SYLLABUS FOR ENTRANCE TEST
(PhD, Food Science & Technology)
SAS&T, LEH, UNIVERSITY OF LADAKH

SUBJECT SPECIFIC (50 Marks)

Unit–I: FOOD MICROBIOLOGY

Types of microorganism associated with food- General characteristics, morphological features, physiological requirements, common microbes associated with foods. Microbial contamination and spoilage of foods–Vegetables, cereals, pulses, oilseeds, milk and meat during handling, processing and storage. Spoilage of processed foods –Canned products, causes of spoilage, appearance of spoiled cans, types of spoilage of canned foods by yeast, moulds and bacteria. Food borne disease-Staphylococcal gastroenteritis, Botulism, Listeriosis, Salmonellasis, Shigillosis. Toxicants of microbial origins – Aflatoxins, ochratoxins, patulin, botulim, enterotoxins.

Unit–II: FOOD BIOCHEMISTRY

Carbohydrates– Chemical reactions in foods, starch gelatinization and retrogradation, modified starches, alginate, pectin, carageenan. Lipids - Saturated and unsaturated foods, hydrogenation of fats. Lipid oxidation and rancidity. Protein and amino acids - Protein denaturation. Effect of processing on protein quality. Enzymes in foods –Papain, lipoxygenase, PPO. Loss of vitamins and minerals due to processing. Pigments in foods –Heme compounds, chlorophyll, alteration of chlorophyll, preservation of chlorophyll during processing, carotenoids and their properties, anthocyanins, their properties and stability, betalains and their properties, use of pigments and biocolours. Food flavours –Taste modalities, sweet, sour, bitter and salty, astringency, pungency, flavours from lactic acid –ethanol fermentation. Browning reactions – Enzymatic and non enzymatic, factors affecting their rate.

Unit–III: PRINCIPLES OF FOOD PROCESSING

Thermal Processing –Canning, Sterilization, Pasteurization, Extrusion. Dehydration–Water activity, types of dryers, effect of dehydration on food quality. Freeze drying. Intermediate moisture foods. Fermentation– Types, nutritional importance of fermented foods. Preservation by chemicals –Benzoate, sorbate, propionate, sulphur dioxide, antioxidants, Hurdle Technology Irradiation–Mechanism, dosimetery, Safety and wholesomeness of irradiated foods. Aseptic processing–HTST and UHT processing, Minimally processed foods–Preservation and packaging of minimally processed foods. Microwave processing–Electromagnetic spectrum, difference between microwave and infrared energy, equipment and applications. Refrigeration and frozen storage- Components of refrigerator, freezing and chilling injuries. Controlled atmospheric storage –Principle, effects of CA storage on food quality. Modified atmospheric storage.

Unit–IV: PRINCIPLES OF FOOD ENGINEERING

Fluid flow - Fluid statics, fluid dynamics, fluid flow applications. Heat transfer - Modes of heat transfer, conduction, convection and radiation, blanching, pasteurization, distillation. Thermal process calculations- D Value, Z value, F value calculation of process time for canned foods. Refrigeration– Principle, refrigeration cycle, thermo dynamics of refrigeration system. Evaporation–Single effect evaporators, multiple effect evaporators, steam economy, essence recovery during evaporation. Dehydration –Psychrometry, ERH, EMC. Size reduction – Slicing, dicing, flaking, shredding, pulping and chopping. Equipment of dry foods –ball mills, disc mills, hammer mills, roller mills. Size reduction of liquid foods – homogenization,

Unit–V: FOOD QUALITY ASSURANCE

Methods of quality assessment–Subjective & objective methods. Sampling–Types of samples, preparations & preservation of sample, sampling errors. Factors affecting sampling size. Statistical quality control–X & R charts, steps for developing control charts. Properties of foods–Colour, gloss, flavour, consistency, viscosity, texture & their relationship with quality. Quality evaluation of foods–Fruits, vegetables, cereals, dairy products, meat, poultry, egg and processed food products. National & international Food laws–AGMARK, PFA, FPO, F S S A I, Codex Alimentarius Commission, grades

and standards. IPR and patents. General hygiene and sanitation in food industry–GMP, HACCP. Food adulteration and food safety–Physical, chemical & biological hazards in foods. Sensory evaluation - Definition, objectives. Panel screening - Selection methods, interaction and threshold. Sensory evaluation methods / training– Difference tests. Instrumental analysis in quality control and food rheology

Unit–VI: FOOD PACKAGING

Introduction to packaging. Principles in the development of protective packaging. Deteriorative changes in foodstuffs and packaging methods for prevention. Shelf life of packaged food stuffs, method to extend shelf life. Migration of contaminants. Food containers–Rigid containers, Corrosion of containers (Tin plate). Can Fabrication. Flexible packaging materials and their properties–Bags, pouches, wrappers, cartons and other traditional package. Shrink packaging, retortable pouches, Wooden boxes, crates, plywood and wire bound boxes. Corrugated and fiber board boxes. Textile and paper sacks. Factors affecting package stability. Packaging standards and regulations, labeling, regulations and functions of labelling. Flexible and laminated pouches, aluminum as packaging material. Biodegradable, edible and active packaging. Packaging requirements of fruits / vegetables, meat, milk, fruit juices and pulps, spices.