

## Department of Food Technology

### Examination Scheme for the Ph.D Course work (Jan,17 to Dec,17)

Sr. No.	Paper code	Subject	Internal Assessment*	Written Theoretical Evaluation	Seminar** (if any)	Total Marks
1	17FTEPC1	Trends in Food Safety and Quality Management Systems	20	80	----	100
2	17FTEPC2	Advanced Tools and Techniques in Food Research & Analysis	20	80	----	100
3	17FTEPC3	Research Methodology and Data Analysis	20	80	----	100
4	17FTEPC4	Review writing and presentation/seminar	---	50	50	100
Grand total						400

**Note: Each theory paper is of 4h duration per week.**

**\*Internal assessment criteria:**

Two assignments of 10 marks each

**\*\*Seminar**

**Division of marks**

Seminar report:	20
Presentation :	15
Discussion/questions :	15

17FTEPC1: Trends in Food Safety and Quality Management Systems  
MM. 80 Time: 3 h

*Note: There will be nine questions in all. The first question will be compulsory and will comprise of eight short answer type questions each of 2 marks. The remaining eight questions will comprise of two questions from each unit and the candidates will have to attempt four questions selecting one question from each unit. Each question will consist of 16 marks.*

**Unit 1**

Concept of food quality and food safety, need for food safety, major challenges to food safety, major consumer concerns and issues regarding food safety and quality, food safety scenario in India, food safety and quality measures techniques in India, FPO, MFPO, MMPO, AGMARK.

**Unit II**

Principles of food safety management: good hygienic practices (GHP), good manufacturing practices (GMP), food safety hazards, hazard analysis, HACCP principles and implementation in food industry, Good laboratory practices: concept, present status and future need for food industry, concept of food traceability and its need for food safety management system.

**Unit III**

Food safety management systems, Food safety standards: purpose, classification and types of food standards, standards setting organizations, ISO 15161: 2001, ISO 15161:20002, ISO 22000, legal aspects of food safety management systems, global laws on food safety, Food Safety and Standards Act of India (FSSA): prospects and problems.

**Unit IV**

Quality assurance and management systems in food industry, principles of quality control, quality standards, ISO standards for food industry, total quality management (TQM) in food industry, certification for food safety and quality management systems, certification criteria, selection of certification bodies, role of accreditation in food industry, accreditation agencies, benefits of certification and accreditation.

**Books recommended**

1. Arora, K.C. 2000. TQM and ISO 14000, Kataria Publications, New Delhi.
2. Bank, J. 1996. The Essence of Total Quality Management, Printice Hal of India, New Delhi.
3. Jouve, J.L., Stringer, M.F., Baird Parker, A.C. 1998. Food Safety Management Tools, International Life Science Institute, ILSI Europe, Brussels.
4. Hester, R.E., Harrison, R.M. 2001. Food Safety and Food Quality, The Royal Society of Chemistry.
5. Inteaz Alli. 2003. Food Quality Assurance: Principles and Practices, CRC Press
6. Schimdt, Ronald, H., Rodrick, Gary, E. 2003. Food Safety Handbook, John Wiley and Sons Publication

17FTEPC2: **Advanced Tools and Techniques in Food Research & Analysis**

**MM. 80**

**Time: 3**

*Note: There will be nine questions in all. The first question will be compulsory and will comprise of eight short answer type questions each of 2 marks. The remaining eight questions will comprise of two questions from each unit and the candidates will have to attempt four questions selecting one question from each unit. Each question will consist of 16 marks.*

**Unit I**

Electrophoresis: different methods of electrophoresis for protein, electrofocussing and SDS-PAGE, chromatography:–adsorption, affinity, partition, Ion-exchange, gel permeation, GC, TLC, HPLC etc

**Unit II**

Theory and principles of centrifugation and application to food systems, rotor heads, differential centrifugation density gradient centrifugation, gel filtration, supercritical fluid extraction

**Unit III**

Introduction to principles and applications of Spectroscopic techniques (UV, Vis, IR, fluorescence, FTIR, NMR), atomic absorption, theory of lyophilization and its applications to food systems

**Unit IV**

Microscopic techniques in food analysis, introduction to principles and working of light and electron microscope, thermal methods in food analysis (differential scanning calorimetry), viscosity measurement in food systems (viscometers and viscoamylographs)

**Books recommended**

1. AOAC International.2003. Official methods of analysis of AOAC International. 17<sup>th</sup> Ed. Gaithersburg, MD, USA, Association of Analytical Communities.
2. Kirk, R.S.& Sawyer, R.1991. Pearson's Chemical Analysis of Foods. 9<sup>th</sup> Ed. Longman Scientific & Technical.
3. Leo, M.L. 2004.Handbook of Food Analysis.2<sup>nd</sup> Ed. Vols.I-III.
4. Linden, G. 1996. Analytical Techniques for Foods and Agricultural Products. VCH.
5. Macleod, AJ. 1973. Instrumental Methods of Food Analysis. Elek Sci. Marcel Dekker.
6. Nielsen, S. (Eds.). 1994. Introduction to Chemical Analysis of Foods. Jones & Bartlett.
7. Pomeranz, Y. & Meloan, C.E. 1996. Food Analysis- theory and Practice. 3<sup>rd</sup> Ed.CBS.publisher.
8. Ranganna, S. 2001. Handbook of Analysis and Quality Control for Frui and Vegetable Products. 2<sup>nd</sup> Ed. Tata-McGraw-Hill.

17FTEPC3: **Research Methodology and Data Analysis**  
MM. 80

Time: 3 h

*Note: There will be nine questions in all. The first question will be compulsory and will comprise of eight short answer type questions each of 2 marks. The remaining eight questions will comprise of two questions from each unit and the candidates will have to attempt four questions selecting one question from each unit. Each question will consist of 16 marks.*

### **Unit I**

**Planning a research problem:** Meaning, aims, nature and scope of research, steps in research process, characteristics and prerequisites of good research, criteria / characteristics of a good research problem, criteria in selecting a research problem, formulation of objectives, research plan and its components.

### **Unit II**

**Research methodology and experimental design:** Guidelines for design of experiments, materials and methods, designing experiments for food analysis, types of samples and sampling techniques, characteristics of a good sample, sampling and non sampling errors, preparation of samples, performing experiments, compilation and documentation of data.

### **Unit III**

**Thesis writing, presentation and research publication:** Format of the research report, style of writing the report, references and bibliography, effective presentation and discussion of results/findings, significance of writing research papers and review articles, impact factor and citation index, intellectual property rights and plagiarism.

### **Unit IV**

**Statistical applications and data analysis:** An overview of application of central tendency and dispersion, standard deviation, standard error of mean, coefficient of variation, variance, population null hypothesis, level of significance and confidence, power of test, one tail and two tail test, parametric tests: definitions and applications of Z test for one and two sample means, t-test for one and two sample means, F test for two variances, analysis of variance (ANOVA) (One way and two way), correlation and regression analysis.

### **Books Recommended**

1. Basotia, G.R. and Sharma, K.K. 2009. *Research methodology*
2. Chaudhary, C.M. 2009. *Research methodology*, RBSA Publications
3. Kothari, C.R. 2004. *Research methodology: Methods and Techniques*
4. Gupta, S. P. 2008. *Statistical Methods*, Sultan Chand and Sons, New Delhi.
5. Gupta, S.C. & Kapoor, V.K. 2003. *Fundamentals of Mathematical Statistics*. S. Chand & sons.