Syllabus for Entrance Test for Ph.D. (Tech) in Food Engineering and Technology

1. Chemistry and functional properties of major food constituents such as proteins, lipids, polysaccharides, their physicochemical and nutritional profile, as well as changes therein on processing; and minor constituents such as vitamins and minerals with respect to physiological functions, deficiency symptoms, food sources, and the effect of processing therein; interactions between food constituents and their impact on processed foods.
2. Basic and advanced nutrition related to major food constituents, Energy value of foods, calculation of energy value based on proximate composition of foods, daily energy need of body for basal metabolism, physical activity and diet induced thermogenesis, energy balance, B. M. I.; role of carbohydrates in nutrition including dental caries, lactose intolerance, galactosemia, dietary fiber, resistant starch, glycemic index of foods, prebiotics including oligosaccharides; role of proteins in nutrition including essential amino acids, protein quality, complete proteins, animal and plant sources of proteins, protein calorie malnutrition, protein quality estimation methods including in vivo and in vitro; role of lipids in nutrition including fat digestion, absorption, saturated fats, medium chain triglycerides, PUFAs as essential fatty acids, omega 6 and omega 3 fats, cholesterol, plant sterols; role of micronutrients in nutrition including fat and water soluble vitamins and minerals; role of water and electrolytes, rehydration therapy; assessment of nutritional status; lifecycle nutrition; sports nutrition; food fortification; effect of food processing and storage on nutrients; nutraceuticals and functional foods; nutrigenomics
3. General biochemistry- metabolic pathways related to carbohydrates, lipids and proteins, enzymes- classification, kinetics, activators, inhibitors; food biochemistry and its impact on quality of all types of processed foods.
4. General and Food Microbiology encompassing fermentation and spoilage of the entire range of food commodities.
5. Chemical contaminants, microbial toxins - safety, toxicology and quality assurance of processed food products.

6. Food additives, ingredients and nutraceuticals - their functions and role in food processing.
7. Commercial manufacture and quality assurance of products of all the commodity classes (cereals, legumes and grains; fruits and vegetables; dairy technology; animal product technology, plantation products), and steps in commercial manufacture and quality assurance of products thereof.
8. **Fundamentals of Food Engineering and Food Preservation**: Basic concept of thermo-dynamics, transport phenomenon; heat transfer, mass transfer in food processing; problems of equipment design with reference to common food processing unit operations such as drying, freezing, evaporation, membrane filtration. Basics of food rheology; size reduction; homogenization; centrifugation; filtration, extraction. Principles of thermal processing; calculation of process time- temperature schedules. Pasteurization & sterilization, canning, freezing; plank equation for freezing time; hurdle technology. Other important principles of preservation of food. Fundamental principles & advance technologies of food processing & preservation such as heat processing, dehydration, non-thermal technologies, as high pressure technology, pulse electric field, newer trends in extraction technologies etc.
9. **Basics and advances in food packaging-** functions of packaging, levels of packaging, materials used, their properties, food applications of these materials, factors affecting shelf life of packaged foods, food package labelling, package testing methods for different properties, retort packaging, aseptic packaging, MAP, active packaging, intelligent packaging, microwaveable packaging, edible coatings and films, biodegradable packaging, migration and scalping.
10. Chemical and instrumental analysis of food constituents and processed foods.
11. Biotechnology for commercial manufacture of foods and food ingredients.
12. Food safety & toxicology
13. Food legislation – CODEX, EFSA, FSSAI.

****