ST ALOYSIUS
(DEEMED TO BE UNIVERSITY)
MANGALURU 575003 - INDIA
ESTD : 1880

Syllabus fors PhD Entrance Exam

January -2025

Department: Food Science

PART I – RESEARCH METHODOLOGY

Unit 1 **Foundations of Research Methodology**

Research and its types, Identifying and Defining Research Problem, Introduction to different Research Designs. Basic principles of experimental design, selection of experimental material, Essential Constituents of Literature Review. Basic Principles of Experimental design.

Unit 2 **Data Collection and Sampling Techniques**

Primary data and secondary data, methods of primary data collection, classification and summarization of data. Presentation of Data - Diagrams and Graphs. Introduction to scientific writings (research papers). Sampling, Need for sampling, unit, population, sample, sampling error, sampling methods; Simple Random Sampling, Probability Sampling, Systematic Sampling, Stratified Sampling, Cluster Sampling and Multistage Sampling. Sample size, Standard Error.

Unit 3 **Statistical Analysis and Hypothesis Testing**

Normal Distribution; Measures of Central Tendency (Mean, Mode Median); Measures of Central Dispersion (Range, Standard Deviation, Standard Error, Coefficient of Variation); Tests of Significance – 't' Test (One Sample and Two Sample Tests), Testing of Hypothesis- Type I and type II errors; Analysis of Variation (ANOVA).

Unit 4 **Probability, Correlation, and Experimental Design**

Probability distribution- Binomial, Poisson, and Normal. Study of relationship between variables Regression – Simple, Multiple (three Variables). Chi square test for goodness of fit, Correlation Analysis, Design of experiments.

Unit 5 **Scientific Reporting and Thesis Preparation**

Types, Structure and components of Scientific Reports; Technical Reports and Thesis; Steps in the preparation of reports and thesis layout, structure and language of typical reports, illustrations and tables, bibliography, referencing and foot notes. Citation, Impact factor, h-index and Acknowledgement.

References

1. Kothari, C. R. (2004). Research methodology: Methods and techniques. New Age International.
2. Montgomery, D. C. (2007). Introduction to statistical quality control. John Wiley & Sons.
3. Chawla, D & Sodhi, N. (2011). Research methodology: concepts and cases. Vikas Publishing House.
4. Singh, Y. K. (2006). Fundamental of research methodology and statistics. New Age International.
5. Gupta, S. (2002). Research methodology and statistical techniques. Deep and Deep Publications.

Part II – Domain Specific

Food Technology and Nutrition

Unit 1 **Fundamentals of Food Microbiology and Preservation**

Historical developments in general and food microbiology. Sources of microorganisms in foods. Microbial growth and its implications in food. Immunological methods: fluorescent antibody, radioimmunoassay, ELISA, and PCR. Water activity: role in food preservation, intermediate moisture foods (IMF).

Unit 2 **Food Preservation Techniques**

Dehydration: definition, drying vs. concentration, drying curves, and drying methods. Types of dryers and their applications in food preservation. Gamma irradiation, Microwave heating, and Ohmic heating in food processing. Freezing and thawing: phase change operations in food preservation.

Unit 3 **Dairy and Cereal Processing**

Dairy industry: definition, composition, nutritive value, and types of milk. Physico-chemical properties of milk: milk fat structure, fat destabilization, milk proteins. Structure and chemical composition of wheat. Wheat milling: general principles, dough rheology, and measurement. Bread making processes and the role of enzymes in bread making.

Unit 4 **Food Engineering and Heat Transfer**

Units, Dimensions, and Conversions: SI System. Steam generation, properties, and Psychrometric chart. Boilers: types and applications in food processing. Mechanism of heat transfer: heat exchangers, boiling, condensation, and evaporation.

Unit 5 **Storage and Preservation of Fruits, Vegetables, Meat, and Fish**

Classification, composition, and nutritional significance of fruits and vegetables. Pre-storage treatments, refrigerated storage, CA, MA, and hypobaric storage. Modified Atmospheric Packaging (MAP) and recent developments. Meat, poultry, and fish industries: status, scope, and preservation techniques. Meat tenderization methods: natural and artificial, pre-rigor processing.

