M.Sc. Nutritional Science
CSJM University, Kanpur

SEMESTER I

Paper NS 101 APPLIED PHYSIOLOGY

Unit – 1

Anatomy & Physiology defined, structural plan, directional terms anatomical positions, anatomical terms, planes and sections, body cavities, abdominopelix regions, abdominopelix quadrants

Cell structure and functions- organelles, tissues, organs brief review

Unit – 2

Nervous System – Review of structure and functions of neuron, conduction of neuro impulse, synapses, role of neurotransmitters.

Organisation of central nervous system, structure and function of brain and spinal cord, afferent and efferent nerves, blood brain barrier, CSF, hypothalamous and its role in various body functions.

Unit – 3

Digestive System – Review of structure and function. Secretory, digestive and absortive functions, role of liver, pancreas and gall bladder motility and hormones of GIT

Excretory System – Structure, function of nephron, urine formation, role of kidney in maintaining pH of blood. Water electrolyte and acid base balance, diuretics.

Unit – 4

Respiratory System – Review of structure and function, role of lungs in exchange of gasses, transport of oxygen and CO_2.

Circulatory System – Structure and function of heart and blood vessels. Regulation of cardiac output and blood pressure, heart failure, hypertension.

Unit – 5

Endocrine System – Structure, function, role of hormones, regulation of hormones secretion. Disorders of endocrine glands.

Reproductive System – Male organs of reproduction, female organs of reproduction. Menstrual cycle, fertilization, physiological changes in pregnancy

Paper NS 102 NUTRITIONAL BIOCHEMISTRY

Unit – 1

Enzymes- Enzymes as biological catalysts, IUB system of classification, concept of active site, specific activity, turnover number, units of enzyme activity. Effect of substrate, concentration velocity of single substrate enzyme catalyzed reaction, Km and Vmax, Graphic method of Km evaluation. Lineweaver Burk plot. Effect of pH and temperature on enzyme catalyzed reaction. Enzyme inhibitors, isoenzymes.

Unit – 2

Biological Oxidation- Enzymes of biological oxidation, redox potential, respiratory chain, oxidative phosphorylation, Mitchell's oxidative phosphorylation.

Unit – 3

Intermediary metabolism and its regulation – carbohydrate: glycolysis, HMP shunt pathway, glucogenesis.

Lipid: β oxidation, pathway of fatty acid catabolism, denovo synthesis of fatty acid. Metabolism of ketone bodies, cholesterol metolism.

Unit – 4

Protein: An overview of protein metabolism, general reaction of protein catabolism, urea cycle, protein biosynthesis.

Unit – 5

Vitamins and minerals- biological role, absorption.

Paper NS 103 ADVANCED NUTRITION

Unit – 1

Body Composition: Concept of body composition, biochemical composition of body, body composition as measured by the nutritionist, techniques of measurement. Nutritional Anthropometry & Calculation of body density. Direct measurement using Archimede's Principle, calculation of percent body water & body fat from body density. Dilution technique & calculation of indices of body composition, concept of body cell mass, lean body weight & fat free body, application of body composition data.

Unit – 2

Energy concepts of foods, physiological fuel value-review. Measurement of energy expenditure: BMR, thermic effect of feeding & physical activity, methods of measurement. Estimating energy requirements of individuals & groups.

Unit – 3

Proteins: protein quality, methods of evaluating protein quality, protein and amino acid requirements. Therapeutic applications of specific amino acids: Branched chain, glutamine, arginine, homocysteine, cysteine, taurine

Unit – 4

Non-nutritive food components with potential health effects: polyphenols, tannins, phytates, phytoestrogens, cyanogenic compounds lectins & saponins.

Unit – 5

Nutrition, Immunity & Infection

Nutrition & Stress

Paper NS 104 ADVANCES IN FOOD MICROBIOLOGY

Unit – 1

Food as a substrate for microorganisms- pH, moisture oxidation-reduction potential, nutrient content, inhibitory substance and biological structure.

Microorganism of importance in food- their classification, morphology, growth and reproduction, industrial importance.

