Syllabus for Ph.D Entrance Examination for Food Safety and Quality Assurance (FSQA)

Basic Concepts of Food Safety and Quality Assurance : Definition and Terminology; Current changes in global food safety standards and their harmonization; HACCP concept, principle and application in food industry; General Principles, Fundamentals and Standards requirements of QMS (ISO: 9000:2000); TQM tools and techniques; Biosafety concept, principles and safety levels; EMS/Laboratory Management System-ISO: 17025; NABL Accreditation of Food Laboratory; Statistical Quality Control.

Concept of Risk Analysis : Microbiological risk profile of pathogen/toxins, ICMSF Risk Ranking of Dairy Products; Risk Management Issues and Control Strategies for dairy products; Food infection, intoxication and toxi-infection; Growth /survival of pathogens, their pathology of illness, mode of transmission, virulence and infectivity.

General Principles of Food Law : Integrated Food Law and its harmonization; Standards, Specifications and guidelines; 2 and 3 class sampling plan; FSSAI Microbiological criteria for different foods including dairy products; Conventional / rapid detection methods/commercial kits for hygiene and safety indicators; Bio-sensors and their current application in food safety evaluation.

Food Microbiology : Classification of food related microorganisms, Sources of contamination, Types of food spoilages of raw and processed fruits, vegetables, meat and fish and milk products, preservative principle, microbial defects and their control measures, Role of different Bacteria in food fermentation; Clean milk production and antimicrobial systems in raw milk; Microbiological aspects of bactofugation, thermization, pasteurization, sterilization, boiling, UHT, non-thermal processes and membrane filtration techniques; Microbiological quality of cream and butter, ice cream, evaporated and condensed milk, dried milks, infant dairy foods, heat desiccated, acid coagulated, fermented and frozen products.
Food Quality Analysis : Setting up of quality control labs; Accreditation of Quality control laboratory and Role of national & International organization viz. IDF; CAC; AOAC; WTO, BIS; CCFS; FSSAI and Agmark; Sampling techniques for chemical analysis of foods with respect to Macro & micro food nutrient analysis by colorimetric, spectrophotometric, flourimetric and chromatographic techniques; Definition and importance of sensory evaluation and General rules of sensory evaluation; Requirements of sensory evaluation; Techniques of sensory evaluation: types of tests and ranking, scoring techniques; Detection of Chemical contaminants /residues: pesticides; antibiotics; heavy metals; radionuclides etc. 2

Chemistry of milk and milk products : Definition, composition and level of various constituents of milk; Physical properties of milk; Chemistry of major milk constituents- carbohydrates; proteins, enzymes, lipids, vitamins and salts; Effect of various processing variables on the constituents of milk; Chemistry of milk products; Composition and legal standards of milk and milk products; Reaction kinetics; Role of enzymes as a biological catalysts; Water activity and its role on shelf-life of milk products; Chemistry of oxygen in relation to auto-oxidation of milk fat, thermal oxidation; Emulsions, foams, gels-their formation, structure and stability; Functional properties of major food ingredients- starch, proteins and lipids; Hydrocolloids and interactions with proteins; legal requirements for food colorants.

Research techniques : Principles, theory and applications of spectroscopy - visible, infrared and ultraviolet; Chromatography - thin layer, gas liquid, high pressure liquid chromatography (HPLC), gel filtration, ion exchange and affinity; Electrophoresis (PAGE, SDS-PAGE); iso-electric focusing, ultra-centrifugation, potentiometry - pH meter and ion selective electrodes.