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| **Human Nutrition** |
| **Sr. No.** | **Core Areas** | **Percentage** |
| 1. | Advanced Nutrition | 10% |
| 2. | Nutritional Status Assessment | 10% |
| 3. | Nutritional Biochemistry and Physiology  | 15% |
| 4. | Nutrition Through Life Cycle | 15% |
| 5. | Nutritional Epidemiology and Research Methods  | 10% |
| 6. | Community Nutrition | 15% |
| 7. | Dietetics and Preventive Nutrition  | 15% |
| 8. | Advances in Food Sciences | 10% |
|  | **Total** | **100%** |

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| **Human Nutrition (Detailed)** |
| **Sr. No.** | **Core Areas** | **Percentage** |
| **1.** | **ADVANCED NUTRITION****1. Nutrition and its Role in Health:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 6%*** Nutrients and their functions in human body
* Macro and micronutrients and their metabolism
* Role of nutrition in growth and development
* Nutritional requirements during health and disease
* Anti-nutritional factors in food and their role in development of nutritional deficiencies
* Nutritional problems causes, prevention and treatment
* Drug-nutrient interaction and its influence on nutritional status
* Inborn errors of metabolism

**2. Advances in Functional Foods and Nutraceuticals: \_\_\_\_\_\_\_\_\_ 2%*** Introduction to functional food, nutraceuticals and phytochemicals
* Recent advances in functional foods & nutraceuticals
* Delivery of functional ingredients through enriched foods
* Product development, encapsulation or slow release of protected components
* Understanding rapidly changing market place for Nutraceutical and functional food products;
* Interpreting health claims information and regulatory requirements

**3. Advances in Sports Nutrition: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2%*** Energy requirements of athletes, body builders, etc.
* Methods of increasing muscle mass and assessment of the use of sports supplements
* Nutrition for the athletes, stress management, preventing accidents, stretching, posture and aerobics
* Vitamins and minerals supplementation for fitness
* Types of fuels used for exercise and other sports
* Gender specific sports nutrition and gender
* Energy balance, fluid balance, fueling cycle
* Specific eating plans for various categories of athletes like my pyramid- for sports
 | **10 %** |
| **2.** | **NUTRITIONAL STATUS ASSESSMENT****1. Introduction to Nutritional Assessment: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 1%*** Introduction to nutritional status assessment
* Methods of nutritional assessment
* Importance of nutritional assessment

**2. Anthropometric Assessment: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 3%*** Anthropometric Assessment, its application and usefulness
* Classification to categorize malnutrition (under nutrition and over nutrition)
* Anthropometric assessment parameters: Weight, height, skin-fold measurement, mid upper arm circumference, waist circumference, hip circumference, waist to hip ratio

**3. Biochemical Assessment: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 3%*** Biochemical techniques and methods: Theory and practice
* Assessment of nutritional status by biochemical techniques
* Spectrophotometry, chromatography, centrifugation, flame photometry, atomic absorption, analysers like blood chemistry analysers, haematology analysers etc

