 90

Course Outcomes:

CO1. Identify the major issues of contemporary significance.

CO2. Discuss the consequences of war and refugee crisis with respect to the psychological dimension.

CO3. Employ theoretical learning in classrooms to current developments in the world.

CO4. Critique the diverse experiences both historical and contemporary to create a more informed vision of the future.

CO5. Develop oneself as a conscious, concerned, conscientious human being.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	1	1	2
CO2	2	1	1	1	1
CO3	2	1	1	1	3
CO4	3	1	1	1	2
CO5	2	1	1	1	3

Syllabus Content

Module 1 **(18 hours)**

"The Unsurrendered People" – Kenzaburo Oe

"The Old Prison" – Judith Wright

"War" – Luigi Pirandello

Module 2 **(18 hours)**

Persuasions on the Power of the Word:

"On Censorship" – Salman Rushdie

"Peril" – Toni Morrison

"The Burning of the Books" – Bertolt Brecht

"The Censors" – Luisa Valenzuela

Module 3 **(18 hours)**

"The Poisoned Bread" – Bandhu Madhav

"A Trip Westward" – Zitkala-Sa

"The Pot Maker" – Temsula Ao

Module 4 **(18 hours)**

"Does it Matter?" – Richard Leakey

"On Killing a Tree" – Gieve Patel

"Hagar: A Story of a Woman and Water" (Gift in Green (chapter 2)) – Sarah Joseph

Module 5 **(18 hours)**

"Understanding Refugeeism: An Introduction to Tibetan Refugees in India" – Mallica Mishra

"Refugee Blues" – W.H Auden

"The Child Goes to the Camp" (from Palestine's Children) – Ghassan Kanafani

SEMESTER II

COMPLEMENTARY COURSE I

ND2CO3B20- GENERAL BIOCHEMISTRY

Credit: 2

Total Lecture Hours: -54

Course Outcomes:

CO1: Summarize the applications of radioisotopes and their significance and health hazards of pesticides.

CO2: Identify recombinant DNA technology and its applications.

CO3: Interpret the use of DNA in the diagnosis and explain the pathology of different types of diseases.

CO4: Differentiate between the basic techniques in Genetic engineering to enhance research prospects.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	1	1	2	2	1
CO2	1	2	2	2	1
CO3	1	2	3	3	1
CO4	1	1	2	1	2

Syllabus Content:-

MODULE I **(13 Hours)**

Environmental biochemistry - Applications of radioactive isotopes, health hazards of artificial fertilizers and pesticides, pesticide residue, significance of biofertilizers and

bioplastics. Recycling codes of plastics.

MODULE II **(12 Hours)**

Introduction to genetic engineering- Gene cloning, host cells, vectors, bacteriophages, cosmids, restriction endonuclease, DNA ligases. Applications of genetic engineering.

MODULE III **(14 Hours)**

DNA in the diagnosis of infectious diseases - tuberculosis, malaria, AIDS, CHAGAS disease, Human Papilloma Virus, lyme disease, periodontal disease.

DNA in the diagnosis of genetic diseases-cystic fibrosis, sickle cell anaemia, Alzheimer's disease, cancers, diabetes, obesity.

Artificial chromosomes, Gene knockout, Gene silencing, Bioethics

MODULE IV **(15 Hours)**

Basic techniques in genetic engineering - electrophoresis, blotting techniques, DNA sequencing, Polymerase Chain Reaction (techniques and applications) DNA analysis for environmental monitoring, DNA finger printing or DNA profiling, FISH techniques.

SEMESTER II

COMPLEMENTARY COURSE I

ND2CP01B20- BIOCHEMISTRY PRACTICAL – I

Credit: 2

Total Lecture Hours: 36

Course Outcomes:

CO1: Identify the principle and applications of colorimetry.

CO2: Examine different types of sugars.

CO3: Interpret various constituents of urine.

CO4: Determine micronutrients in urine.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	2	1	1
CO2	1	2	2	2	1
CO3	1	3	3	3	1
CO4	1	3	2	3	1

Syllabus Content:-

MODULE I **(6 Hours)**

Principles and applications and methodology of colorimetry.

MODULE II **(12 Hours)**

Qualitative analysis of Sugars

1. Glucose

2. Fructose
3. Maltose
4. Lactose

MODULE III **(8 Hours)**

1. Estimation urinary Creatinine
2. Estimation of urinary Urea

MODULE IV **(10 Hours)**

1. Estimation of urinary Calcium
2. Estimation of urinary Phosphorous
3. Estimation of urinary Ascorbic Acid

SEMESTER II

COMPLEMENTARY COURSE II

ND2C04B20- HUMAN ANATOMY AND PHYSIOLOGY II

Credit: 2

Total Lecture hours :54

Course Outcomes:

CO1: Interpret on the various mechanisms in our body undertaken by different organ Systems.

CO2: Discuss on basic body structures and get an insight into body functions.

CO3: Identify the functions and abnormalities of various organ systems.

CO4: Discuss on the significance of different organ systems.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	2	3	1
CO2	1	3	2	3	1
CO3	1	2	2	2	1
CO4	1	2	2	3	1

Syllabus Content:

MODULE I **(13 Hours)**

Cardiovascular System- Structure of heart, conducting system of heart, cardiac cycle, Blood – functions, composition, blood clotting, blood groups, blood vessels-artery, vein capillaries, blood circulation-greater, lesser.

MODULE II (12 Hours)

Lymphatic System- Tissue fluid, Lymph, Functions, formation of Lymph, lymph glands - structure and functions, lymphoid organs in the body.

MODULE III (14 Hours)

Immune System- AMI and CMI, Innate and Acquired, Antigens and Antibodies, Helper T cells and Cytokines.

MODULE IV (15 Hours)

Respiratory system -Organs of respiration – structure and functions, volume and capacity of lungs, mechanism of respiration, Artificial respiration, Compliance of lung and chest wall, cell respiration.

SEMESTER II

COMPLEMENTARY COURSE II

ND2CP02B20- HUMAN PHYSIOLOGY PRACTICAL I

Credit: 2

Total Lecture hours: 36

Course Outcomes:

CO1: Identify the principal tissue structures.

CO2: Identify different parts of the body with the help of models.

CO3: Interpret different blood indices.

CO4: Determine body temperature, blood pressure and pulse.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	1	2	2	1	1
CO2	1	3	2	2	1
CO3	1	2	2	1	1
CO4	1	2	3	1	1

Syllabus Content:-

MODULE I **(6 Hours)**

Microscopic examination of prepared slides - examines and draws the tissues

a) Squamous, ciliated and columnar epithelia.

b) Bone and cartilage

c) Smooth, cardiac and striated muscle

d) Nerve cell

e) Skin

MODULE II **(12 Hours)**

Physical examination of body

a) Pulse rate at rest and after exercise
b) Determination of arterial blood pressure
c) Measurement of body temperature and diurnal rhythm.

MODULE III **(8 Hours)**

Examine the model: identify and draw

a) Section of human heart
b) Section of human kidney
c) Histology of artery and vein

MODULE IV **(10 Hours)**

Hematology

a) Enumeration of RBC of human blood
b) Enumeration of WBC of human blood
c) Haematocrit (PCV) and hemoglobin
d) Mean Corpuscular Hemoglobin (MCH) and Mean Corpuscular Volume(MCV)
e) Mean Corpuscular Hemoglobin Concentration(MCHC)
f) Colour Index(CI)

SEMESTER II

CORE COURSE

ND2B03B20 - NUTRITION THROUGH LIFE CYCLE

Credits: 4

Total Lecture Hours : 72

Course Outcomes:

CO1: Generalise on growth, development and feeding during infancy.

CO2: Discuss the growth, feeding pattern and nutritional problems in early childhood.

CO3: Summarise on nutritional requirements of school children and adolescents as well as eating disorders.

CO4: Generalise on reference man and woman, nutritional requirement among adults.

CO5: Explain the physiological changes in pregnancy and lactation and also the nutritional requirements.

CO6: Discuss nutritional requirement, dietary modification and nutritional problems among geriatric.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	1	3	2	2	1
CO2	1	3	2	2	1
CO3	1	3	2	2	1
CO4	2	3	2	2	1
CO5	1	3	2	2	1
CO6	1	3	2	2	1

Syllabus Content:-

MODULE-I **(10Hours)**

Nutrition during infancy- Infancy: Growth and development, nutritional requirements,

breast feeding, bottle feeding. Introduction to supplementary foods.

MODULE-II (12Hours)

Nutrition during early childhood: Early childhood. (Toddlers and Preschoolers) - Growth and nutrient needs, nutritional related problems, Feeding Pattern.

MODULE-III (15Hours)

Nutrition for school children and adolescence: School children - Nutritional requirements, Importance of snacks, packed lunch. Adolescence - Growth, stages of adolescence, Nutrient needs, food choice, eating habits, factors influencing. Eating disorders.

