

**DEPARTMENT OF HOME SCIENCE
KURUKSHETRA UNIVERSITY KURUKSHETA**

Syllabus for PhD Entrance Test in the discipline of Home Science (Foods and Nutrition)

Paper – I (Objective Type)

Maximum Marks: 100

Duration of Exam: 1 hour

Instructions for paper setters: The examiner will set 50 questions of 2 marks each spread over the whole syllabus.

Instructions for students: Attempt all the 50 questions. Each question carries 2 marks. Give your answer by marking a tick () on one of the response alternatives to each question. All questions carry equal marks and there is No Negative Marking. If more than one response has been marked the question will not be scored.

Paper – II (Subjective Type)

Maximum Marks: 100

Duration of Exam: 2 hours

Instructions for paper setters: The examiner will set 15 questions each carrying equal marks spread over the whole syllabus.

Instructions for students: This paper will consist of 15 subjective questions. The candidates will be required to attempt any 10 questions. Each question shall carry equal marks. Time allotted for the second paper will be 2 hours.

Nutritional Biochemistry:

Concept of free energy, energy rich compounds. (ATP, PEP, Phosphagens), role of ATP/ADP cycle in transfer of high energy phosphates, concept of coupled reaction

Carbohydrates: Protein and fat :classification, structure, Properties, digestion absorption, transport and Metabolism.

Glycolysis, Formation of lactate in muscles, citric acid cycle, hexose monophosphate shunt, glycogenesis, glycogenolysis, cori cycle, gluconeogenesis, glyoxalate cycle. Regulation of blood glucose level. **Nucleic acid:** Double helical model of DNA, types of RNA and their functions. DNA replication, transcription, translation,. Biosynthesis of purines and pyrimidines. **Lipids** : Beta-oxidation of saturated and unsaturated acids, biosynthesis of fatty acids, triacylglycerols, Phospholipids, ketone body formation and their utilization.

Biological oxidation: Oxidation and reduction, respiratory Oxidative phosphorylation and its mechanism, uncouplers.

Enzymes: General characteristics, classification and nomenclature, enzyme cofactors, concept of holoenzyme and apoenzyme, units of enzyme activity, applications of enzymes in food industry and Nutrition.

Vitamins and Hormones: Structure, occurrence and biochemical roles of vitamins in metabolism, NAD⁺, FMN/FAD coenzyme. biotin, lipoic acid, TPP, Pyridoxal Phosphate, Pantothenic acid, Tetra hydrofolate. Mechanism of action of hormones.

Biochemical Techniques used in Foods & Nutrition Research: Chromatography
Electrophoresis, Colorimetry – Beer Lambert's Law, determination and application of extinction coefficient, Immunological Methods – RIA, ELISA, Use of Isotopes

Microbiology:

Important groups of microorganisms and their practical significance in Food processing. Factors affecting the growth of microorganisms in food, methods of measurement of growth. Normal Micro flora of Human body – Skin, Eye, Nasal Cavities, Mouth, Intestinal tract (brief introduction). Bacterial agents: Salmonella, Staphylococcus, Clostridium, E. coli, Vibrio, Fungal agents: Aspergillus, Fusarium, penicillium. Viruses Polio, Hepatitis. Microbiology of food plant sanitation, water and milk testing
Methods of isolation and detection of microorganisms or their products in foods,

Human Nutrition

Body Composition: General body composition, determination of body water, acid-base balance, changes in body composition. Exchange of water/ fluid in the body and impact of low and excess intake of water. Nutritional requirements and recommended allowances for the entire life span (infancy to old age all physiological condition) and methods for assessing the adequacy of requirements for- Energy, Proteins and amino acids, Vitamins and Minerals. **Energy:** The share of three main energy-nutrients- CHO, fat and protein in human nutrition, Energy expenditure- factors affecting-BMR and its maintenance Energy measurement-direct and indirect calorimetry Thermogenesis, SDA.

Carbohydrates: dietary fiber, Glycemic index of foods. Sweeteners- nutritive and non nutritive. **Proteins:** Protein quality, methods of evaluating protein quality. Protein and amino acid requirements. Therapeutic applications Branched chain amino acids.

Lipids: Functions of EFA. Role of n-3, n-6 fatty acids in health and disease. Requirements of total fat and fatty acids. Trans fatty acids. Prostaglandins. **Vitamins** food sources, absorption and transport, functions, interactions with other nutrients. Physiological, pharmacological and therapeutic effects, toxicity and deficiency. **Minerals (Macro, micro and trace): sources**, bioavailability, function requirements, DI/ESADDI, deficiency and toxicity, interactions with other nutrients.

Food Service Management:

Evolution of the food service industry, Commercial and welfare catering, Service of food in different institutions.

Principles, functions and tools of management, management of resources, budget; energy, time, conservation of energy and time; man power planning, placement, recruitment, training and motivation, Food cost calculation.

Kitchen and food service layout and equipment, menu planning, portion control and quality assurance

Kitchen and personal hygiene, Labour laws, welfare policies and scheme for employees

Home Science Research: Types of Research: Experimental, Field studies, Case study, and Survey research. Designing research, Method of data collection, Research designs, Method of sampling and importance. Measure of center tendency, standard deviation, standard errors,

variance, normal distribution. Type –I and Type-II errors, T-Test- student T –Test and pair T-Test, Analysis of variance one way (anova), correlation, (spearsons and spearmans')

Computer: General knowledge about Application of computer in Home Science, Knowledge about Internet and E-mail

Human Physiology

Structure and functions of skeletal system, Digestive system, cardio-vascular system, respiratory system, endocrine system, reproductive system, excretory system, sensory and nervous system.