**4. Dietary and Clinical Methods of Assessment:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 3%*** Introduction and significance of dietary and clinical assessment
* Methods of dietary and clinical assessment
* Classification of dietary assessment methods
* Application of dietary and clinical assessment methods along with merits and demerits
* Clinical assessment associated with nutritional deficiencies of macronutrients, vitamin and minerals
 | **10 %** |
| **3.** | **NUTRITIONAL BIOCHEMISTRY AND PHYSIOLOGY**1. **Nutritional Biochemistry:** **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 8%**
* Course introduction and fundamentals of nutritional biochemistry
* Overview of energy metabolism and effect of under and over energy intake on nutritional status and health
* Carbohydrates: Defination and classification, functions, properties, metabolism, glycemic index, glycemic load, dietary fibre
* Proteins: Definition, classification, properties, functions, metabolism, quality of protein, biochemical role of protein in nutrition
* Lipids / Fats: Defination, classification, properties, functions, metabolism, quality of lipids / fats, biochemical role of fats in nutrition
* Water: Functions and biochemical role of water in human nutrition
* Vitamins: Definition, classification, properties, functions, metabolism, deficiency diseases, biochemical role of fat soluble and water soluble vitamins in human body
* Minerals: Definition, classification, properties, functions, metabolism, deficiency diseases, biochemical role of macro- & micro- minerals in human body
* Enzymes: Definition, classification, mechanism of action of various enzymes, enzyme activity & factors affecting enzyme activity, role of enzymes in nutrition
1. **Physiology:** **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_7%**
* Introduction to human physiology and basic concepts
* Cell: Types of cells, components of cell and their functions, communication between cells, apocrine and paracrine, transport across the cell membrane, cell division, Electrical properties of cells,
* Muscle tissues and muscular system: Types, functions, muscle contractile activities
* Important organs of the body like brain, liver, kidney, heart, stomach, small intestine, large intestine, lungs etc
* Blood and other body fluids: Composition, flow, function, maintenance and regulation
* Human body systems: Various types of systems in their functions (nervous system, circulatory system, cardiovascular system, digestive system, renal system, endocrine physiology
 | **15 %** |
| **4.** | **NUTRITION THROUGH LIFE CYCLE****1. Nutrition During Pregnancy and Lactation \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_3%** * Introduction to pregnancy and lactation with reference to physiological changes
* Nutritional requirements during pregnancy & lactation
* Nutritional status during pregnancy in relation to birth outcome
* Effect of mothers nutritional status on volume and composition of breast milk
* Common nutritional problems associated with pregnancy and lactation
* Dietary/ nutritional recommendations

**2. Nutrition During Infancy:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 3%** * Introduction to growth and development during infancy
* Nutritional requirements during infancy
* Importance of breast milk and supplementary & complementary feeding
* Nutrition for the children at risk
* Common nutrition-linked problems
* Dietary/ nutritional recommendations

**3. Nutrition for Toddlers and Pre-schoolers: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_2%** * Normal growth and development
* Energy and nutrient needs
* Dietary/ nutritional recommendations
* Common nutrition-linked problems
* Food allergies and intolerance

**4. Nutrition for Adolescents : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_2%** * Normal physical growth and development
* Energy and nutrient requirements of adolescents
* Dietary/ nutritional recommendations
* Common nutrition-linked problems
* Eating disorders.

**5. Nutrition for Adults :\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_2%** * Physiological changes
* Maintaining a healthy body
* Common nutrition-linked problems
* Dietary/ nutritional recommendations

**6. Geriatrics Nutrition: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_3%** * Physiological changes
* Nutritional risk factors
* Dietary / nutritional recommendations
* Common nutrition-linked problems
* Nutrition in special clinical conditions
 | **15 %** |
| **5.** | **Nutritional Epidemiology and Research Methods:****1.Epidemiology & Public Health:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 5%*** Introduction and definitions of epidemiology
* Types of epidemiology: clinical, occupational, experimental
* Epidemiological methods and types of studies: Cross sectional, cohort, case control, prospective, retrospective, nested, meta-analysis etc
* Epidemiologic consideration in disease process
* Sampling methodology: procedure, sample size, various sampling techniques, sampling error, bias, risk, data collection of infectious disease cases, antibiotic resistance profile of infectious agents; Screening tests, accuracy of screening tests, predictive value, reliability; hypothesis testing, statistical significance, (p values, confidence interval etc)
* Disease pattern in community and social diversity
* Surveillance and monitoring of diseases
* Applied epidemiology: rationale, strategies and concepts of control and eradication of diseases

**2. Nutritional Intervention Planning: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_2%*** Planning process - assessment of nutritional problems
* Complete nutrition intervention planning and implementation

**3. Research Methods in Human Nutrition:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_3%*** Research process
* Types of research in human nutrition & dietetics
* Various experimental designs and their application in nutrition research designs
* Data analysis techniques in human nutrition
* Various ways and methods of data presentation & interpretation
 | **10 %** |
| **6.** | **COMMUNITY NUTRITION****1. Importance of Community Nutrition: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 3%*** Introduction to community nutrition and its importance
* Scope of community nutrition in preventive health
* Community needs assessment

