Syllabus for Ph.D. entrance examination in Food Science and Nutrition

Core Subject

Unit I: Food Science

A. Processing of foods: Wheat, rice, millets, legumes, fruits and vegetables, fats and oils, sugarand confectionaries, beverages, milk and milk products, eggs, meat and fish. Product development and sensory evaluation.

B. Food spoilage and its control: Intrinsic and extrinsic factors of microbial growth, Contamination and spoilage of cereal, pulses, vegetables, fruits, flesh foods, eggs, poultry, marine products, milk & milk products. Food borne illness.

C. Concept and meaning of food quality and food Safety. National and international food laws, food standards and Governing bodies. Hazard analysis and critical control points in processing of foods. Quality control in Food industry.

D. Preservation of foods: Principles and techniques of preservation - Food dehydration and concentration, heat processing, cold preservation, chemicals and irradiation. Food Processing: Food fortification and Food packaging, Physico-chemical and functional attributes of food components. Instrumentation and applications of food processing.

Unit II: Advanced Nutrition

A. Body composition – Methods of study, compositional changes during life cycle, nutritional disorders, and their effect on body composition. Body fluids and water balance – Body water compartments, regulation of water balance, disorders of water balance.

B. Energy metabolism- Basal and resting metabolism – influencing factors, methods to determine energy requirements & expenditure, thermogenesis, adaptation to altered energy intake. Regulation of food intake.

C. Basis for computation of nutrient requirements, latest concepts in dietary recommendations, RDA – ICMR and WHO their uses & limitations.

D. Macro/macro nutrients and trace element: Carbohydrate, Protein, Lipids, Fat and Water soluble Vitamins and Minerals - Food sources – general and specific sources, Digestion, Absorption, bioavailability and functions. Relevance and essentiality – involvement in biochemical reactions and nutritional implications. Assessment of nutriture and analysis in food materials. Toxicity and deficiency - levels, symptoms, health consequences and their management

Unit III: Nutrition during life span

A.Pregnancy and lactation – Physiological adjustments, nutritional requirements, nutritional status of Indian Pregnant women, effect of malnutrition on outcome of pregnancy, complicationsof pregnancy. Lactation – Physiology of lactation, factors affecting lactation, nutritional requirements, effect of lactation on maternal malnutrition and fertility.

B. Growing period -Infancy – Growth and development, nutritional requirements, feeding pattern, compositional differences between human milk and milk substitute and their suitabilityfor infant feeding. Weaning practices, weaning and supplementary foods.

Preschool age - Growth and development, nutritional requirements, special care infeeding preschoolers, nutritional problems specific to this age.

School age and adolescent children – Growth and development, nutritional requirements, factors affecting their eating habits, nutritional problems specific to this age.

C. Adults and elderly – Nutritional requirements, nutritional status of Indian adult population, nutritional problems common to this age. Elderly – Nutritional requirements, special needs, nutritional problems.

Unit IV: Therapeutic Nutrition

A. Diet Therapy: Principles, Diet prescription, Modification of normal diet, Nomenclature of diet adequacy in standard hospital diet

B. Medical Nutrition Therapy: Modifications of diets in febrile conditions, Oral and dental conditions, Gastrointestinal disorders, Nutrition in critical care, cancer, allergies and food intolerances.

C. Nutrition in Non-communicable Disease: Cardiovascular disorders, diabetes mellitus, hypertension, renal diseases, pulmonary disorders, Liver, pancreas and Gall bladder.

D. Nutrition in metabolic diseases: Gout, inborn errors of metabolism, etiology, symptoms and complications, nutritional management.

Unit V. Public Health Nutrition

A. Public Health Nutrition: Aims and scope, primary prevention, nutritional epidemiology, public health and health promotion.

B. Nutrition related non-communicable diseases (Indian Perspective) – Demographic, developmental and nutrition transition and its impact on chronic diseases, prevalence and determinants, nutritional management and prevention strategies.

C. Assessment methods for research and practice – Dietary, anthropometric, clinical, functional, biochemical tests, body composition, as applicable in individuals, populations and specific situations, Integrating assessment data – subjective global assessments.

D. Nutrition in health care – Illness and nutrition status, health professionals and nutrition care, nutrition screening, nutrition care process, ethical issues in nutrition care.

Unit VI: Advances in Food Science and Nutrition

A. Recent concepts in food science and nutrition: Nutrigenomics, metabolomics, nutrition for space travelers, neutraceuticals, functional foods, genetically modified foods, fat substitutes, emerging food processing technologies {nanotechnology, microencapsulation, biopolymers for packaging, active packaging, edible gums and coatings, pulsed electric fields, supercritical extraction,membrane filtration}.

B. Special Nutrition: Nutrition during Physical activity and exercise, sports nutrition, nutrition in space, submarines.

C. Food and Drug Interactions: Affects on Kinetic properties, chemical properties, bioavailability and Metabolisms, Adverse affects.

D. Interactions of Nutrition and Immunity: Defense mechanisms and nutrients essential in the development of immune system. Malnutrition affecting the immuno-competence and susceptibility to infections.

REFERENCES:

- B. Srilakshmi (2015). Nutrition Science, New Age International Publishers.
- Sharma S.K & Kalvit H.K (2018). Objective Food Science, Jain Brothers Publishers.
- Swaminathan, M (1987). Food Science, Chemistry and Experimental Foods, Bangalore Publishers
- Potter N.M. & Hotchkiss J.H. (2000) Food Science, CBS Publishers & Distributors
- Visakh P. M., Laura B. Iturriaga & Pablo Daniel Ribotta. (2013). Advances in Food Science and Nutrition. Scrivener Publishing LLC.
- Fidel Toldra (2019). Advances in Food and Nutrition Research, Volume 87, 1st Edition Academic Press
- Kumud Khanna, Sharda Gupta, Santosh Jain Passi, Rama Seth, Ranjana Mahna & Seema Puri (2016). Textbook of Nutrition and Dietetics. Elite Publishing.
- Neeta Baijal & Lalita Sharma (2016). Basics of Dietetics and Therapeutic Nutrition. Star Publications
- Shubhangini A Joshi (2015). Nutrition and Dietetics. McGraw Hill Education.
- Krause (2010) Food, Nutrition and Diet Therapy, Saunders
- Insel P, Turner R.E & Don Ross (2010). Nutrition, Jones & Bartlett.