

Revised Syllabus
For
D.D.N.
Diploma in Dietician and
Nutrition



**LAL BAHADUR SHASTRI HEALTH SCIENCES
AND TECHNICAL COUNCIL, INDIA**

लाल बहादुर शास्त्री आरोग्य विज्ञान एवं प्राविधिक परिषद, भारत

मुख्य कार्यालय : 4वीं मंजिल, प्राइम प्लाजा, इंदरा नगर, लखनऊ

प्रशासनिक कार्यालय : द्वितीय तल, सुनील कम्पलेक्स, वेस्टर्न कचेरी रोड, मेरठ

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Exam :March and Aprail
(To be implemented from 2026-27 session)

Syllabus Of “D.D.N. ” Diploma in Dietician and Nutrition

First Year (1st Year)

S.NO	Subject	Distribution Of Mark			
		TH	PR	Viva -Voce	Total
DDN-101	Anatomy and Physiology	100	-	-	100
DDN-102	Fundamentals of Nutrition	100	-	-	100
DDN-103	Food Science and Cookery	100	-	-	100
DDN-104	Human Biochemistry	100	-	-	100
DDN-105	Basic Dietetics (Theory & Practical)	-	100	-	100
	Total	-	-	-	500

Second Year (2nd Year)

S.NO	Subject	Distribution Of Mark			
		TH	PR	Viva -Voce	Total
DDN-201	Therapeutic Nutrition	100	-	-	100
DDN-202	Clinical Dietetics	100	-	-	100
DDN-203	Community and Public Health Nutrition	100	-	-	100
DDN-204	Nutrition Through the Life Cycle	100	-	-	100
DDN-205	Diet Planning and Counselling (Clinical & Practical)	-	100	-	100
	Total	-	-	-	500

First Year (1st Year)

➤ DDN-101 – ANATOMY AND PHYSIOLOGY

Unit 1 – Structural Organization & Cytology: Cellular structure, cell organelles, transport mechanisms across cell membranes (Passive diffusion, Facilitated diffusion, Active transport, Pinocytosis), classification and functions of primary tissues (Epithelial, Connective, Muscular, Nervous).

Unit 2 – Anatomy & Physiology of the Digestive System (Upper GIT): Oral cavity, salivary glands (composition and digestive action of saliva), mastication and deglutition; Anatomy of Pharynx and Oesophagus; Anatomy and histology of Stomach, gastric glands, composition and functions of gastric juice, mechanism of gastric secretion and regulation.

Unit 3 – Anatomy & Physiology of the Lower GIT & Glands: Small intestine (Duodenum, Jejunum, Ileum, villi and microvilli structure, intestinal juice/succus entericus); Large intestine (Caecum, Colon, Rectum, gut microbiota and fermentation); Anatomy of Pancreas (exocrine pancreatic juice and enzymes), Liver and Gallbladder (bile secretion, functions of bile salts in fat emulsification and micelle formation).

Unit 4 – Digestion, Absorption & Bioavailability of Nutrients: Mechanical and chemical digestion of carbohydrates, proteins, and lipids; sites and mechanisms of nutrient absorption; portal and lymphatic transport; factors influencing bioavailability and transit time.

Unit 5 – Circulatory & Lymphatic Systems: Anatomy of the heart, blood vessels (Arteries, Veins, Capillaries), systemic and pulmonary circulations; Blood composition (RBCs, WBCs, Platelets, Plasma proteins), blood pressure regulation; Lymphatic circulation and role of lacteals in fat absorption.

Unit 6 – Respiratory & Excretory Systems: Anatomy of the respiratory tract, pulmonary ventilation, gas exchange, cellular respiration and basal oxygen consumption; Anatomy of Kidneys and Nephron, mechanism of glomerular filtration, tubular reabsorption, secretion, urine formation, and fluid/electrolyte balance.

Unit 7 – Endocrine System & Nutritional Regulation: Hormonal control of metabolism: Pancreatic hormones (Insulin, Glucagon, Somatostatin); Thyroid hormones (T₃, T₄ and Basal Metabolic Rate regulation); Adrenal hormones (Cortisol, Epinephrine, Aldosterone); Pituitary growth hormone; Gastrointestinal hormones (Gastrin, Secretin, CCK, Ghrelin, Leptin).

Unit 8 – Musculoskeletal System & Energy Expenditure: Major muscle groups, skeletal structure, bone remodeling (Osteoblasts, Osteoclasts), Calcium and Phosphate homeostasis (Parathyroid hormone, Calcitonin, Vitamin D); Muscular contraction and ATP utilization during exercise.

Unit 9 – Central & Autonomic Nervous System: Brain structures controlling appetite and satiety (Hypothalamic feeding and satiety centers, vagal afferents), autonomic control of gastrointestinal motility and secretions.

Unit 10 – Reproductive Physiology & Life Stages: Male and female reproductive systems, menstrual cycle, physiological changes during pregnancy, physiology of lactation (Prolactin, Oxytocin, let-down reflex), and senescence in aging.