Unit – 2

Methods of isolation and detection of microorganisms or their products in food

Conventional methods, Rapid methods (newer techniques), Immunological methods, Chemical methods.

Unit – 3

Spoilage of Food: sources of contamination, soil, water, air, animal, plants, humans, sewage, equipment, ingredients product to product.

Spoilage of different groups of food: cereal and cereal products, vegetables and fruits, meat and meat products, egg and poultry, fish and other sea foods, milk and milk products, canned foods.

Unit – 4

Food preservation: physical methods, chemical methods and biological based preservation systems.

Food borne diseases: Bacterial and viral borne diseases, food borne important animal parasites, mycotoxins.

Unit – 5

Role of microbes in fermented and genetically modified foods.

SEMESTER II

Paper NS 201 RESEARCH METHODS, STATISTICS & COMPUTER APPLICATION

Unit – 1

Definition and identification of research problem, justification, hypothesis, assumptions, limitations and delimitations of a problem. Research design: principles, purpose application, exploratory and descriptive, survey and case study. Qualitative research methods: theory and design, types, methods and techniques of data collection. Types of variables and data gathering instruments.

Unit – 2

Conceptual understanding of statistical measures. Classification and tabulation of data. Measurement of central tendency, measure of variation. Frequency distribution, histogram, frequency, polygons, ogive. Theory of probability, probability sampling: two stage and multi stage sampling, cluster sampling. Non-probability sampling.

Unit – 3

Binomial and normal Distribution; Normal Probability Curve; Testing of hypothesis: significance level, confidence limit. Parametric and non parametric tests; Chi square test, t-test, f-ratio, analysis of variance-one way and two way classification. Correlation, coefficient of correlation, rank correlation. Reliability of mean, standard deviation and predictions; experimental designs- completely randomized design, randomized block design, latin square design, factorial design, trend analysis.

Unit – 4

Introduction to computers and its classification: what is computer, functional units of computer, its characteristics, history, generation, classification according to data processing mode and according to size/function, hardware, software, input devices: key board, mouse, bar code readers, optical card readers, magnetic ink correcter reader, smart cards. Output devices: Monitor, printer.

Unit – 5

Primary and secondary storage devices, data processing concepts, introduction to storage devices, characteristics, main memory, secondary storage. Data information and data processing. Representation of information , number system (binary, octal, decimal, hexadecimal) and their conversions. Bits, bytes, kilobyte, megabyte, gigabyte. Application of computers.

Paper NS 202 FOOD SCIENCE

Unit – 1

Physical & Physiological changes in food. Colloidal chemistry as related to food emulsions, foams, sols & gels, osmotic pressure. Enzymatic browning of immobilized enzymes & enzymes in food processing. Denaturation of protein.

Unit – 2

Pigmentation of colours in foods: Flavours and visual appearance, texture sensation & flavour compounds. Leavening products & agents.

Unit – 3

Food quality : sensory evaluation. Non nutritional constituents and food safety. Food adulteration & control of food quality

Unit – 4

Food additives: Meaning, need of food additives.

Antioxidants, chelating agents, colouring agents, curing agents. Nutrient supplements, Non nutritive sweetners, pH control agents. Preservatives, stabilizers and thickners, other additives. Additives & food safety.

Unit – 5

Introductory concept of product & process development. Experimental preparation of foods, recipe formation, products development and evaluation.

NS 203 PROBLEMS IN HUMAN NUTRITION

Unit – 1

Historical background, prevalence, etiology, biochemical and clinical manifestations, preventive and therapeutic measures for the: PEM, Vitamin A deficiency, Nutritional anemia

Unit – 2

Historical background, prevalence, etiology, biochemical and clinical manifestations, preventive and therapeutic measures for: Rickets, osteomalacia or osteoporosis, Beri-beri, Scurvy, Fluorosis.

Unit – 3

Nutrition for cancer- Introduction, cases, symptoms, nutritional considerations, dietary counseling.

Unit – 4

Chronic Alcoholism- effects on digestion, & absorption alteration of nutrient metabolism, Alcohol-nutrient interactions, complications, associated, nutritional therapy.