**2. Professional Approach To Community Nutrition:\_\_\_\_\_\_\_\_\_\_\_\_\_3 %*** Avenues of opportunity in community nutrition
* Requirements for conducting community nutrition research
* Important issues relevant to community nutrition research

**3. Primary Prevention of Diseases: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 3%*** Communicable and non-communicable diseases
* Food-borne illnesses and their prevention
* Food service sanitation procedures
* Preparing for community emergencies

**4. Preventing Nutrition Linked Diseases: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 3%*** Designing and planning community nutrition interventions
* Food security
* Hunger related disorders (Protein energy malnutrition)
* Hidden hunger disorders (Micro-nutrient deficiencies)

**5. Nutritional Education and Awareness: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_3%*** Need for Nutrition Education
* Nutrition education programmes
* Scope and challenges of educating people about eating well
* Implications for competencies and skills for nutrition education
* Understanding communication model:
* Preparing/organizing oral presentations
* Delivering nutrition education workshops
* Nutrition mass media communication campaigns
* Social marketing & ethics in nutrition education
* Non-government and public health organizations relevant to nutrition and their current programmes.
 | **15%** |
| **7.** | **Dietetics and Preventive Nutrition****1. Nutrition, Health and Hospital Dietetics: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 3%*** Background: Dietetics and its role in health and diseases
* Communication and nutrition counselling skills Relationship between nutrition and dietetics
* The hospitalized patient and its nutritional needs
* Introduction to diet therapy and classification of diets

**2. Nutritional care and Management in Chronic Diseases: \_\_\_\_\_\_\_ 3%** * Hypertension
* Cardiovascular diseases
* Diabetes

**3. Disorders of the Gastrointestinal Tract and Nutritional Management \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_2%** * The gastrointestinal tract and its functions
* Disorders of the mouth, pharynx and oesophagus
* Disorders of the stomach and duodenum
* Disorders of the small and large intestine

**4. Nutrition Support during Injury, Surgery and Fever: \_\_\_\_\_\_\_\_ 2%** * Nutritional needs of injury, surgery and fever patients
* Nutrition support-enteral feeding
* Nutritional support-parenteral feeding
* The special needs of patients with burns

**5. Nutritional Care for Disorders of the Liver, Gall-Bladder and Pancreas:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_2%** * Review of normal functions
* Hepatitis/ Cirrhosis
* Hepatic Encephalopathy
* Cholelithiasis and Cholecystitis
* Pancreatitis

**6. Nutritional Care for Renal Diseases \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 3%** * The organs of the urinary system
* Nephritic syndrome
* Glomerulonephritis and nephrosclerosis
* Acute & chronic renal failure
* Haemodialysis
* Renal stones
 | **15%** |
| **8.** | **ADVANCES IN FOOD SCIENCE****1. Advances in Food Science Linked with Nutrition: \_\_\_\_\_\_\_\_\_\_4%*** Advances in functional foods, genetically modified foods, organic foods in relation to their nutritional significance
* Food supplementation, fortification & enrichment
* Food bio-fortification: Bio-fortification techniques, important nutrients & foods as candidates for bio-fortification

**2. Advances in Food Science & Food Safety: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_3%*** Emerging food processing technologies like extrusion technology, irradiation, ohmic heating, high pressure processing, high electric field pulse, ozone processing, modifies atmospheric packaging etc in relation to nutrient stability and shelf life for fats and oil, cereals, dairy, beverage, fruits and vegetables and meat industry
* Emerging food safety issues
* Food additives: Classification, labelling rules, safety issues and their mode of metabolism and excretion from body

**3. Advances in Food Analysis: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_3%**New tools for food analysis: Chromatography (HPLC, GC, GLC, column chromatography, TLC), electrophoresis, FTIR, mass spectrometry and coupling techniques like GC-MS, LC-MS  | **10%** |
|  | **Total** | **100%** |