➤ **DDN-102 – FUNDAMENTALS OF NUTRITION**

Unit 1 – Concept & Scope of Nutrition Science: Definition of food, nutrition, nutrients, health, nutritional status; Food groups (Basic 5 food groups), Food Guide Pyramid, MyPlate concept, Indian Dietary Guidelines (ICMR-NIN).

Unit 2 – Energy Metabolism & Basal Metabolic Rate (BMR): Units of energy (Kilocalories, Megajoules); Direct and indirect calorimetry, Respiratory Quotient (RQ); Components of Total Energy Expenditure (TEE): Basal Metabolic Rate (BMR/RMR), Thermic Effect of Food (TEF), Physical Activity Level (PAL); Factors affecting BMR; Estimation of daily energy requirements.

Unit 3 – Carbohydrates & Dietary Fibre: Classification (Monosaccharides, Disaccharides, Oligosaccharides, Polysaccharides), food sources, functions; Glycemic Index (GI) and Glycemic Load (GL) of Indian foods; Dietary fibre (Soluble and Insoluble fibres), health benefits in diabetes, CVD, and colon health; RDA and excess/deficiency states.

Unit 4 – Proteins & Amino Acids: Classification of proteins (Simple, Conjugated, Derived), Essential and Non-essential amino acids, Conditionally essential amino acids; Functions of proteins, Nitrogen balance (Positive, Negative, Equilibrium); Methods of evaluating protein quality (Biological Value / BV, Net Protein Utilization / NPU, Protein Efficiency Ratio / PER, Amino Acid Score / DIAAS); Supplementary value of proteins.

Unit 5 – Lipids & Essential Fatty Acids: Classification of lipids (Simple, Compound, Derived); Saturated Fatty Acids (SFA), Monounsaturated Fatty Acids (MUFA), Polyunsaturated Fatty Acids (PUFA - Omega-3 and Omega-6 fatty acids); Trans fatty acids hazards; Functions of lipids, food sources, visible vs invisible fats; Recommended dietary ratio of SFA:MUFA:PUFA.

Unit 6 – Fat-Soluble Vitamins: Vitamin A (Retinol, Beta-carotene, Rhodopsin cycle, deficiency disorders - Night blindness, Bitot's spots, Xerophthalmia, Hypervitaminosis A); Vitamin D (Cholecalciferol, bone mineralization, Rickets, Osteomalacia); Vitamin E (Tocopherols, antioxidant role); Vitamin K (Phylloquinone, Menaquinone, blood clotting) — sources, functions, absorption, RDA, and deficiencies.

Unit 7 – Water-Soluble Vitamins (B-Complex & Vitamin C): Thiamine (B1 - Beriberi), Riboflavin (B2 - Ariboflavinosis, Angular stomatitis), Niacin (B3 - Pellagra 4Ds), Pyridoxine (B6), Folic acid (Neural tube defects, Megaloblastic anemia), Cobalamin (B12 - Pernicious anemia), Pantothenic acid, Biotin; Vitamin C (Ascorbic acid - Collagen synthesis, Scurvy, antioxidant action) — sources, RDA, and deficiency manifestations.

Unit 8 – Macro Minerals & Electrolytes: Calcium (Bone health, muscle contraction, tetany, osteoporosis), Phosphorus, Magnesium; Electrolytes: Sodium, Potassium, Chloride — role in osmotic pressure, acid-base balance, nerve conduction, hypertension, and fluid homeostasis.

Unit 9 – Trace Elements / Micro Minerals: Iron (Hemoglobin synthesis, Iron deficiency anemia / IDA, absorption enhancers and inhibitors); Iodine (Thyroid synthesis, Goitre, Cretinism); Zinc (Immunity, wound healing, growth); Selenium, Copper, Fluoride (Dental caries prevention and Fluorosis), Chromium, Manganese.

Unit 10 – Water Balance & Acid-Base Equilibrium: Distribution of water in body compartments, functions of water, daily water balance (intake vs output), mechanisms of thirst and water regulation (ADH, Aldosterone), Dehydration and Water intoxication; Acid-base balance mechanisms in nutrition.

➤ **DDN-103 – FOOD SCIENCE AND COOKERY**

Unit 1 – Introduction to Food Science & Cooking Methods: Objectives of cooking food; Classification of cooking methods: Moist heat methods (Boiling, Simmering, Poaching, Steaming, Pressure cooking), Dry heat methods (Baking, Roasting, Grilling), Fat-frying methods (Sautéing, Shallow frying, Deep frying), Microwave cooking; Effect of cooking on nutrient retention.

Unit 2 – Cereal & Grain Science: Structure of cereal grain (Endosperm, Germ, Bran), composition of Wheat, Rice, Millets (Ragi, Jowar, Bajra), Oats, Maize; Starch chemistry: Gelatinization, Retrogradation, Dextrinization, Syneresis; Gluten formation in wheat dough and factors affecting gluten strength; Parboiling of rice and nutritional benefits.