Unit – 5

Risk Factors, Prevalence, Etiology, clinical manifestation and dietary management of : Obesity, Cardiovascular Diseases, Diabetes Mellitus

Paper NS 204 GERIATRIC NUTRITION

Unit – 1
Meaning of Ageing, The ageing process- physiological, biochemical and body composition changes.

Unit – 2
Socio-psychological aspects of ageing- special problems of elderly women.

Unit – 3
Nutritional requirements of elderly and dietary management to meet nutritional needs.

Unit – 4
Diseases and nutritional problems of elderly, their symptoms, management, prevention & control.

Unit – 5
Policies & programmes of the government & NGO sector pertaining to the elderly.

SEMESTER III

Paper NS 301 CLINICAL & THERAPEUTIC NUTRITION

Unit – 1
Adaptation of normal diet, progressive diet-General & Modified Diets.

Unit – 2
Nutritional support- special feeding methods.

Unit – 3
Incidence, etiology, pathology & metabolic aberrations, clinical manifestations, complications, dietary management & counseling of: Surgery & burns. Gastro-intestinal- upper GIT, small intestine, large bowel. Liver & Gall bladder. Allergy

Unit – 4
Etipathophysiology, metabolic aberrations, complications, prevention and dietary management of: Cardioascular, Renal, Metabolic- Diabetes and Gout. Neurological disorders.

Unit – 5
Disorders including inborn errors of metabolism & nutritional management.

Paper NS 302 INSTITUTIONAL FOOD ADMINISTRATION

Unit – 1
Introduction of food service systems and their development.

Unit – 2
Management- Definition, principles & functions of catering management, tools, styles, theories of management, organization charts and its types.

Unit – 3
Space, equipment & material management. Planning Layouts. Determining equipment, selection, placement maintenance & layout of equipment. Menu planning, Planning of material needed, its detection, storage, quantity food production.

Unit – 4
Personnel management- Manpower planning, placement, recruitment, induction, training, motivation & performance appraisal.

Unit – 5
Quality assurance, food quality, food laws & standard

Paper NS 303 FOOD PROCESSING AND TECHNOLOGY

Unit – 1

Physical principles in Food Processing Operations: Food deterioration, methods of preservation and processing- Thermal processing, refrigeration, freezing, dehydration, ionizing radiations, fermentation, concentration.

Unit – 2

Chemical Principles of Food Processing: Preservation processing by sugar, salt, smoke, acid and chemicals. Chemical and biochemical reactions affecting food quality and safety.

Unit – 3

Processing technology of foods and nutritional implications for –

Cereals and pulses- wheat grain characteristics and products, rice processing, pulses processing and their elimination of toxic factors. Fermentation and germination.

Nuts and oilseeds- nuts oilseeds processing, solvent extraction purification, hydrogenation and tempering products- butter, margarine.

Unit – 4

Fruits and Vegetables: Physiological and biochemical charges during ripening, handling and storage and fruit processing. Processing of vegetables, canning, freezing, dehydration, pickles and chutneys.

Flesh foods: Processing and their products.

Unit – 5

Milk and milk products- classification and standardization, pasteurization, homogenization, packing of milk.

Milk Products- fortified milk, skim milk, concentrated milks, cream, butter, cheese, ice cream and indigenous milk products- khoa, paneer, curd, yoghurt, ghee.

Beverages and Appetizers- Classification, coffee, tea, cocoa chocolates, fruit beverages, soups, vegetable beverages, carbonated and non-carbonated beverages, alcoholic beverages.

Recent concepts in food technology- biotechnology in food, algae as food, low cost nutrient supplement.

Paper NS 304 ASSESSMENT OF NUTRITIONAL STATUS

Unit – 1

Nutritional assessment as a tool for improving the quality of life of various segments of the population including hospitalized patient.

Unit – 2

Current methodologies of assessment of nutritional status, their interpretation and comparative application of the following:

- Food consumption
- Anthropometry
- Clinical and laboratory
- Biochemical assessment

Unit – 3

Dietary survey in detail.