MODULE-IV (10Hours)

Nutrition in Adulthood: Nutritional requirements RDA based on activity Nutritional status of Indian adult population, Reference Man and Woman.

MODULE–V (15 Hours)

Nutrition in pregnancy and lactation– Pregnancy: Physiological stages of pregnancy, nutrition requirements food selection and Complications of pregnancy. Lactation – structure of mammary gland, Physiology of lactation, nutritional requirements.

MODULE-VI (10Hours)

Geriatric nutrition - Factors affecting food intake, nutrient needs, modification of diet for geriatric, nutrition related problems.

SEMESTER II

CORE COURSE

ND2B04B20 - FOOD STANDARDS AND QUALITY CONTROL

Credits: 3

Total Lecture Hours: 72

Course Outcomes:

CO1: Explain the application and important specifications of regulations in quality control and food safety system.

CO2: Identify the sources for food standards, regulations and specifications prescribed by different certificate bodies.

CO3: Discuss regulations and guidelines with regards to Indian and International food laws.

CO4: Explain the importance and specifications of regulations in quality control.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	2	3	2	2	2
CO2	1	2	1	1	2
CO3	1	3	1	1	2
CO4	1	2	1	2	2

Syllabus Content:-

MODULE–I **(15Hours)**

Food quality and quality control-Meaning, objectives, important considerations, principles of–quality control of food, raw material and inspection of finished products. Total Quality Management (TQM) - Parameters, evolution, elements TQM, need for TQM and of implementation of TQM in the food industries.

MODULE-II (16Hours)

Index of nutritional quality (INQ)-Need for INQ, INQ as an evaluating tool in the food industry, nutrition labeling of foods. Methods of assessing food quality - Cereals and Pulses, fruits and vegetables, milk, meat and its products, egg, Oils, fats, nuts and oilseeds.

MODULE-III (10Hours)

Standard of foods- Cereals and Pulses, fruits and fruits products, vegetable and vegetable products, coffee, tea, sugar and sugar products, milk and milk products, eggs and selected fleshy foods.

MODULE-IV (11Hours)

Indian and International Food Laws (An Overview)-Food Safety and Standards Act of India, 2006: Provision, definitions and different sections of the Act and implementation. FSSRules and Regulations Overview of other relevant national bodies - APEDA, BIS EIC, MPEDA, Spice Board

MODULE-V (10Hours)

International Food Control Systems/Laws, Regulations and Standards/Guidelines with regard to Food Safety – (i) Overview of CODEX Alimentarius Commission (History, Members, Standard setting and Advisory mechanisms: JECFA, JEMRA JMPR): WTO agreements (SPS/TBT): Important national and international accreditation bodies

MODULE-VI (10 Hours)

Regulations in quality control -FAO/WHO Codex Alimentarius commission, PFA, AGMARK, BIS, FPO, CPA, fair average quality (FAQ) specifications for food grains, ISO 9000 series; HACCP background, principles, benefits and limitations; FSSAI.

SEMESTER II

CORE COURSE

ND2BP02B20 NUTRITION THROUGH LIFE CYCLE PRACTICAL

Credits: 2

Total Lecture Hours: 36

Course Outcomes:

CO1: Administer the principles of dietetics for preschool and adults.

CO2: Apply the nutrient requirements identified for pregnant and lactating women into diets.

CO3: Construct recipes for supplementary feeding and packed lunches for school.

CO4: Prepare diets suitable for adolescent girls and geriatric considering the nutrient requirements and physiological changes respectively.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	1	2	3	2	2
CO2	1	2	3	3	2
CO3	2	2	3	2	2
CO4	1	2	3	3	2

Syllabus Content:-

MODULE I **(5Hours)**

Plan and prepare diet for adult during different activities – sedentary female and heavy worker male

MODULE II **(5 Hours)**

Plan and prepare balanced diet for a pregnant woman.

MODULE III **(5 Hours)**

Plan and prepare balanced diet for a nursing mother.

MODULE IV **(3 Hours)**

Plan and prepare Supplementary feed

MODULE V **(5Hours)**

Plan and prepare diet for preschooler

MODULE VI **(3Hours)**

Plan and prepare school packed lunch

MODULE VII **(5Hours)**

Plan and prepare diet for adolescent girl

MODULE VIII **(5 Hours)**

Plan and prepare a diet for geriatric condition

SEMESTER III

Course Code	Course Title	Credits	Course Type
ND3C05B20	Nutritional Biochemistry	2	Complementary Course I
ND3C06B20	Human Anatomy and Physiology III	2	Complementary Course II
ND3B05B20	Food Culture and Nutrition	4	Core Course
ND3B06B20	Basic Dietetics	4	Core Course
ND3B07B20	Food Service Management	4	Core Course
ND3BI01B20	Industrial Internship	1	Internship

SEMESTER III

COMPLEMENTARY COURSE I

ND3C05B20- NUTRITIONAL BIOCHEMISTRY

Total Credit: 2

Total Lecture Hours: 90 Hours

Course Outcomes:

CO1: Compare different metabolic pathways of carbohydrates.

CO2: Distinguish between different metabolic pathways of lipid and its derivatives.

CO3: Identify the structure and general pathways of amino acids metabolism.

CO4: Illustrate the integration of metabolic pathways of energy metabolism.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	1	1	2	3	2
CO2	1	1	2	3	2
CO3	1	1	2	3	2
CO4	1	2	2	3	2

Syllabus Content

MODULE I **(28 Hours)**

Carbohydrate Metabolism: Basic structure, Metabolism of glucose (glycolysis), fructose and galactose; Metabolism of pyruvate and lactate; Metabolism of acetyl Co A (TCA cycle); energetic of glucose metabolism, Synthesis of ribose (HMP Shunt); Synthesis of glucose from noncarbohydrates (gluconeogenesis); Metabolism of Glycogen- Glycogenesis and Glycogenolysis.

MODULE II (22 Hours)

Lipid metabolism: Basic structure, Metabolism of Triacylglycerol, synthesis of fatty acid- saturated and unsaturated; Beta-oxidation of fatty acid-; Metabolism of Cholesterol; Metabolism of Ketone bodies

MODULE III (22 Hours)

Protein metabolism: Basic structure of protein and amino acids; General pathways of amino acid metabolism -Deamination, transamination, decarboxylation, and demethylation; urea cycle and fate of ammonia.

MODULE IV (18 Hours)

Integration of metabolic pathways of energy metabolism, Metabolism in diabetes, obesity, starvation.

Regulation of metabolism: Interrelationship of carbohydrate, protein and lipid metabolism. Metabolic adaptation during starvation, exercise, stress and diabetes mellitus.

SEMESTER III

COMPLEMENTARY COURSE II

ND3C06B20- HUMAN ANATOMY AND PHYSIOLOGY III

Total Credit: 2

Total Lecture Hours: 90

Course Outcomes:

CO1: Describe the mechanism performed by different endocrine glands.

CO2: Distinguish the reproductive systems in male and female.

CO3: Explain the structure and functions of muscular system.

CO4: Discuss about functioning of nervous system.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	2	2	2
CO2	1	1	2	3	2
CO3	1	1	2	3	2
CO4	1	1	2	3	2

Syllabus Content:

MODULE I **(28 Hours)**

Endocrine System- Endocrine glands: structure and functions of Pituitary, Thyroid, Parathyroid, Adrenal, Pancreas, Placenta, Ovary, Testes, Thymus and Pineal body. Disorders of over and under secretions.

MODULE II **(22 Hours)**

Reproductive system- Male and Female reproductive organs:structure and functions, reproductive hormones, Menstruation, Puberty, menopause, fertilization, development of fertilized ovum, placenta and its functions, parturition.

MODULE III **(22 Hours)**

Muscular system -General account of the system, types of muscles, muscle contraction, Sliding filament theory, Biochemical events in muscular contraction, skeletal muscles of organs (brief)- pharynx, larynx, diaphragm, abdominal wall.

MODULE IV **(18 Hours)**

Nervous System : Structure of nerve cell, nerve fiber. Classification of nervous system – CNS, PNS, ANS – their functions.Nerve impulses, synapse, reflex action, voluntary action.

SEMESTER III

CORE COURSE

ND3C05B20 FOOD CULTURE AND NUTRITION

Total Credits: 4

Total Lecture Hours: 90

Course Outcomes:

CO1: Identify the various cuisines and cultures of the world.

CO2: Summarize the historical perspective of food habits.

CO3: Explain different perspectives of Indian culinary system.

CO4: Discover different factors influencing Indian cuisines.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	1	2
CO2	3	1	1	1	1
CO3	3	1	2	1	2
CO4	3	1	1	1	2

Syllabus Content:

MODULE-I **(14 Hours)**

Introduction to Indian Cuisine: Factors influencing Indian cuisine, cultural and philosophical influence on Indian cooking, Foreign influence on Indian cooking, Diversity, cooking according to tastes, Ayurvedic food, Royal kitchens of India.

MODULE-II **(12 Hours)**

Indian Culinary Terms: Introduction, royal kitchen hierarchy, ethnic equipment and utensils used, cooking method and signature dishes.