Unit 3 – Pulses, Legumes & Oilseeds: Nutritional composition of pulses, processing of pulses (Soaking, Germination/Sprouting, Fermentation - nutritional benefits and enhancement of Vitamin C, B-complex, and bioavailability); Anti-nutritional factors (Trypsin inhibitors, Phytates, Tannins, Hemagglutinins/Lectins, Lathyrogens) and methods of removal; Functional uses of pulses in Indian cookery.

Unit 4 – Fruits & Vegetables Science: Classification of fruits and vegetables; Plant pigments (Chlorophyll, Carotenoids, Anthocyanins, Anthoxanthins, Betalains) and effect of heat, acid, and alkali on color; Enzymatic and non-enzymatic browning (Maillard reaction, Caramelization) and prevention methods; Pectic substances and Jam/Jelly preparation.

Unit 5 – Milk & Dairy Products: Nutritional composition of milk; Milk proteins (Casein and Whey proteins), Curdling, Coagulation by heat and acid; Pasteurization methods (HTST, LTLT, UHT), Homogenization; Processing of dairy products: Curd/Yogurt, Paneer, Cheese, Butter, Ghee, Skimmed milk, Khoa, Whey beverages.

Unit 6 – Eggs, Meat, Poultry & Fish: Structure and composition of egg, evaluation of egg quality, functional properties of eggs in cookery (Emulsification, Foaming, Binding, Thickening, Coating); Composition and structure of meat, Post-mortem changes (Rigor mortis), meat tenderization; Poultry and Fish selection, composition, and cooking characteristics.

Unit 7 – Fats, Oils & Sugar Cookery: Properties of fats and oils (Melting point, Smoke point, Flash point, Fire point); Rancidity (Hydrolytic and Oxidative rancidity) and prevention (Antioxidants); Hydrogenation of oils; Sugar cookery: Solubility, Crystallization, Stages of sugar syrup (Thread, Soft ball, Hard ball, Caramelization) and confectionery applications.

Unit 8 – Spices, Condiments, Beverages & Food Additives: Role of spices and culinary herbs in flavoring and digestion; Bioactive phytochemicals (Curcumin in Turmeric, Allicin in Garlic, Piperine in Pepper); Beverages: Alcoholic vs Non-alcoholic beverages (Tea, Coffee, Herbal infusions); Food additives: Preservatives, Colorants, Flavor enhancers (MSG), Artificial sweeteners (Stevia, Sucralose, Aspartame).

Unit 9 – Food Spoilage & Preservation Techniques: Causes of food spoilage (Microbial, Enzymatic, Chemical); Principles and methods of food preservation: Low temperature (Refrigeration, Freezing), High temperature (Canning, Pasteurization), Dehydration/Drying, Chemical preservation (Salt, Sugar, Vinegar, Benzoates), Irradiation, Vacuum packaging.

Unit 10 – Food Safety, Hygiene & Adulteration: Food hygiene and sanitation in kitchen/food service establishments; Personal hygiene of food handlers; Food adulteration: Common adulterants in milk, spices, oils, pulses, and simple household detection tests; Food Safety and Standards Authority of India (FSSAI) regulations, AGMARK, BIS, HACCP principles.

➤ **DDN-104 – HUMAN BIOCHEMISTRY**

Unit 1 – Introduction to Biomolecules & Cellular Chemistry: Chemical bonding, properties of water as a biological solvent, pH, buffers (Henderson-Hasselbalch equation), biological buffer systems maintaining physiological homeostasis.

Unit 2 – Carbohydrate Chemistry & Metabolism: Structure and stereochemistry of carbohydrates; Metabolic pathways: Glycolysis (Embden-Meyerhof pathway, energy yield, regulation), Citric Acid Cycle (TCA / Krebs Cycle, amphibolic nature, ATP production), Gluconeogenesis, Glycogenesis, Glycogenolysis, Hexose Monophosphate (HMP) Shunt, Regulation of blood glucose level.

Unit 3 – Bioenergetics & Biological Oxidation: Concepts of free energy (ΔG), High-energy phosphate compounds (ATP, Creatine phosphate); Electron Transport Chain (ETC): Components of complexes I-IV, Cytochromes, Proton gradient, Oxidative phosphorylation, ATP synthase mechanism, Inhibitors and Uncouplers of ETC.

Unit 4 – Lipid Chemistry & Metabolism: Structure of fatty acids, Triacylglycerols, Phospholipids, Cholesterol; Fatty acid oxidation (Beta-oxidation of saturated fatty acids, ATP calculation); Ketone body synthesis (Ketogenesis), utilization, and Pathogenesis of Diabetic Ketoacidosis (DKA); De novo fatty acid synthesis; Lipoprotein metabolism (Chylomicrons, VLDL, LDL, HDL - Atherogenic risk).

Unit 5 – Protein & Amino Acid Metabolism: Structure of amino acids, peptide bonds, protein conformation (Primary, Secondary, Tertiary, Quaternary); General reactions of amino acids: Transamination (SGOT/AST, SGPT/ALT), Deamination, Decarboxylation; Urea cycle (steps, regulation, hyperammonemia); Metabolism of branched-chain and aromatic amino acids (Phenylketonuria / PKU, Maple syrup urine disease).