Unit – 4

Nutritional surveillance Basic concepts, uses and setting up of surveillance system.

Unit – 5

Monitoring and Evaluation.

SEMESTER IV

Paper NS 401 NUTRITION IN CRITICAL CARE

Unit – 1
Nutritional support system and other life saving measures for the criticaliy ill.

Unit – 2
Patho-physiological, clinical and metabolic aspects, understanding of special nutritional requirements, nutritional goals in critical illness like - Stress, trauma, burns, surgery, CV complications, cancer.

Unit – 3
Clinical and metabolic aspects & nutritional goals of: AIDS, Hepatic failure and transplants, GIT surgery and complications

Unit – 4
Complications of nutritional support systems including refeeding syndrome.

Unit – 5
Diet related ethical issues in terminally ill.

Paper NS 402 NUTRITION FOR HEALTH FITNESS

Unit – 1
Definition, components of specific fitness and health status. Energy input & output, diet and exercise nutrition, exercise, physical fitness & health inter-relationship.

Unit – 2
Review of different energy systems for endurance and power activity: shifts in carbohydrate and fat metabolism. Mobilization of fat stores during exercise.

Unit – 3
Nutrition in sports: spor s specific requirements, diet manipulation, pre-game and post-game meal. Diets for persons with high energy requirements, stress and injury.

Unit – 4
Significance of physical fitness and nutrition in prevention and management of weight control, obesity, CV disorder.

Unit – 5
Alternative systems for health and fitness, like ayurveda, yoga, meditation.

Paper NS 403 NUTRITION FOR EMEREGENCIES AND DISASTERS

Unit – 1

Nutritional problems in emergencies in vulnerable groups: causes of malnutrition in emergency situation, protein-energy malnutrition, specific deficiencies.

Unit – 2

Communicable diseases: surveillance and treatment. Control of communicable diseases in emergencies, role of immunization and sanitation.

Unit – 3

Assessment and surveillance of nutritional status in emergency affected populations. Indications of malnutrition, clinical signs for screening acute malnutrition. Indicators and cut-offs indicating seriously abnormal nutrition situations, weight for height based indices, social indicators.

Unit – 4

Nutrition relief and rehabilitation. Assessment of food needs in emergency situations. Food distribution strategy- identification and reaching the vulnerable group targeting ford aid.

Unit – 5

Public nutrition approach to tackle nutritional problems in emergencies. Role of public nutritionists in health care.

Semester I
PRACTICAL

1. Estimation of calcium in serum.
2. Estimation of inorganic phosphorus in serum.
3. Estimation of ascorbic acid in foods.
4. Estimation of albumin, globulin and albumin/globulin ratio in serum.
5. Estimation of glucose in blood.
6. Estimation of cholestrol in blood.
7. Preparation of dilute solutions of acid and alkali and determining their exact normalities.
8. Preparation of buffer solutions and determination of their pH.
9. Cleaning and sterilization processes in microbiology laboratory
10. Preparation of common laboratory media for cultivation of bacteria, yeasts and molds.
11. Techniques of culturing of microorganisms on broth and agar media.
12. Bacteriological analysis of processed and unprocessed foods.
13. Coliform test of the food sample.
14. Methylene blue reductase test for checking the quality of milk.
15. Determination of most probable number.

Semester II

PRACTICAL

1. Demonstration of estimation of energy valve of food stuff using bomb colorimeter.
2. Estimation of protein Quality using different methods. PER, BV, NPU etc.
3. Estimation of energy requirements- BMR, Energy expenditure on physical activities.
4. Gelatinization properties of starches & factors effecting gelatinization & setting quality of food starches.
5. Study the effect of heat on vegetable & fruits.
6. Observe the effect of changes in pH during cooking of vegetables & fruits.
7. Experiment on chemistry of food system (Sols, gels, forms & emulsions)
8. Detection of common adulterants in foods.
9. Food evalution-visual examination of foods, sensory evaluation.

Apart from these experiments based on statistical analysis and computer applications.