MODULE-III **(12 Hours)**

Regional cuisine of India: Introduction to different regions, the specialty, geographical influence, cultural and religious influence, popular regional cuisine ,Philosophy of Indian cooking, influence of the invaders and travellers on Indian cuisine, regional and religious influence on Indian cuisine.

MODULE-IV **(12 Hours)**

Introduction of cuisines of the world: Asia-East Asia, Europe-Western Europe, North America-United States, South America, Oceania- Australia, New Zealand, French, Continental, Oriental.

MODULE-V **(10 Hours)**

Introduction, Rules for reheating foods, Meals that accommodate leftovers, Uses of leftover ingredients.

MODULE-VI **(10 Hours)**

Food habits of different ethnicities-Ethnic group diet and interaction of ideals, identities and roles, Food culture and nutrition, Factors affecting regional cuisine. Race and gender affecting nutrition habits

MODULE-VII **(8 Hours)**

Historical perspective of food habits - Civilizations and time periods, Hunters and gatherers, the beginning of agriculture, Contemporary life, Diet trends overtime.

MODULE-VIII **(12 Hours)**

Introduction to Culinary art - Definition of Culinary Arts, Culinary concepts, Evolution of culinary arts, Relation between culinary Arts and Science, Challenges and issues in culinary industry, Introduction to Haute/ Classique/ Nouvelle cuisine/ Contemporary Cuisine. History of cooking.Introduction to classical cuisine.

SEMESTER III

CORE COURSE

ND3B06B20 -BASIC DIETETICS

Credits: 4

Total Lecture Hours: 90

Course Outcomes:

CO1: Enumerate the role of dietician and the nutrition care process**.**

CO2: Summarise nutritional assessment based on physical finding, Global Leading Initiated Management, ABCD, Nutritional History and ADIME.

CO3: Discuss routine hospital diets and therapeutic diets.

CO4: Prepare diet plans based on theories of weight management.

CO5: Develop diets for immune system diseases including allergies based on theory.

CO6: Employ the fundamentals of gastro intestinal diseases to plan a diet.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO 5**
CO1	1	2	1	1	2
CO2	1	3	2	1	2
CO3	1	3	2	1	1
CO4	1	3	3	2	1
CO5	1	3	3	2	1
CO6	1	2	3	2	2

Syllabus Content:

MODULE-I **(10 Hours)**

Introduction to Dietetics: Definition of Dietician, types and scope of dietician. Code of ethics. Nutrition Care Process: Definition of Nutrition Care Process. Steps of NCP: Nutrition Assessment**,**

Nutrition Diagnosis**,** Nutrition Interventions, Nutrition Monitoring and Evaluation and documentation

MODULEII (15 Hours)

Nutrition assessment – Nutrition Focus on Physical Finding, Global Leading Initiated Management, Anthropometric, Biochemical, Clinical and Dietary assessments, Nutritional History, ADIME

MODULE-III (10 Hours)

Routine hospital diets and feeding routes -Types of hospital diets. Therapeutic adaptation of normal diets. Principles and classification of therapeutic diets. Regular diet, soft diet, fluid diet.

MODULE-IV (10 Hours)

Nutritional Care for Weight Management-Aetiological factors, consequences. Types of obesity, Dietary management. Underweight – aetiological factors and treatment.

MODULE-V (20 Hours)

Dietary management in immune system diseases:

Diet in HIV- Aetiological factors, stages of HIV, Opportunistic conditions, kaposis sarcoma Diagnostic tests and Dietary Management and treatment

Diet in Febrile Conditions and vector borne diseases– aetiology, symptoms, types: acute, chronic and intermittent and dietary treatment.

MODULEVI (10 Hours)

Diet in Allergy - Definition, Symptoms, diagnostic tests and dietary management in allergy.

MODULE-VII (15Hours)

Gastro intestinal tract- diseases and dietary management: Etiologic factors, symptoms, diagnostic tests and dietary treatment for oesophagitis, Diarrhoea and Constipation. Gastritis, Peptic Ulcer and Ulcerative colitis. Malabsorption syndrome.

SEMESTER III

CORE COURSE

ND3B07B20 -FOOD SERVICE MANAGEMENT

Total Credits: 4

Total Lecture Hours: 90

Course Outcomes:

CO1: Develop general knowledge on the origins and development of food service in hotels, restaurants, and institutions.

CO2: Discover nutritional menus for food service production.

CO3: Define the steps involved in menu planning and menu design.

CO4: Identify various equipment used and factors affecting the selection of equipment in food service establishments.

C05: Explain planning of kitchen layout in relation to equipment used in different food service establishments.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	1	2	2	1	1
CO2	1	3	3	1	1
CO3	1	2	2	1	1
CO4	1	1	2	1	1
CO5	1	1	3	1	1

Syllabus Content

MODULE-I **(15Hours)**

Introduction to Food Service and Food Service Institutions- A brief introduction on the above concepts.

MODULE-II (15Hours)

Food management - Definition and functions of a menu, principles and need for menu planning, steps in menu planning and its evaluation

MODULE-III (15Hours)

Equipment in Food Service-Classification in equipment, factors affecting the selection and use of equipment in food service institutions-Electrical

MODULE-IV (15 Hours)

Materials Used - Base materials, materials used for finishes ñ materials used for accessory parts. Strength and limitations of materials

MODULE-V (15 Hours)

Food Plant Layout and Space allocation of food plant according to different capacities- Restaurants, dietary kitchen, cafeterias, banquet space. Flow of traffic - receiving food, preparing food, storage and serving, removing soiled utensils to dishwashing area, hand washing. Traffic of guest- entrances and exit

MODULE-VI (15 Hours)

Kitchen Planning-Planning kitchen in relation to equipment, different work centers and sizes in relation to equipment. Modular kitchen

SEMESTER III

ND3BI01B20 - INDUSTRIAL INTERNSHIP

Total Credits: 1

Duration: 10 Days

Course Outcomes:

CO1: Examine the working atmosphere and to get a deep insight into the procedures to be followed in different units of a food industry.

CO2: Develop skills to manage a food industry.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	1	3	1	3
CO2	2	1	3	1	3

Syllabus Content

In 3rd semester students are expected to do a 10 days industrial internship at a three or four star hotel or any food industries. This is for them to have practical experience of the subject Food service management. Training should cover all departments of the industry. The students have to submit and present the report of their experience

SEMESTER IV

Course Code	Course Title	Credits	Course Type
ND4C07B20	Biochemical Aspects of Nutrition	2	Complementary Course I
ND4CP03B20	Biochemistry Practical II	2	Complementary Course I
ND4C08B20	Human Anatomy and Physiology IV	2	Complementary Course II
ND4CP04B20	Human Physiology Practical II	2	Complementary Course II
ND4B08B20	Nutrition in Health Promotion	4	Core Course
ND4B09B20	Dietetics	4	Core Course
ND4B10B20	Research Methodology	3	Core Course
ND4BP03B20	Dietetics Practical	2	Core Course

SEMESTER IV

COMPLEMENTARY COURSE I

ND4C07B20- BIOCHEMICAL ASPECTS OF NUTRITION

Credit: 2

Total Lecture Hours: -54

Course Outcomes:

CO1: Differentiate between the metabolism, functions, deficiencies and toxicity of various macro minerals.

CO2: Compare the significance of different microminerals.

CO3: Describe the biochemical functions, utilization and metabolism of fat soluble and water-soluble vitamins.

CO4: Summarize the role of vital nutrient- nutrient interrelationships in the human body.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	2	3	1
CO2	1	2	2	3	1
CO3	1	2	2	3	1
CO4	1	1	2	3	1

Syllabus Content:-

MODULE I **(12 Hours)**

Metabolism of Macro minerals: Functions, Biochemical importance, metabolism, deficiency, and toxicity of the following minerals: Calcium, phosphorus, magnesium.

MODULE II **(12 Hours)**

Metabolism of Microminerals: Functions, Biochemical importance, Metabolism, deficiency

and toxicity of the following minerals: Iron, Zinc, copper, selenium, chromium, iodine, manganese, Molybdenum and fluorine.

MODULE III **(20 Hours)**

Metabolism of Fat Soluble Vitamins: Functions, biochemical importance, metabolism, deficiency and toxicity of vitamin A, D, E, K.

Metabolism of Water Soluble Vitamins: Functions, Biochemical importance, metabolism , Deficiency, Toxicity of Thiamin, Riboflavin, Niacin, vitamin B6, Vitamin B12, Biotin, Pantothenic acid, Folic acid and Vitamin C.

MODULE IV **(10 Hours)**

Nutrient-Nutrient interrelationships: Role of Vitamins and Minerals in macronutrient metabolism, micronutrient interrelationships.

SEMESTER IV

COMPLEMENTARY COURSE I

ND4CP03B20 - BIOCHEMISTRY PRACTICAL II

Total Credit: 2

Total Lecture Hours: 36

Course Outcomes:

CO1: Determine the amount of glucose, protein and lipid in blood.