Unit 6 – Nucleic Acids & Molecular Genetics Basics: Structure of purines and pyrimidines, Nucleosides, Nucleotides; DNA double helix (Watson-Crick model), RNA types (mRNA,

tRNA, rRNA); Central Dogma of Molecular Biology: DNA replication, Transcription, Genetic code, Protein translation; Uric acid formation and Gout.

Unit 7 – Enzymology & Clinical Diagnostic Enzymes: Classification of enzymes (IUBMB system); Mechanism of enzyme action, Active site, Coenzymes (Vitamin B derivatives) and Cofactors; Factors affecting enzyme activity (Substrate concentration, pH, Temperature); Enzyme kinetics (Michaelis-Menten equation, K_m and V_{max}); Enzyme inhibition (Competitive, Non-competitive, Allosteric); Diagnostic serum enzymes (Cardiac markers: Troponin, CK-MB; Liver enzymes: ALP, SGOT, SGPT; Pancreatic enzymes: Amylase, Lipase).

Unit 8 – Hormonal Biochemistry & Signal Transduction: Chemical classification of hormones (Peptides, Steroids, Amino acid derivatives); Mechanisms of hormone action: Cell surface receptors (G-protein coupled receptors, Second messengers - cAMP, IP3/DAG, Calcium), Nuclear receptors (Steroid and Thyroid hormone action); Biochemical actions of Insulin, Glucagon, Thyroid, and Adrenal hormones.

Unit 9 – Free Radicals, Oxidative Stress & Antioxidants: Reactive Oxygen Species (ROS) and Reactive Nitrogen Species (RNS), mechanisms of cellular oxidative damage (Lipid peroxidation, DNA damage); Enzymatic antioxidants (Superoxide dismutase / SOD, Catalase, Glutathione peroxidase) and Non-enzymatic antioxidants (Vitamin E, Vitamin C, Beta-carotene, Glutathione, Polyphenols).

Unit 10 – Inborn Errors of Metabolism & Clinical Biochemistry Testing: Overview of inborn errors of metabolism (Galactosemia, Glycogen storage diseases, PKU, Albinism); Clinical biochemistry laboratory tests: Fasting blood glucose, HbA1c, Lipid profile, Renal Function Tests (Urea, Creatinine, Uric acid), Liver Function Tests (Bilirubin, Albumin/Globulin ratio), Serum Electrolytes.

➤ **DDN-105 – BASIC DIETETICS (THEORY & PRACTICAL)**

Unit 1 – Introduction to Dietetics & Role of a Dietician: Definition, history, and scope of dietetics; Responsibilities and code of ethics of clinical and community dietitians; Indian Dietetic Association (IDA) standards; Multi-disciplinary healthcare team role.

Unit 2 – Indian Recommended Dietary Allowances (RDA) & EAR: Concepts of RDA, Estimated Average Requirement (EAR), Tolerable Upper Intake Level (UL) as per ICMR-NIN guidelines; Concept of Reference Indian Adult Man and Woman (Height, Weight, Sedentary, Moderate, Heavy physical activity categories).

Unit 3 – Nutritional Assessment Methods (ABCD Parameters): Anthropometric assessment (Height, Weight, BMI, Waist-to-Hip Ratio / WHR, Mid-Upper Arm Circumference / MUAC, Skinfold calipers); Biochemical parameters (Hb, Serum proteins, Blood glucose, Lipid profile); Clinical examination for deficiency signs; Dietary assessment methods (24-hour dietary recall, Food Frequency Questionnaire / FFQ, Diet history, Weighed food records).

Unit 4 – Routine Hospital Diets & Consistency Modifications: Standard hospital diets: Regular / Normal diet; Texture/Consistency modified diets: Clear liquid diet, Full liquid diet, Semi-solid / Pureed diet, Soft diet, Mechanical soft diet; Indications, nutritional adequacy, and sample menu plans.

Unit 5 – Nutrient Density & Meal Planning Principles: Principles of planning balanced diets for adults based on physical activity levels (Sedentary, Moderate, Heavy); Steps in diet planning: Calculating total calorie requirement, Macronutrient distribution (Carbohydrates 50-60%, Proteins 10-15%, Fats 20-30%), Exchange lists system.

Unit 6 – Use of Food Exchange Lists & Food Composition Tables: Concept and application of Food Exchange Lists in meal planning (Cereal, Pulse, Milk, Meat/Egg, Vegetable, Fruit, Fat, Sugar exchanges); Using ICMR-NIN Indian Food Composition Tables (IFCT) for nutrient calculation.

Unit 7 – Hospital Food Service Management & Tray Delivery: Types of hospital food service systems (Centralized vs Decentralized tray service); Food purchasing, receiving, storage (Dry and Cold storage), food preparation, tray assembly, and distribution; Infection control and kitchen hygiene.

Unit 8 – Practical Dietary Calculations & Menu Formulation: Practical exercises: Calculating energy, protein, fat, calcium, and iron content of single foods and mixed recipes; Standardizing recipes for portion size and yield.