Brief account of muscle fatigue, dislocation, sprain, strain, hypertension, erythropoiesis, ABO and Rh blood group system, regulation of breathing , laryngitis, pharyngitis, Bronchitis, Asthma, critinism, myxedema, grave's disease, Addison's disease, Cushing disease, menopause, breast and cervical cancer, menstrual disorders, infertility, ultra sound imaging, renal stones, albuminurea, haematuria, oedema, uremia, incontinence, Neuralgia, sciatica, coma, poliomyelitis, EEC, ECG and CT, diabetes.

Therapeutic Nutrition

Therapeutic modification of the normal diet – Newer trends in delivery of nutritional care and dietary counseling . Nutritional support –substrates, enteral and parenteral nutrition

Major alterations in carbohydrates, protein and fat metabolism in chronic nutrition related degenerative diseases

Inborn errors of metabolism-Introduction, clinical features, dietary management of phenylketonuria, Galactosemia, Alkaptonuria

Etiology, metabolic and clinical aberrations, complications, prevention and recent advances in the nutritional management of : Infection, fever, allergy, stress, obesity, diabetes, hypertension, cardiovascular diseases, Gastrointestinal disorders, liver and gall bladder disorders and renal disorders.

Nutrition in surgical conditions, burns , AIDS, cancer, arthritis, gout, troical and celiac sprue, food allergy, space travel, high altitudes, flood and famines, heavy manual labour in tropical climate and chronic alcoholism.

Food Science

Relation of cookery to colloidal chemistry: Definition of colloidal system altering degree of dispersion, Hydrophilic and Hydrophobic colloids, stabilization of colloidal systems, properties i.e. surface tension, adorption, foam formation, rheology, gel. Formation and emulsions. **Beverages:** (Synthetic and natural, alcoholic and non-alcoholic, carbonated and non-carbonated, coffee, tea, cocoa, Malted drinks.) **Nuts and Oilseeds:** Composition, Oil extraction and by-products.; **Spices and Condiments:** Composition, flavouring extracts – natural and synthetic ; **Fermentation technology, enrichment and fortification technology.** **Sugar Cookery:** Sources, properties of crystallization of sugar, stages of sugar cookery fondant, fudge, caramel and brittles. ; **Starch Cookery:** Sources and uses of starch, gelatinization, Flours- Composition and baking qualities. Batters and doughs (chappaties and puries), Leavening agents, Cooking and parboiling of rice. ; **Fats and Oils:** Sources of edible fats and oils. Their characteristics and properties. Changes in fats during storage and cooking uses of fats. **Vegetables and fruits:** Structure, texture, pigments and acids in vegetables and fruits, Browning reaction. **Pectic substances:** Characteristics, uses, theory of

pectic gel formation, testing of pectin, factors affecting jelly formation. **Protein Cookery:** Eggs: Structure, composition and selection. Coagulation of eggs protein. Eggs cooked in shells, poached eggs, omelets. Meat: Structure, constituents of meat, post-mortem changes, Methods of cooking and changes in meat during cooking. Tenderness and juiciness. Fish and sea food- Types and composition, Storage and changes during storages. Changes during processing. By products and newer products.

Milk and Milk products: Composition and constituents of milk. Coagulation of milk protein. Setting of curds, Creaming butter, different types of cheese. **Grams and Dhals:** Composition, methods of processing and cooking, Effect of processing such as roasting, parching, soaking, germination and fermentation toxic factors in pulses

Community Nutrition:

Prevalence, etiology, biochemical and clinical manifestation, preventive and therapeutic measures for : Protein calories Malnutrition as well as during deficiencies of .Vitamins (A, B₁, niacin and C,) Iron , Iodine, calcium. Excess and low intake of fluorine. Factors affecting food distribution at macro and micro levels- Food production & conservation, Per capita food availability and consumption, Identification of target groups for nutrition intervention, Formulation of food production targets, **Nutrition surveillance and planning**, National nutrition Policy. **Methods used for assessment of Nutritional status of the Community**, Programmes for improvement of Nutritional status; **Nutrition Education:** Methods, Planning and execution, Evaluation and follow up.

Food safety and quality control: food safety issues, factors affecting food safety, importance of safe foods. **Shelf life of Food Products:** factors affecting shelf life and methods to check the shelf life. **Food additives (kind) and contaminants** of Natural and other origins. Genetically modified foods. **Recent concerns on food safety.**

Food processing: methods by application of heat and removal of heat, ambient temperature processing. Minimal processing, Pulsed electric field processing, processing using pulsed light. **Food laws and regulations: Food safety and quality management systems:** general principle of food safety risk management, hazard analysis critical control point system (HACCP). **Food Packaging.**

Physical Fitness and Sports Nutrition

Nutrition for Health and Fitness: Holistic approach to the management of fitness and health: Energy input and output. Diet and Exercise, Effect of specific nutrients on work performance and physical fitness. Nutrition, exercise, physical fitness and health inter-relationship. Energy systems for endurance and power activity: nutrients to support physical activity. Shifts in carbohydrate and fat metabolism during sports and exercise. Mobilization of fat stores during exercise.

Nutrition in Sports: Sports specific requirement: Diet manipulation. Pre-game and post-game meals. Diets for persons with high energy requirements, stress, fracture and injury.

Water and electrolyte balance: Losses and their replenishment during exercise and sports events, effect of dehydration, sports drinks.

Nutritional and exercise regime for management of obesity. Various dietary regimes for weight and fat reduction. Prevention of weight cycling. Nutrition and exercise regimes for pre and post-natal fitness.