CO2: Calculate the quantity of various enzymes in body fluids.

CO3: Determine the constituents of blood.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	3	2	1
CO2	1	2	3	2	1
CO3	1	2	3	3	1

MODULE I **(12 Hours)**

Analysis of Blood for

1. Glucose
2. Total Protein, albumin and globulin
3. Total Cholesterol and lipid profile

MODULE II **(8 Hours)**

1. Estimation of Acid phosphatase
2. Estimation of Alkaline phosphatase

MODULE III **(8 Hours)**

1. Estimation of Iron
2. Estimation of Haemoglobin

MODULE IV **(8 Hours)**

1. Estimation of SGPT
2. Estimation of SGOT

SEMESTER IV

COMPLEMENTARY COURSE II

ND4C08B20 - HUMAN ANATOMY AND PHYSIOLOGY IV

Total Credit: 2

Total Lecture Hours: 36

Course Outcomes:

CO1: Explain the structure, functions and diseases and disorders associated with sense organs.

CO2: Discuss the structure, functions, formation and dysfunction of the human skeletal system.

CO3: Describe the regulatory mechanisms of the human body.

CO4: Illustrate the physiological changes in the human body on exposure to special conditions.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	1	3	1
CO2	1	2	2	3	1
CO3	1	2	2	3	1
CO4	1	2	2	3	1

Syllabus Content:-

MODULE I **(10 Hours)**

Sense Organs -Structure, functions, physiology and diseases and disorders of Skin (integumentary system), Eye, Ear, Nose and Tongue.

MODULE II **(10 Hours)**

Skeletal system -General structure and functions of bone, bone mineralization, factors affecting bone formation, A general account of axial skeleton and appendicular skeleton. Types of joints, Arthrology.

MODULE III **(6 Hours)**

Regulatory Mechanism -Regulation of blood pressure, pulse, heart rate and temperature, adaptations during exercise.

MODULE IV **(10 Hours)**

Physiology in special conditions -High altitude and space physiology, aviation physiology, deep sea physiology, effect of exposure to cold and heat.

SEMESTER IV

COMPLEMENTARY COURSE II

ND4CP04B20- HUMAN PHYSIOLOGY PRACTICAL II

Total Credit: 2

Total Lecture Hours: 36

Course Outcomes:

CO1: Identify blood cells from prepared smear.

CO2: Determine blood grouping and basic tests of blood clotting.

CO3: Interpret the physical characteristics and abnormal constituents of urine.

CO4: Determine the components of saliva.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	2	3	1
CO2	1	2	3	3	1
CO3	1	2	3	3	1
CO4	1	2	3	3	1

Syllabus Content:-

MODULE I **(12 Hours)**

Smear preparation of human blood for RBC and WBC types.

MODULE II **(8 Hours)**

Haematology

1. Testing of bloodgroup
2. Bleeding time : Duke"smethod
3. Blood clotting time : Wright"smethod

MODULE III **(8 Hours)**

Clinical examination of urine

i. Physical examination: Volume, colour, odour, appearance, pH , specificgravity
ii. Test for abnormal constituents of urine
    a) Sugar
    b) Blood
    c) Albumin
    d) Bilesalts
    e) Bilepigments
    f) Ketone bodies

MODULE IV **(8 Hours)**

Analysis of saliva

a) Amylase
b) Mucin
c) Calcium
d) Inorganic Phosphate

SEMESTER IV

CORE COURSE

ND4B08B20 - NUTRITION IN HEALTH PROMOTION

Total Credits: 4

Total Lecture Hours: 72

Course Outcomes:

CO1: Generalize on the various concepts, evolution and classification of nutraceuticals.

CO2: Describe the significance and relevance of nutraceutical in the management of diseases and disorders.

CO3: Review on phytochemicals and mode of action of various phytochemicals.

CO4: Summarize the role of antioxidants in terms of mechanism of action, role in the prevention of diseases and classification.

CO5: Paraphrase the role and development of functional foods and health benefits of different functional foods in the Indian diet.

CO6: Differentiate between the types and health benefits of probiotics and prebiotics.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	1	3	1
CO2	1	2	1	3	1
CO3	1	3	1	3	2
CO4	1	2	1	3	1
CO5	2	3	1	3	2
CO6	1	3	1	3	2

Syllabus Content:-

MODULE I **(12 Hours)**

Nutraceuticals –Definition, concept, Evolution of nutraceuticals, Classification of nutraceuticals based on chemical nature and mechanism of action

MODULE II **(10 Hours)**

Significance and relevance of nutraceuticals in the management of diseases and disorders – CVD, cancer, diabetes, obesity, osteo arthritis, immune enhancement, endurance, performance Application of nutraceuticals in Indian and International market, regulatory issues of nutraceuticals.

MODULE III **(13 Hours)**

Phytochemicals: Definition, mode of action Classification of Phytochemicals: Terpenoids,

.Carotenoids - Carotene, Leutein, zeaxanthin, Lycopene , Poly Phenols: Non Flavonoid polyphenols, Flavonoids - Flavanols, Flavanol (Catechin) Flavan-3-ol, Flavones, Flavanones, Anthocyanidins, Phytoestrogens (isoflavonones), Other Poly Phenols: Curcumin, Tannins, Lignan and Resveratrol Sulphur containing Compounds: Sulphides and Glucosinolates

MODULE IV **(13 Hours)**

Antioxidants: Formation of Free Radicals, Reactive Oxygen Species and Oxidative Stress. Antioxidant Definition and Mechanism of action Classification Of antioxidants: Endogenous and Exogenous, Role of endogenous antioxidants- SuperOxide Dismutase (SOD), Catalases, Glutathione Reductase, Peroxidases- Glutathione Peroxidase in protecting cells. Role of Exogenous antioxidants- Retinol, β – carotene, Ascorbic acid and Tocopherol in prevention of Cancer, CVD, Ageing and Inflammation and other lifestyle diseases

MODULE V **(11 Hours)**

Functional foods - Definition, development of functional foods, use of bioactive compounds in appropriate form with protective substances and activators. Health benefits of functional foods and future promises in the Indian diet. Types of foods categorized as functional foods. Safety and Regulatory aspects of functional foods

MODULE VI **(13 Hours)**

Probiotics and prebiotics – definition, types, Health benefits of probiotics in gastrointestinal health, cancer, and other diseases Recent advances in probiotics – Lactobacillus, Lactobacillus casei, L. casei strain shirota Challenges and regulatory issues related to probiotics Prebiotics – definition, types Health benefits of prebiotics Recent advances in prebiotics – galacto- oligosaccharides (GOS), functional disaccharides (lactulose, lactitol and lactose), Resistant starch (RS) Prebiotic ingredients in foods types of prebiotics and their effects on gut microbes; Symbiotics

SEMESTER IV

CORE COURSE

ND4B09B20 - DIETETICS

Credits: 4

Total Lecture Hours: 72

Course Outcomes:

CO1: Generalize on enteral and parenteral feeding.

CO2: Prepare diet plans based on theories of various disease conditions.

CO3: Describe the etiological factors, symptoms, biochemical changes and diagnostic tests of various diseases.

CO4: Review on cancers and its MNT.

CO5: Summarize on fundamentals and nutritional management of metabolic stress conditions including burns.

CO6: Discuss the effect of drugs on nutritional status of the individual.

Mapping of Course Outcomes with Programme Specific Outcomes

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	2	3	2
CO2	1	3	3	2	1
CO3	1	2	2	2	1
CO4	1	3	2	2	1
CO5	1	3	2	2	1
CO6	1	2	2	2	1

Syllabus Content:-

MODULE-I **(12 Hours)**

Nutrition delivery - Enteral feeding – NG, NJ, PEJ, PEG, formulas, method of feeding. Parenteral Feeding - Central and peripheral routes, elemental formulas.

Diet in diseases of cardio vascular system-Introduction to CVD, Aetiological factors, symptoms

, biochemical changes during CVDand dietary treatment for Atherosclerosis, Ischemic Heart Disease, Congestive Cardiac Failure, Hypertension: DASH diet

MODULE-II (10 Hours)

Diet in diseases of the kidney-Aetiological factors, symptoms, biochemical changes during kidney diseases, diagnostic tests and dietary treatment for Acute and chronic renal failure. Glomerulonephrities, Nephrotic Syndrome, Nephrolithiasis, Kidney transplantation and Dialysis.

MODULE-III (10 Hours)

Diet in disease of the pancreas and liver- Pancreatitis Liver - Aetiological factors, symptoms, biochemical changes, diagnostic tests and dietary treatment for Viral Hepatitis, Cirrhosis of the liver and liver encephalopathy. Cholelithiasis and cholecystitis.

MODULE-IV (10 Hours)

Diet in diabetes mellitus-Classification, Aetiological factors, symptoms, biochemical changes during diabetes, diagnostic tests, metabolic changes in the body, Complications of Diabetes, Food Exchange List.Glycemic Index and Glycemic load– classification of foods, carbohydrate counting.