Unit 9 – Practical Planning of Texture Modified Diets: Planning, preparation, and presentation of Clear liquid, Full liquid (soups, milkshakes, custards), and Soft diets in laboratory.

Unit 10 – Case Documentation & Dietetic Logbook Evaluation: Preparation of standardized nutritional assessment case sheets, dietary intake analysis, meal plan charts for normal adults, and practical viva-voce.

Second Year (2nd Year)

➤ DDN-201 – THERAPEUTIC NUTRITION

Unit 1 – Principles of Medical Nutrition Therapy (MNT): Definition, objectives, and role of MNT in disease management; Adaptation of normal diet to therapeutic diets (Quantitative and Qualitative modifications in energy, nutrients, texture, fiber, and meal frequency); Nutrition Care Process (NCP: Assessment, Diagnosis, Intervention, Monitoring, Evaluation).

Unit 2 – Medical Nutrition Therapy in Fevers & Infections: Metabolic alterations during fevers and hypermetabolic states (increased BMR, negative nitrogen balance, glycogen depletion); Dietary management in Acute fevers (Typhoid, Dengue, Malaria, Viral pyrexia) and Chronic fevers (Tuberculosis - high calorie, high protein diet).

Unit 3 – Dietary Management in Gastrointestinal Disorders: Upper GI disorders: GERD, Esophagitis, Hiatus hernia, Gastritis, Peptic Ulcer Disease (Gastric vs Duodenal ulcers, Bland diet); Lower GI disorders: Constipation (High fiber diet), Diarrhea (BRAT diet, ORS, low

residue), Irritable Bowel Syndrome (IBS - low FODMAP diet), Inflammatory Bowel Disease (Crohn's disease and Ulcerative Colitis), Celiac Disease (Gluten-free diet).

Unit 4 – Dietary Management in Liver, Gallbladder & Pancreatic Diseases: Liver disorders: Viral Hepatitis (Jaundice), Cirrhosis of Liver (High protein vs Protein restriction in Hepatic Encephalopathy, low sodium in ascites), Non-Alcoholic Fatty Liver Disease (NAFLD / NASH); Gallbladder disorders: Cholecystitis, Cholelithiasis (Low fat diet); Pancreatitis (Acute vs Chronic pancreatitis - low fat, medium chain triglycerides / MCT).

Unit 5 – Dietary Management in Cardiovascular Disorders: Etiology, risk factors, and MNT in Hypertension (DASH Diet - Dietary Approaches to Stop Hypertension, Sodium restriction: Mild, Moderate, Strict); Atherosclerosis and Coronary Artery Disease (CAD - Step I and Step II AHA diets, low saturated fat, low cholesterol, omega-3 fatty acids, soluble fiber); Congestive Heart Failure (Fluid and sodium restriction).

Unit 6 – Medical Nutrition Therapy in Diabetes Mellitus: Classification (Type 1, Type 2, Gestational Diabetes Mellitus / GDM, Pre-diabetes); Pathophysiology, diagnostic criteria (Fasting glucose, OGTT, HbA1c); Dietary goals: Calorie calculation, Carbohydrate counting, Glycemic Index and Glycemic Load application, Distribution of carbohydrates across meals, Artificial sweeteners, Prevention and management of Hypoglycemia and Diabetic Nephropathy.

Unit 7 – Dietary Management in Renal Disorders: Acute Glomerulonephritis (Low sodium, restricted protein and fluid); Nephrotic Syndrome (Adequate protein, low sodium, lipid management); Chronic Kidney Disease (CKD Stages 1-5: Protein restriction, Phosphorus restriction, Potassium restriction, Sodium and fluid regulation); Dialysis patients (High protein requirement in Hemodialysis 1.2 g/kg and Peritoneal Dialysis 1.3-1.5 g/kg); Renal Calculi (Urolithiasis - Calcium oxalate, Uric acid, and Struvite stones dietary modifications).

Unit 8 – Weight Management (Obesity & Underweight): Obesity: Etiology, classification (BMI classes I, II, III), Android vs Gynoid fat distribution, health risks; Dietary management: Low calorie diets, VLCD precautions, behavioral modification, physical activity; Underweight / Anorexia: Etiology, High calorie, high protein rehabilitation diets.

Unit 9 – Dietary Management in Cancer & HIV/AIDS: Nutritional consequences of cancer (Cancer cachexia, altered taste perception, stomatitis, radiation enteritis, anorexia); MNT during chemotherapy, radiation, and surgical oncology; Neutropenic diet precautions; MNT in HIV/AIDS (combating wasting syndrome, maintaining CD4 cell immunity).

Unit 10 – Nutrition in Surgical, Burn & Trauma Conditions: Pre-operative nutritional optimization; Post-operative nutritional care (Early oral feeding vs gradual progression); Metabolic response to trauma, surgery, and sepsis; Severe Burns management: Parkland formula, high calorie-high protein nutrition, micronutrient supplementation (Zinc, Vitamin C, Glutamine).