Unit 6 **Functional Foods and Food Safety**

Nutraceuticals and functional foods: definition, importance, and role in disease prevention. Food safety management systems: HACCP principles. Role of national regulatory agencies: PFA, FPO, FSSAI. Introduction to food packaging: functions, Vacuum and Modified Atmosphere Packaging Systems

Unit 7 **Basic Nutrition Concepts**

Introduction to nutrition: definition, scope, and significance. Basic nutrition terminology: nutrients, metabolism, and dietary guidelines. Carbohydrates: types, functions, and food sources. Proteins: amino acids, complete vs. incomplete proteins, functions, food sources. Fats: types (saturated, unsaturated, trans fats), functions, food sources. Recommended dietary intake and energy balance.

Unit 8 **Micronutrients and Dietary Guidelines**

Water-soluble vs. fat-soluble vitamins: functions, deficiencies, and sources. Key minerals (calcium, iron, potassium, magnesium, zinc) and their roles in health. Impact of micronutrient deficiencies. Food guides, food pyramids, MyPlate, and dietary guidelines. Portion sizes and reading food labels.

Unit 9 **Nutrition Across the Life Span**

Nutritional needs at different life stages: infants, children, adolescents, adults, and older adults. Special considerations during pregnancy and lactation. Role of diet in chronic disease prevention: obesity, heart disease, diabetes, osteoporosis. Understanding antioxidants and their role in health.

Unit 10 **Specialized Nutrition and Assessment**

Dietary considerations for athletes, vegetarians, and vegans. Addressing food allergies and intolerances: lactose intolerance, gluten sensitivity. Nutritional assessment methods: BMI, dietary recall, food diaries. Meal planning for various age groups and special dietary needs. Nutritional supplements: types and appropriate use.

References:

1. James M. Jay (2000). Modern Food Microbiology, 5th Edition, CBS Publishers.
2. Khetarpaul N. (2005). Food Processing and Preservation, Dya Publishing House, New Delhi.
3. Rathore N S (2008). Fundamentals of Dairy Technology-Theory & Practices. Himanshu Publication.
4. R. Paul Singh and Dennis R. (2013) Introduction to Food Engineering, Elsevier Science

& Technology, 5th Edition, ISBN: 9780123985309.
5. A.K. Thompson (2003): Fruit and Vegetables – Harvesting, handling and storage. 2nd Edition Blackwell Publishing.
6. Vacklavic Vickie, A., and W. Christian Elizabeth. (2008). Essential of Food Science Texas Springer Science Business Media.
7. A R Sen, M Muthukumar, B M Naveena. (2013) Meat Science: A Student Guide. Satish Serial Publishing House.
8. Robert EC. (2006). Hand book of Nutraceuticals and Functional Foods. 2nd Ed. Wildman.
9. Stanbury, P.F., A. Whitaker and S.J. Hall, (1997), Principles of Fermentation Technology, 2nd Edition Aditya Books (P) Ltd.
10. Vogel, H.C. and Todaro, C.L. (2005). Fermentation and Biochemical Engineering Handbook: Principles, Process Design and Equipment, 2nd Edition, Standard Publishers.
11. Ahvenainen, R. (2003) Novel Food Packaging Techniques, CRC Press.
12. Robertson, G.L. (2006). Food Packaging: Principles and Practice (2nd), Taylor & Francis.
13. Early R. (1995) Guide to Quality Management Systems for the Food Industry, Blackie, Academic and professional, London.
14. David Zachary Mc Swane, Richard Linton, Nancy R. Rue, (2010). Food Safety Fundamentals: Essentials of Food Safety and Sanitation - Second Edition, Food Marketing Institute.
15. Mann, J., Truswell, S., & Hodson, L. (Eds.). (2023). Essentials of Human Nutrition 6e. Oxford University Press.
16. Gibney, M.J., Lanham-New, S.A., Cassidy, A. and Vorster, H.H. (2009). Introduction to Human Nutrition, 2nd Edition. Wiley-Blackwell, A John Wiley and Sons, Ltd., Publication.
17. Venn, B. J. (2020). Macronutrients and human health for the 21st century. Nutrients, 12(8), 2363.
18. Krause's food and the nutrition care process, 14th edition (2017), L Kathleen Mahan and Janice Raymond.
19. Raymond, J. L., & Morrow, K. (2022). Krause and Mahan's Food and the Nutrition Care Process, 16e, E-Book: Krause and Mahan's Food and the Nutrition Care Process, 16e, E-Book. Elsevier Health Sciences
20. Mahan, L. Kathleen (2018). Krause's Food & the Nutrition Care Process-E-Book: Krause's Food & the Nutrition Care Process-E-Book. Elsevier Health Sciences.

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