MODULE-V (11 Hours)

Diet in cancer- Types, mechanism of the cancer formation, Medical Nutrition Therapy.

MODULE-VI (14 Hours)

Diet in metabolic stress: Pre and post- surgical conditions, Sepsis, Trauma

Burns- structure of skin, types of burns, calculation of burns: rule of nine and dietary treatment

MODULE-VII (5 Hours)

Nutrient Drug Interaction-Introduction, Definition, classification of nutrient drug, effect of drug on nutritional status, nutrient drug interaction list.

SEMESTER IV

CORE COURSE

ND4B10B20 - RESEARCH METHODOLOGY

Total Credits: 3

Total Lecture Hours: 72

Course Outcomes:

CO1: Discuss the different concepts and significance of research methodology.

CO2: Explain formulations of research problem and hypothesis.

CO3: Illustrate basics of sampling and data analysis techniques.

CO4: Discuss on different data interpretation, layouts and writing of research report.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	1	1	3
CO2	1	2	2	1	3
CO3	1	2	2	1	3
CO4	1	2	2	1	3

Syllabus Content:-

MODULE-I (10 hours)

Foundations of Research: Meaning, Objectives, Motivation, Utility. Concept of theory, empiricism, deductive and inductive theory.Characteristics of scientific method – Understanding the language of research – Concept, Construct, Definition, Variable. Research Process

MODULE-II (12hours)

Problem Identification & Formulation – Research Question – Investigation Question – Measurement Issues – Hypothesis – Qualities of a good Hypothesis –Null Hypothesis &

Alternative Hypothesis. Hypothesis Testing – Logic & Importance

MODULE-III (13 hours)

Research Design: Concept and Importance in Research – Features of a good research design – Exploratory Research Design – concept, types and uses, Descriptive Research Designs – concept, types and uses. Experimental Design: Concept of Independent & Dependent variables.

MODULE-IV (13 hours)

Qualitative and Quantitative Research: Qualitative research – Quantitative research – Concept of measurement, causality, generalization, and replication. Merging the two approaches Measurement: Concept of measurement, Problems in measurement in research – Validity and Reliability. Levels of measurement – Nominal, Ordinal, Interval, Ratio

MODULEV (15 hours)

Sampling: Concepts of Statistical Population, Sample, Sampling Frame, Sampling Error, Sample Size, Non Response. Characteristics of a good sample. Probability Sample – Simple Random Sample, Systematic Sample, Stratified Random Sample & Multi-stage sampling. Determining size of the sample – Practical considerations in sampling and samplesize.

MODULE-VI (12 hours)

Data Analysis: Data Preparation – Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis – Cross tabulations and Chi-square test including testing hypothesis of association.

MODULE-VII (5 hours)

Interpretation of Data and Paper Writing – Layout of a Research Paper, Impact factor of Journals, Ethical issues related to publishing, Plagiarism and Self-Plagiarism.

MODULE-VIII (10 hours)

Report generation, report writing, and APA format – Title page, Abstract, Introduction, Methodology, Results, Discussion, Use of Encyclopaedias, Research Guides, Handbook etc., and Academic Databases.

SEMESTER IV

CORE COURSE

ND4BP03B20 - DIETETICS PRACTICAL

Credits: 2

Total Lecture Hours: 72

Course Outcomes:

CO1: Prepare common food preparations and standardize the recipes.

CO2: Prepare routine hospital diets.

CO3: Prepare therapeutic diet for disease conditions.

CO4: Compute nutritional value of planned menu plan.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	3	2	2
CO2	1	2	3	2	2
CO3	2	2	3	2	3
CO4	1	1	3	1	3

Syllabus Content:-

MODULE-I **(6 Hours)**

Standardization of common food preparations.

MODULE-II **(12 Hours)**

Planning, preparation and calculation of routine hospital diet – normal diet, clear liquid diet, soft diet and tube feed

MODULE-III **(18 Hours)**

Planning, preparation and calculation of high calorie diet – Tuberculosis, underweight, cancer, anaemia Planning, preparation and calculation of low calorie diet – obesity, diabetes, atherosclerosis and hypertension

MODULE-IV **(14 Hours)**

Planning, preparation and calculation for gastro intestinal diseases–Diarrhoea, constipation, peptic ulcer and ulcerative colitis

MODULE-V **(14Hours)**

Planning, preparation and calculation for renal diseases – Glomerulonephritis and Nephrotic syndrome and acute renal failure

MODULE-VI **(8Hours)**

Planning, preparation and calculation for liver diseases – Hepatitis, Cirrhosis

SEMESTER V

Course Code	Course Title	Credits	Course Type
ND5B11B20	Public Health and Community Nutrition	4	Core Course
ND5B12B20	Nutritional Epidemiology	3	Core Course
ND5BP04B20	Community Nutrition Practical	4	Core Course
ND5B13B20	Human Rights and Environmental Studies	4	Core Course
ND5D01aB20	Health and Nutrition	3	Open Course
ND5D01bB20	Food Adulteration		
ND5D01cB20	Basic Life Support		

SEMESTER V

CORE COURSE

ND5B11B20- PUBLIC HEALTH AND COMMUNITY NUTRITION

Total Credits: 4

Total Lecture Hours: 90 hrs

Course Outcomes:

CO1: Explain different assessment methods to implement nutritional status in a community

CO2: Establish the various phases in nutrition education programme and different channels of communication in public health education

CO3: Summarize nutrition related policies and programmes in a community

CO4: Generalize various National and International agencies to combat malnutrition

CO5: Observe various nutritional problems of a community and determine the programmes and strategies to prevent nutritional deficiencies

CO6: Identify the major hazards caused in the health and nutritional status of a population

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	2	1	2
CO2	1	3	2	1	2
CO3	1	3	2	3	1
CO4	1	3	2	1	1
CO5	1	2	2	1	1
CO6	1	3	2	1	1

Syllabus Content

MODULE-I **(10Hours)**

Definition of public health nutrition -Direct and indirect assessment of nutritional status in individuals and population: Direct: Anthropometry, biomarkers, clinical assessment and dietary assessment- methods and their advantages and disadvantages. Indirect: Morbidity and Mortality.

MODULE-II **(10Hours)**

Nutrition Education- definition, objectives, conceptualization phase, formulation phase, implementation and evaluation of education program.

MODULE-III (12 Hours)

Communication in public health education- key elements and barriers of communication, Edgar Dale Cone of experience and its importance. Principles of communication. Aids in communication: audio aids, visual aids and audio visual aids in communication. Channels of communication- individual method, group method, mass method, traditional method.

MODULE-IV (11 Hours)

Nutrition related policies and programs- Health, nutrition and family welfare through XII five year plan; ICDS- objectives and services; Public Distribution System; National nutrition mission (Poshan Abhyan); National Food Security Act; National Food for Work Program.

MODULE-V (13Hours)

National and International agencies to combat malnutrition- International agencies- WHO, FAO, UNICEF, Aim and functions. National- ICAR, ICMR, NIN, NFI, FNB, CFTRI, NNMB, NSI, DFRL- Aim and functions.

MODULE–VI (13 Hours)

Nutritional problems of the community- Common problems in India - Causes - Nutritional and non-nutritional. Incidence of nutritional problems, signs and symptoms – PEM, Micro-nutrient deficiencies (Vitamin A, Iron, Iodine), Fluorosis. Non nutritional problems: cholera, diarrhoea, dysentery

MODULE-VII (7 Hours)

Strategies to combat nutrition deficiencies-prophylaxis programs against Micro nutrient deficiencies (Vitamin A, Iron, Iodine).

MODULE-VIII (7 Hours)

Hazards to community health and nutritional status -Adulteration in food. Pollution of water Industrial effluents, sewage Pesticide residues in food, Nutrition education -Scope, Objective, Methods available and evaluation. Nutrition policy in India and plan of action

MODULE IX (7 Hours)

Food fortification, restoration and enrichment, immunization programmes, Hard water and soft water and the methods to remove the harness of water.

SEMESTER V

CORE COURSE

ND5B12B20 - NUTRITIONAL EPIDEMIOLOGY

Total Credits: 3

Total Lecture Hours: 90 hrs

Course Outcomes:

CO1: Discuss the history, scope and challenges of nutritional epidemiology

CO2: Compare the various nutritional epidemiology study designs

CO3: Discuss the statistical terms and data interpretation related to nutritional epidemiology

CO4: Identify the role of biomarkers, biochemical indicators, dietary assessment and evidence-based approach in nutrition and policy making

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	1	2	2
CO2	1	2	2	1	2
CO3	1	2	1	2	2
CO4	1	3	1	3	2

Syllabus Content

MODULE-I **(14 Hours)**

History and scope for nutritional epidemiology. Nutritional epidemiology: Definitions of "Epidemiology" and "Nutritional epidemiology". Aims, objectives and concerns: possibilities and challenges. Exposure and outcome: definition, examples and interrelationship. Causality and causal criteria in nutritional epidemiology: Hills' criteria.