➤ **DDN-202 – CLINICAL DIETETICS**

Unit 1 – Clinical Nutrition Assessment in Hospitalized Patients: Subjective Global Assessment (SGA), Mini Nutritional Assessment (MNA for geriatrics), Malnutrition Universal Screening Tool (MUST), Nutritional Risk Screening (NRS 2002); Identification of Hospital Malnutrition.

Unit 2 – Enteral Nutrition (Tube Feeding): Indications, contraindications, and advantages of enteral feeding; Enteral access routes: Nasogastric (NG), Nasoduodenal (ND), Nasojejunal (NJ), Percutaneous Endoscopic Gastrostomy (PEG), Percutaneous Endoscopic Jejunostomy (PEJ); Enteral formula classification: Standard polymeric, Blenderized kitchen feeds, Semi-elemental / Hydrolyzed, Disease-specific formulas (Diabetic, Renal, Hepatic, Pulmonary formulas); Administration methods (Bolus, Intermittent gravity, Continuous pump infusion); Complications (Mechanical, Gastrointestinal, Metabolic) and monitoring.

Unit 3 – Parenteral Nutrition (Total Parenteral Nutrition / TPN): Indications, contraindications of intravenous nutrition; Peripheral Parenteral Nutrition (PPN) vs Central Parenteral Nutrition (CPN / TPN via PICC or Subclavian central line); Composition of TPN solutions (Dextrose, Amino acid mixtures, Intravenous Lipid Emulsions / IVLE - 10%, 20%, 30%, Electrolytes, Multivitamins, Trace elements); Compounding: 2-in-1 vs 3-in-1 (All-In-One / AIO) bags; Complications: Catheter-related sepsis, Hyperglycemia, Refeeding Syndrome (hypophosphatemia, hypokalemia), Fatty liver; Monitoring protocols.

Unit 4 – Critical Care Nutrition in ICU: Metabolic response to critical illness (Ebb phase vs Flow phase, hypermetabolism, proteolysis, insulin resistance); Nutritional support in Sepsis, Acute Respiratory Distress Syndrome (ARDS - low carbohydrate, high fat, EPA/GLA formulas), Multiple Organ Dysfunction Syndrome (MODS), and Polytrauma.

Unit 5 – Nutrition in Inborn Errors of Metabolism: Clinical management and therapeutic diets for Phenylketonuria (PKU - Phenylalanine-free formulas), Galactosemia (Lactose/Galactose-free diet), Maple Syrup Urine Disease (MSUD), Glycogen Storage Diseases, Homocystinuria.

Unit 6 – Nutrition in Neurological & Musculoskeletal Disorders: Nutritional support in Stroke and Dysphagia (IDDSI framework - International Dysphagia Diet Standardisation Initiative for food textures and liquid thicknesses: Levels 0-7); Epilepsy and Ketogenic Diet (4:1 and 3:1 fat to non-fat ratios, Modified Atkins Diet / MAD); Parkinson's disease (levodopa-protein interaction), Alzheimer's disease, Gout (Low purine diet), Osteoarthritis, Osteoporosis.

Unit 7 – Food Allergies & Food Intolerances: Mechanism of IgE-mediated food allergies (Common allergens: Milk, Egg, Peanut, Tree nuts, Wheat, Soy, Fish, Shellfish); Diagnostic tests (Skin prick test, Serum specific IgE, Elimination-Challenge diet); Food intolerances: Lactose intolerance (Lactase deficiency, lactose-free milk), Fructose malabsorption, Histamine intolerance; Cross-contamination prevention.

Unit 8 – Drug-Nutrient Interactions: Effects of food/nutrients on drug absorption and bioavailability; Effects of drugs on nutrient absorption and metabolism; Specific clinical interactions: MAO inhibitors and Tyramine (Cheese reaction), Warfarin and Vitamin K,

Statins and Grapefruit juice, Methotrexate and Folic acid, Tetracycline and Calcium/Dairy, Corticosteroids and Sodium/Calcium.

Unit 9 – Pediatric Clinical Nutrition: Clinical dietetics in Pediatric Intensive Care (PICU), Failure to Thrive (FTT), Severe Acute Malnutrition (SAM - F-75, F-100 therapeutic milk, Ready-to-Use Therapeutic Food / RUTF), Pediatric Gastroesophageal Reflux, Short Bowel Syndrome, and Congenital Heart Defects.

Unit 10 – Quality Assurance & Ethics in Clinical Dietetics: Medical documentation in electronic health records (SOAP format: Subjective, Objective, Assessment, Plan); Patient confidentiality, Informed consent for feeding tubes, Ethical dilemmas in end-of-life nutritional support, Clinical nutrition audits.

➤ **DDN-203 – COMMUNITY AND PUBLIC HEALTH NUTRITION**

Unit 1 – Concept & Scope of Public Health Nutrition: Definition, primary objectives, ecology of malnutrition, socio-economic and environmental determinants of community nutrition; National Nutrition Policy of India; Sustainable Development Goals (SDG 2 - Zero Hunger, SDG 3 - Good Health & Well-being).