MODULE II **(14 Hours)**

Types of epidemiological study designs: hypothesis generating: case studies, case series, cross-sectional & ecological studies. Hypothesis testing: case controls, cohorts, randomized control

trials. meta analysis and systematic reviews (Advantages and disadvantages in each design, with 2 examples).

MODULE III **(14 Hours)**

Nutrition Biomarkers, Data interpretation: incidence, prevalence, mortality, OR, RR, RRR, CI, correlation, confidence Interval, p – value, power and sample size calculation.

MODULE-IV **(12 Hours)**

Interpreting epidemiological associations: concepts of chance, bias, confounding with examples.

MODULE-V (14 Hours)

Nutritional Epidemiology in Public Health Practice: Assessing the Usual Intake of a Population, References for Assessing Dietary Intake in Populations, Impact of Under-Reporting of Intake, Consequences of Within-Person Variability in Other Areas of Public Health Nutrition Practice. Hierarchy of evidence in nutritional epidemiology and its role in policy making with two examples.

MODULE-VI **(12 Hours)**

Biochemical Indicators of Dietary Intake. Importance of evidence-based approach in nutrition with 2 examples.

MODULEVII **(10 Hours)**

Nutritional epidemiology of type 2 diabetes in India.

SEMESTER V

CORE COURSE

ND5B13B20 - HUMAN RIGHTS AND ENVIRONMENTAL STUDIES

Total Credits: 4

Total Lecture Hours: 90 hrs

Course Outcomes:

CO1: Discuss the ecosystem and different resources in nature.

CO2: Explain conservation of biodiversity, environmental pollution and Environment Protection Act.

CO3: Explain environmental issues and ethics.

CO4: Explain the physiological changes and nutritional needs in space, high altitude and sea voyage.

CO5: Describe basic aspects related to human rights and environment conservation.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	1	1	1	1	1
CO2	1	1	1	1	1
CO3	1	1	1	1	1
CO4	1	3	1	2	1
CO5	1	1	1	1	1

Syllabus Content

MODULE-I **(18 hours)**

- Multidisciplinary nature of environmental studies: Definition, scope and importance, Need for public awareness.
- 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

Role of individual in conservation of natural resources.Equitable use of resources for sustainable life styles.

- 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 given ecosystem:- Forest ecosystem

MODULE-II **(26 Hours)**

Biodiversity and its conservation: Introduction, Bio geographical classification of India Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega-diversity nation, Hot- spots of biodiversity Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India

Environmental Pollution: Definition, Causes, 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. Social Issues and the Environment, 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 Consumerism and waste products Environment Protection Act, Air (Prevention and Control of Pollution) Act Water (Prevention and control of Pollution) Act Wild life Protection Act, Forest Conservation Act Issues involved in enforcement of environmental legislation, Public awareness

MODULE-III (14 Hours)

Space Nutrition: Physiological changes during space flight, types of space foods, space shuttle food system, and essential quality criteria required for space foods.

MODULE- IV (14 Hours)

Nutrition In High Altitude: Physiological Changes, Nutritional Requirement, Food supplements, special foods. Sea voyages: Food on board, possible socio cultural and psychological causes for malnutrition, psychosocial and physical stress, diet pattern.

MODULE– V (18 hours)

- Human rights Human Rights– An Introduction to Human Rights, Meaning, concept and development, Three Generations of Human Rights (Civil and Political Rights; Economic, Social and Cultural Rights).

- Human Rights and United Nations – contributions, main human rights related organizations - UNESCO, UNICEF, WHO, ILO, Declarations for women and children, Universal Declaration of Human Rights
- Human Rights in India – Fundamental rights and Indian Constitution, Rights for children and women, Scheduled Castes, Scheduled Tribes, Other BackwardCastesandMinorities
- Environment and Human Rights - Right to Clean Environment and Public Safety: Issues of Industrial Pollution, Prevention, Rehabilitation and Safety Aspect ofNewTechnologies such as Chemical and Nuclear Technologies, Issues of Waste Disposal, Protection of Environment Conservation of natural resources and human rights: Reports, Case studies and policy formulation. Conservation issues of western ghatsmention,Gadgil committee report.Kasthurirengan report. Over exploitation of ground water resources,marine fisheries, sand miningetc.

SEMESTER V

CORE COURSE

ND5BP04B20 - COMMUNITY NUTRITION PRACTICAL

Total Credits: 4

Total Lecture Hours:108 hrs

Course Outcomes:

CO1: Determine the anthropometric measurements of preschool children using various assessment methods.

CO2: Articulate the prevalence rate of different diseases by conducting nutritional surveys in rural areas.

CO3: Develop nutrition awareness among communities by conducting public awareness classes.

CO4: Construct various effective communication aids to provide awareness

CO5: Collect information on community nutrition and report on the outcome of the implemented programme

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO	PSO5
CO1	1	3	3	2	2
CO2	1	3	3	2	2
CO3	1	3	3	2	2
CO4	1	3	3	2	2
CO5	2	3	3	1	2

Syllabus Content

MODULE-I **(27 Hours)**

Anthropometric measurement of Preschool children -Measure and record the weight, height, head circumference, MUAC of the pre-school children in an institution

MODULE-I1 **(27 Hours)**

Survey -Conduct a survey in a nearby rural area to detect the prevalence rate of different disease conditions

MODULE–III **(27 Hours)**

Nutrition awareness class -Each student should take a class on nutrition/ dietetics in a rural area in collaboration with government/ non- governmental organization

MODULE-IV **(27 Hours)**

Development of visual aids - Development of visual aids for suitable for the problems identified during survey in module I

SEMESTER V

OPEN COURSE 1

ND5D01aB20 - HEALTH AND NUTRITION

Total Credits: 3

Total Lecture Hours – 72 hrs

Course Outcomes:

CO1: Describe different food groups, nutrients and their functions.

CO2: Explain malnutrition, anaemia, obesity and vitamin A deficiency.

CO3: Discuss on different anthropometric measurements.

CO4: Describe the dietary management of degenerative diseases.

Syllabus Content

MODULE I **(22 Hours)**

Food- Definition, function, basic food groups. Nutrition-definition, types of nutrition-Carbohydrates, protein, fat, vitamins and minerals-their functions, sources and deficiencies, importance of breakfast.

MODULE II **(18 Hours)**

Malnutrition- symptoms, causes and preventive measures of protein energy malnutrition, Vitamin A deficiency, Anaemia, Obesity.

MODULE III **(14 Hours)**

Anthropometric assessment-height, weight, body mass index, head circumference, mid arm circumference, Skinfold thickness.

MODULE IV **(18 Hours)**

Dietary management of degenerative diseases-Diabetes mellitus, Hypertension, Cardio vascular diseases.

SEMESTER V

OPEN COURSE 2

ND5D01Bb20 - FOOD ADULTERATION

Total Credits: 3

Total Lecture Hours – 72 hrs

Course Outcomes:

CO1: Discuss on food adulteration, common adulterants and its detection.

CO2: Explain different food additives.

CO3: Describe different food colours and sweeteners, its detection and health hazard.

CO4: Observe different food safety measures and quality control.

Syllabus Content

MODULE 1 **(22 hours)**

Adulteration-Food adulteration-definition,types,natural toxins-naturally occurring toxicants in plants,mycotoxins,metal contaminants,pesticide residues,presence of extraneous material,residue from processing and packaging material,common adulterants and its detection,ffod grains,wheat flour,Bengal gram flour,dhal,sweet meat,milk and milk products,edible oils,ghee or butter,sugar,jaggery,honey,tea,coffee,soft drinks,spices and condiments.

MODULE II **(18 hours)**

Food additives-BHA or BHT ,MSG,hydrolysed vegetable protein or autolysed yeast extract,potassium bromate,propyl gallate,sulfites,sodium nitrate,sodium benzoate,hydrogenated or partially hydrogenatedoils.

MODULE III **(18 hours)**

Food colours and seeteners-Detection and health hazards of brilliant blue,indigo,carmine,citrus red ,fast green,erthrosine,allura red,tartrazine,sunset yellow,food sweetners: high fructose corn syrup,aspartame,sucrolase,saccharin,neotame,sorbitol and certified sweetners.

MODULE 1V **(14 hours)**

Food safety measures and quality control-National agencies regulating food quality and safety.

Indicators of food quality-HACCP and Food standards:AGMARK ,BIS,ISI,FPO.

SEMESTER V

OPEN COURSE 3

ND5D01Cb20-BASIC LIFE SUPPORT

Total Credits: 3

Total Lecture Hours – 72 hrs

Course Outcomes:

CO1: Explain basic life support and activation of the emergency response system.

CO2: Illustrate CPR, chest compressions.

CO3: Apply BLS during choking, road accidents.

CO4: Determine primary care during snake bite, other bites, sting, burns, scalds and electric shock.