Unit 2 – Assessment of Nutritional Status in Community: Community nutritional assessment methodologies: Direct methods (Anthropometric surveys, Clinical examination for deficiency signs, Biochemical screening, Dietary surveys - 24-hr recall, weighed food intake); Indirect indicators: Maternal Mortality Rate (MMR), Infant Mortality Rate (IMR), Under-5 Mortality Rate (U5MR), Low Birth Weight (LBW) prevalence.

Unit 3 – Major Public Health Nutritional Problems in India: Etiology, prevalence, clinical features, and prevention of: Protein Energy Malnutrition (PEM - Kwashiorkor & Marasmus); Nutritional Anaemia (Iron & Folate deficiency); Vitamin A Deficiency (VAD - Xerophthalmia, Night blindness); Iodine Deficiency Disorders (IDD - Goitre, Cretinism); Fluorosis (Dental and Skeletal fluorosis).

Unit 4 – National Nutrition Intervention Programmes in India: Integrated Child Development Services (ICDS - Supplementary nutrition, Growth monitoring, Non-formal preschool education); PM POSHAN Scheme (Mid-Day Meal Programme in schools); National Prophylaxis Programme against Nutritional Blindness (Vitamin A supplementation); National Anaemia Mukht Bharat (AMB - 6x6x6 strategy); National Iodine Deficiency Disorders Control Programme (NIDDCP - Universal salt iodization).

Unit 5 – POSHAN Abhiyaan & Maternal-Child Welfare Schemes: POSHAN Abhiyaan (National Nutrition Mission - Technology-driven monitoring, Convergence, Jan Andolan / Community mobilization); Pradhan Mantri Matru Vandana Yojana (PMMVY); Janani Suraksha Yojana (JSY); Village Health Sanitation and Nutrition Days (VHSND).

Unit 6 – Food Security & Public Distribution System (PDS): Concept of National and Household Food Security; Target Public Distribution System (TPDS), National Food Security Act (NFSA 2013); Buffer stocks, Food Corporation of India (FCI), Antyodaya Anna Yojana (AAY); Grain banks and community kitchens.

Unit 7 – Food Fortification & Bio-Fortification: Definition, principles, and public health impact of food fortification; Mandatory and voluntary fortification in India (+F logo by FSSAI); Fortified staple foods: Double Fortified Salt (Iron + Iodine), Fortified Rice (Iron, Folic acid, B12), Fortified Wheat Flour (Atta), Fortified Oil and Milk (Vitamins A & D); Bio-fortified crops (Zinc/Iron-rich Pearl Millet, Golden Rice).

Unit 8 – Nutrition Education & Behavior Change Communication (BCC): Principles and methods of community nutrition education; Developing Information, Education, and Communication (IEC) materials: Posters, flashcards, flipcharts, puppet shows, folk theater, digital social media; Conducting group cooking demonstrations of low-cost nutritious weaning foods.

Unit 9 – Role of International & National Nutrition Agencies: Mandates, strategies, and programmes of International agencies: WHO, UNICEF, FAO, World Food Programme (WFP), CARE; National agencies: ICMR (Indian Council of Medical Research), National Institute of Nutrition (NIN, Hyderabad), Food and Nutrition Board (FNB), Central Food Technological Research Institute (CFTRI).

Unit 10 – Nutrition in Disaster Relief & Emergencies: Assessment of nutritional needs during floods, droughts, earthquakes, and refugee crises; General food distribution, Supplementary feeding, Therapeutic feeding of malnourished children, Safe drinking water and sanitation, Prevention of epidemic disease outbreaks in relief camps.

➤ **DDN-204 – NUTRITION THROUGH THE LIFE CYCLE**

Unit 1 – Nutrition for Adults (Sedentary, Moderate & Heavy Workers): Nutritional requirements and RDA (ICMR-NIN) for adult men and women based on physical activity levels; Balanced diet formulation, maintenance of optimal body weight and body composition, lifestyle disease prevention.

Unit 2 – Nutrition During Pregnancy: Physiological and hormonal adaptations during pregnancy; Weight gain recommendations (based on pre-pregnancy BMI - IOM guidelines); Nutritional requirements (Increased energy, protein, iron, folic acid, calcium, iodine); Nutritional complications: Morning sickness, heartburn, constipation, gestational diabetes, pre-eclampsia, pica; Fetal origins of adult disease (Barker hypothesis).

Unit 3 – Nutrition During Lactation: Physiology of milk production and secretion; Composition of colostrum, transitional milk, and mature human breast milk vs cow/buffalo milk; Nutritional requirements of lactating mothers (0-6 months and 6-12 months); Galactagogues (traditional and dietary); Practical tips for successful exclusive breastfeeding.

Unit 4 – Nutrition in Infancy (0 to 12 Months): Growth and development parameters in infancy; Importance of exclusive breastfeeding for first 6 months; Infant feeding difficulties; Weaning / Complementary feeding: Principles, timing (at 6 months), homemade complementary foods (Amylase-Rich Foods / ARF, multi-cereal pulse mixes), commercial infant formulas, feeding guidelines.

Unit 5 – Nutrition for Preschoolers (1 to 6 Years): Growth characteristics, nutrient requirements; Food habits, food jags, food neophobia, picky eating; Feeding problems, balanced meal planning, finger foods, developing healthy dietary patterns, prevention of dental caries and iron deficiency.