Syllabus Content

MODULE 1 **(11 hours)**

Introduction to basic life support, Recognition of sudden cardiac arrest and activation of the emergency response system, Learn to look for arterial pulse, Learn to look for breathing patterns.

MODULE II **(15 hours)**

CPR-Adults,Infants,Chest compressions:Hands on training,Rescue Breaths,Early Defibrillation with an AED,Recovert position.

MODULE III **(10 hours)**

BLS during choking,Relief of Foreign-Body Airway Obstruction.

MODULE IV **(9 hours)**

Snake bite:Primary care,other bites and stings:primary care

MODULE V **(9 hours)**

BLS during road accidents:Log roll,helmet removal,spine fractures,Basic traumavictim management,Basic wound management.

MODULE V1 **(9 hours)**

Burns,scalds,electric shock

MODULE V11 **(9 hours)**

Basics of Heart attack,stroke,hypoglycemia,hypothermia

SEMESTER VI

Course Code	Course Title	Credits	Course Type
ND6B14B20	Food Microbiology	4	Core Course
ND6B15B20	Essentials of Entrepreneurship	3	Core Course
ND6B16B20	Nutrition In Health and Fitness	4	Core Course
ND6BP05B20	Food Microbiology Practical	2	Core Course
ND6B17aB20	Food Technology and Preservation	3	Choice Based Course
ND6B17bB20	Human Development		
ND6B17cB20	Extension Education		
ND6PRB20	Project	4	Core Course
ND6BI01B20	Hospital Internship	3	Core Course

SEMESTER VI

CORE COURSE

ND6B14B20 –FOOD MICROBIOLOGY

Total Credits: 4

Total Lecture Hours: 90

Course Outcomes:-

CO1: Summarize about general morphology and growth curve of microorganisms
CO2: Describe different food borne diseases
CO3: Explain the general principles underlying spoilage of food
CO4: Explain microbiology of different foods
CO5: Generalize on food contamination and other food hazards

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	1	1	1
CO2	1	3	1	1	1
CO3	1	3	1	1	1
CO4	1	3	1	1	1
CO5	1	3	1	1	1

Syllabus Content

MODULE–I **(9 Hours)**

Introduction to microbiology and its relevance to everyday life- General morphology of microorganisms – General characteristics of bacteria, fungi, virus, protozoa, algae. The relationship of microorganisms to sanitation, Role of microbiology-Environment effects of microbial growth. Effects of micro- organisms on food degradation and food borne illness – Bacteria, Virus, Molds, Yeasts and parasites.

MODULE–II (13 Hours)

Control of microorganisms growth curve – Effect of environmental factors on the growth of microorganisms-pH, water activity – oxygen availability, temperature and others.

MODULE–III (15 Hours)

General Principles Underlying Spoilage of Food- Fitness or unfitness of food for consumption – causes of spoil age – classification of foods by ease of spoilage – factors affecting kinds, numbers and growth of microorganisms in food chemical changes caused by microorganisms

MODULE–IV (15 Hours)

Food borne diseases– Sources of contamination of foods toxic production and physiological action. Sources of infection of foods by pathogenic organisms, symptoms and method of control,Beneficial effect of microorganisms. Relevance of microbiological standards for food safety.

MODULE–V (15 Hours)

Food contamination-Naturally occurring toxicants-animal sources and plant sources.Environmentalcontaminants-biological and non- biological sources Other agents of contamination -Human, domestic animals, vermin's, birds.

MODULE–VI (15 Hours)

Microbiology of different foods – Spoilage and contamination- Sources, types, effects on the following: Cereals and Cereals products, Sugar and Sugar products, Vegetables and Fruits., Meat and Meat products, Fish and other sea foods, Eggs and Poultry, Milk and Milk products, Canned and other processed foods.

MODULE–VII (8 Hours)

Other food hazards – chemicals, antibiotics, hormones, metals contamination – poisonous foods.

SEMESTER VI

CORE COURSE

ND6B15B20 - ESSENTIALS OF ENTREPRENEURSHIP

Total Credits: 3

Total Lecture Hours: 90

Course Outcomes: -

CO1: Explain the concept and essentials of entrepreneurship
CO2: Discuss the factors contributing to entrepreneurship and challenges involved
CO3: Summarize various business plans and strategies
CO4: Develop the skills and potential for E- Entrepreneurship

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	1	1	2
CO2	1	1	1	1	2
CO3	1	1	1	1	2
CO4	1	1	1	1	3

Syllabus Content

MODULE–I

(14 Hours)

Introduction to entrepreneurship - concept, definition, functions of an entrepreneur, characteristics of a successful entrepreneur.

MODULE-II

(18Hours)

Factors contributing to entrepreneurship – economic factors (capital, labor, market), noneconomic factors (social condition- psychological factors- cultural factors-personality factors- government action – competitive factors)

MODULE-III **(18 Hours)**

Entrepreneurship and women empowerment– concept of women entrepreneur- problems – approaches to women empowerment-indicators- global initiatives – national initiatives (welfare and support services, socio-economic programme)

MODULE-IV **(20 Hours)**

Business plan and strategies – entry strategy (opening new business, purchasing franchises, acquiring an existing business) exit strategy, franchising- types, benefits, drawbacks. Export documentation – principle documents, auxiliary documents, mode of payment, and mode of transportation.

MODULE–V **(20Hour)**

E- Entrepreneurship – selling on internet, planning an e- business, niche marketing and the internet, marketing and e-business, e-business customer servic

SEMESTER VI

CORE COURSE

ND6B16B20 –NUTRITION IN HEALTH AND FITNESS

Total Credits: 4

Total Lecture Hours: 90

Course Outcomes:-

CO1: Describe the basic relationship with nutrition and fitness and the basic aspects of health and fitness
CO2: Discuss the role of physical exercise in musculoskeletal and cardiorespiratory systems
CO3: Identify the substrates for exercise and the role of nutrition during various events.
CO4: Summarize the exercise regime for various conditions.
CO5: Develop exercise prescription for various lifestyle diseases.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	1	3	1
CO2	1	1	1	3	1
CO3	1	2	2	3	1
CO4	1	2	1	3	1
CO5	1	3	2	2	1

Syllabus Content

MODULE I **(10 Hours)**

Introduction to Fitness and Training Benefits of Exercise: Parameters of fitness, fitness tests, Holistic approach to management of health and fitness including diet and exercise (Aerobic and anaerobic), energy production, Alternative systems for Health and fitness.

MODULEII **(12 Hours)**

Musculo-skeletal Systems Types of Skeletal muscles fibre, Effect of anaerobic exercise on musculoskeletal system, Endurance, strength/ Power, Speed, Coordination, agility, balance.

MODULEIII (14 Hours)

Cardio--respiratory System: Effect of aerobic exercise on heart rate, blood pressure and lung function, Assessment of Cardio-respiratory fitness using Maximum aerobic capacity (VO2max), Assessment of coronary risk profile- RISKO factor , Recognizing symptoms to stop any exercise. Emergency procedures.

MODULEIV (8 Hours)

Substrate for exercise Utilization of lipid and carbohydrate in relation to exercise type, intensity and duration.

MODULEV (14 Hours)

Sports Nutrition: Overview, Nutritional requirements and recommendations, pre event and post event meal, water and electrolyte balance**,** Regime of hydration and dehydration. Symptoms and effect of dehydration. Sports Drink.

MODULE VI (12 Hours)

Effect of Specific Nutrients on Work Performance: Nutritional requirements during exercise, Effect of specific nutrients during exercise- carbohydrate, protein, fat, iron, calcium, vitamins, consumption pattern -Merits and demerits of nutragenic aids and supplements**.** Ergogenic Aids- physical, chemical and mechanical, Use and Abuse of Dietary Supplements

MODULE VII (10 Hours)

Exercise prescription in Special Conditions: Exercise regime for pre and post-natal fitness, Obesity and weight control – Prevention of weight cycling, Diabetes, Hypertension and Coronary Heart Disease, Osteoarthritis and Osteoporosis, Spondylitis Back aches.

MODULE VIII (10 Hours)

Formulating dietary guidelines: Fitness and health Obesity management and critically analyzing different established weight reduction diet plans. Management of diabetes mellitus and management of CVD.

SEMESTER VI

CORE COURSE

ND6BP05B20 - FOOD MICROBIOLOGY PRACTICAL

Total Credits: 2

Total Lecture Hours: 90

Course Outcomes:-

CO1: Practice the handling of glassware and equipment commonly used in food microbiology.
CO2: Examine various microorganisms
CO3: Practice the preparation of common laboratory media and various plating techniques
CO4: Determine the quality of water using microbial analysis

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1U	PSO2U	PSO3A	PSO4U	PSO5A
CO1A	1	2	1	1	2
CO2A	1	2	1	1	2
CO3A	1	2	2	1	2
CO4A	1	3	2	1	2

Syllabus Content

MODULE I **(10 Hours)**

Use of equipment: Handling of Glasswares and Equipment: Microscope, Autoclave, Laminar airflow, Incubator

MODULE II **(15Hours)**

Preparation of Slides: bacterial smears, simple staining, differential staining, staining of yeast and molds

MODULE III **(18 Hours)**

Morphological identification of common food microorganisms: Mucur, Rhizopus, Aspergillus, Pencillium, Fusarium, Alternaria, Cladosporium

MODULE IV **(15 Hours)**

Preparation of common laboratory media: Cultivation of bacteria, yeast and molds. Use of usually available media for cultivation

MODULE V **(17 Hours)**

Isolation of microorganisms: By pour plate method (dilution), spread plate and streak plate method

MODULE VI **(15Hours)**

Demonstration: Microbial analysis of water for enumeration of standard plate count and coliform count

SEMESTER VI

CHOICE BASED CORE COURSE

ND6B17aB20 - FOOD TECHNOLOGY AND PRESERVATION

Total Credits: 3

Total Lecture Hours: 90

Course Outcomes:-

CO1: Generalize the scope and current trends of food technology and various principles of food preservation methods

CO2: Apply different high osmotic pressure, high and low temperature preservation techniques in food industry

CO3: Determine the effects of chemical preservatives in food industry

CO4: Generalize the role of different traditional and modern methods of drying used in food technology and identify different food additives and action in food.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	1	1	2
CO2	1	2	1	1	3
CO3	2	3	2	1	2
CO4	1	2	2	2	2

Syllabus Content

MODULE-I **(15 Hours)**

Introduction to Food Technology- Definition, scope and current trends in food science and technology

MODULE-II **(13Hours)**

Principles of Food Preservation- Importance and principles of food preservation Need for preservation, types of spoilage, role of microorganism in food spoilage, prevention of food spoilage, shelf life of food products, Factors affecting shelf life.

MODULE-III **(10Hours)**

Preservation by High Osmotic Pressure- High concentration of sugar, Procedure for fruit jelly and jam, fruit preserves, failure to jelly and jam to set. High concentration of salt-Pickling and curing of meat. Fermentation, Types, advantages and factors affecting fermentation

MODULE-IV **(7 Hours)**

Preservation by use of high temperature- Factors affecting heat resistance, canning procedures, spoilage of canned foods, heat sterilization and pasteurization.

MODULE-V **(10 Hours)**

Preservation by use of low temperature-Refrigeration-Advantages,factors to be considered, common spoilage. Freezing-Difference between refrigeration and freezing, methods of freezing steps involved in freezing.

MODULE-VI **(10 Hours)**

Preservation by using chemicals- Definition, classification, mode of action, mechanism, Food irradiation, Properties and safety of irradiation, advantages, mechanism permitted doses.

MODULE-VII **(15 Hours)**

Drying and dehydration- Home drying, methods of dehydration, factors in the control of drying, treatment of foods before drying, procedures after drying, intermediate moisture foods, merits and demerits, factors affecting drying.

MODULE-VIII **(10 Hours)**

Food additives – Definition and classification, Citric Acid – Sources, preparation, uses. Permitted colour, flavour, stabilizer, emulsifier, antioxidants etc. Safety and need for use. Different additives used commonly in food, functions.

SEMESTER VI

CHOICE BASED CORE COURSE

ND6B17bB20- HUMAN DEVELOPMENT

Total Credits: 3

Total Lecture Hours: 90

Course Outcomes

CO1: Generalize different methods of studying human development.
CO2: Explain different stages of human development.
CO3: Interpret the multiple contexts and psycho-social dimensions of childhood.
CO4: Explain education, nutrition and health in early childhood.
CO5: Discuss various development and socio-cultural influences on adolescents.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	1	1	1	2
CO2	1	2	2	3	2
CO3	1	1	1	1	1
CO4	1	2	1	1	2
CO5	1	2	1	1	2

Syllabus Content

MODULE-I **(11Hours)**

Approaches to the study of human development – Longitudinal and Cross –Sectional, Methods of studying human development – Observation, Interview and Questionnaire, Principles of development. Roles of heredity and environment in human development

MODULE-II **(17Hours)**

Human Development: Conception through Early Childhood-Infant Development - (Newborn – One Year) -The important development for babies , Characteristics of human childhood, Prenatal

Development - Conception; Course of prenatal development, Conditions affecting prenatal development, Infancy- Characteristics, Developmental tasks and Problems, Toddler Development (1 – 3 years old) -The language skill development. Pre-schooler Development (3 – 5 year olds) - Physical, emotional, intellectual and social development. Middle Childhood Development - (6-11 years)-Motor Skill Development.

MODULE-III (15Hours)

Multiple contexts of childhood in India- Ethnic, religious, regional, social, economic and ecological variations, Childhood in families; Growing up without the family, Children in schools; Children in extra-familial settings.

MODULE-IV (14Hours)

Psycho-social dimensions of childhood- Growing up in a tribal family; Childhood in selected family occupations: artists, farmers, weavers; Growing up in a rural setting, Children on the streets, Belonging to a minority community, Being a girl in India; Adoption and childhood.

MODULE-V (15Hours)

Early childhood care and education- Features of physical social environments promoting all round development in young children, Activities and methods of playful interactions to foster development in children birth –two years, Understanding childhood nutrition and health, Teaching concepts in childhood, Enhancing social and language skills and Music, movement and drama for children.

MODULE-VI (18Hours)

Adolescent development (12 – 18 years)- Adolescence– Definition, Concept of adolescence, Significance and Developmental tasks of adolescence, Moving towards a unique identity, Physical Development, Cognitive Development and Changes in the Brain, Identity Exploration, Self-Concept. Psychological changes, Parental Relationships, Cultural and Societal Influences on Adolescent Development

SEMESTER VI

CHOICE BASED CORE COURSE

ND6B17cB20- EXTENSION EDUCATION

Total Credits: 3
Total Lecture Hours: 90
Course Outcomes

CO1: Generalize on various audio visual aids, principles and methods, concept, components and role of extension in developing education
CO2: Explain the types, advantages and disadvantages of extension system
CO3: Summarize the goals, strategies, structure and achievements of national and international developmental programmes
CO4: Generalize different national developmental programmes and communication strategies in development programmes

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	3	2	1	2
CO2	1	3	2	2	2
CO3	1	3	1	1	1
CO4	1	3	2	1	2

Syllabus Content

MODULE-I (18Hours)

Concept of Extension- concept, goals and history, components of Extension. Relationship between communication and extension - role of extension in development Adult learning

MODULE-II (17 Hours)

Communication for Extension- nature and philosophy of Extension Principles of Extension Methods and Media of community outreach; Audio-Visual aids- concept, classification, characteristics and scope. Relationship between Communication, Extension and Development.

MODULE-III (17Hours)

Methods and Approaches of Extension - Stakeholders in development people's participation and social mobilization in development. Extension systems- types, advantages and disadvantages,

Diffusion of innovation and adoption. Extension methods and approaches - classification, characteristics and selection.

MODULE-IV (20Hours)

Development Programmes- Development issues and goals- national and international perspectives, National Development Programmes – goals, strategies, structure and achievements.

MODULE-V (18Hours)

Analysis of contemporary national development programmes- objectives, clients, salient features, outcomes and communication support. Behaviour Change Communication strategies in development programmes.

SEMESTER VI

CORE COURSE

ND6PRB20 - PROJECT

Credits: 4

Total Lecture Hours - 0

Course Outcomes

CO1: Determine the research gap in the field of nutrition and dietetics
CO2: Establish relation between significant variables of research study
CO3: Connect results with supportive evidences
CO4: Focus on intervention strategies based on research findings
CO5: Summarize recommendations for future line of work

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	1	1	3
CO2	1	2	1	1	3
CO3	1	2	2	1	3
CO	1	3	3	1	3
CO5	2	3	2	2	3

SEMESTER VI

CORE COURSE

ND6BI01B20 - HOSPITAL INTERNSHIP

Total Credits: 3

Total Lecture Hours - 0

Course Outcomes

CO1: Analyze case studies of various diet related clinical conditions
CO2: Report the clinical, nutritional and biochemical profile of inpatients and out patients.
CO3: Explain the modification of diet, acceptability, and compliance of patients to therapeutic diet.
CO4: Analyze the cases and infer by presenting the case studies for evaluation.

Mapping of Course Outcomes with Programme Specific Outcomes

Mapping	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	1	2	3	2	2
CO2	1	2	3	2	1
CO3	1	2	3	2	1
CO4	1	2	3	2	1

The hospital internship is for a duration of 1 month. The hospital should be minimum 200 bedded multispecialty with a well-established Nutrition or Dietetics department. Minimum 2 case studies have to done satisfying the following conditions:

- Selection of minimum five inpatients from various specialities
- Study the clinical, nutritional and biochemical profile on admission during hospital stay and at discharge
- Critically evaluate the modification of diet
- Study acceptability and compliance of diet
- Plan sample menu on discharge and follow up for compliance and response to effective diet counseling