Unit 6 – Nutrition for School-Age Children (7 to 12 Years): Physical growth spurt, cognitive development, nutrient needs; Importance of healthy breakfast; School tiffin/lunch planning, midday meal programme benefits, prevention of childhood obesity, healthy snacking vs junk food/processed food hazards.

Unit 7 – Nutrition in Adolescence (13 to 18 Years): Pubertal growth spurt, body composition changes, sexual maturation; Nutrient requirements (High demand for energy, protein, iron, calcium, zinc); Nutritional concerns: Adolescent pregnancy, Iron deficiency anaemia (Weekly Iron-Folic Acid Supplementation / WIFS), Body image issues, Eating disorders (Anorexia Nervosa, Bulimia Nervosa, Binge eating disorder), Fast food consumption.

Unit 8 – Geriatric Nutrition (Elderly / Senior Citizens): Physiological changes in aging (Sarcopenia, reduced BMR, dental loss/edentulous, diminished taste and smell, altered GI motility, reduced bone density); Nutritional requirements for elderly; Common nutritional problems (Dehydration, constipation, osteoporosis, malnutrition, cognitive decline); Dietary modifications for soft, easy-to-digest, nutrient-dense meals.

Unit 9 – Sports Nutrition & Physical Fitness: Nutritional requirements of athletes and sports persons; Energy systems during exercise (Phosphagen, Glycolytic, Aerobic systems); Carbohydrate loading (Glycogen supercompensation protocol); Pre-game, during-game, and post-game meals; Hydration strategies (Fluid and electrolyte replacement, sports drinks); Ergogenic aids and dietary supplements.

Unit 10 – Nutrition in Special Environmental Conditions: Nutritional adaptations and energy/fluid needs at High Altitudes (hypoxia, acute mountain sickness); Extreme Cold and Polar climates (increased calorie demand); Extreme Hot and Desert environments (fluid, electrolyte, and heat exhaustion prevention); Space nutrition overview.

➤ **DDN-205 – DIET PLANNING AND COUNSELLING** **(CLINICAL & PRACTICAL)**

Unit 1 – Principles of Effective Dietary Counselling: Communication skills, empathy, active listening, non-judgmental approach; Stages of Change Model (Prochaska's Transtheoretical Model: Pre-contemplation, Contemplation, Preparation, Action, Maintenance); Motivational Interviewing techniques in dietetics.

Unit 2 – Nutrition Care Process (NCP) & Clinical Documentation: Standardized steps of Nutrition Care Process: Nutrition Assessment, Nutrition Diagnosis (PES statements - Problem, Etiology, Signs/Symptoms), Nutrition Intervention, Nutrition Monitoring and Evaluation; Writing SOAP clinical notes.

Unit 3 – Diet Planning for Diabetes Mellitus & Metabolic Syndrome: Step-by-step diet planning for Type 2 Diabetes Mellitus with Carbohydrate Counting, Exchange Lists, Glycemic Index optimization, and planning for Diabetic Nephropathy.

Unit 4 – Diet Planning for Cardiovascular Diseases & Hypertension: Formulating Sodium-restricted diets (2g Na, 1g Na), DASH meal plans for stage 1 & 2 hypertension, and therapeutic low-cholesterol, low-saturated-fat diets for myocardial infarction and hyperlipidemia.

Unit 5 – Diet Planning for Renal Diseases (Pre-Dialysis & Dialysis): Formulating low-protein, restricted sodium, potassium, and phosphorus meal plans for CKD Stage 3-4 (0.6 g protein/kg); Formulating high-protein, restricted fluid and electrolyte diet plans for Hemodialysis and CAPD patients.

Unit 6 – Diet Planning for Gastrointestinal & Liver Disorders: Planning High-Fiber diets for constipation; Low-FODMAP diets for IBS; Gluten-Free diets for Celiac disease; High-Calorie Moderate-Protein diets for Viral Hepatitis and Cirrhosis.

Unit 7 – Diet Planning for Weight Management (Obesity & Underweight): Designing hypocaloric balanced diets (1200 kcal, 1500 kcal plans) with macronutrient distribution; Formulating hypercaloric, high-protein rehabilitation diets (2500+ kcal) for severe underweight and anorexia.

Unit 8 – Preparation of Educational & Visual Counselling Aids: Creating diet charts, sample weekly menu plans, patient handout pamphlets, portion size visual models, food exchange flashcards, and digital mobile app-based dietary trackers.

Unit 9 – Simulated Patient Dietary Counselling Role-Play: Conducting mock patient counselling sessions for diabetic, hypertensive, antenatal, and pediatric cases; Handling patient resistance, barriers to compliance, cultural dietary restrictions, and socio-economic budgeting.

Unit 10 – Clinical Dietetic Internship Portfolio & Grand Viva-Voce: Compilation and evaluation of 30 full clinical case studies (inpatient and outpatient hospital cases), diet calculation sheets, patient counselling logs, and comprehensive grand viva-voce.

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