

THIRUVALLUVAR UNIVERSITY

MASTER OF PHILOSOPHY

M.PHIL. MICROBIOLOGY

(FT/PT)

PART I

CORE COURSE I

RESEARCH METHODOLOGY

UNIT-I: RESEARCH METHODOLOGY

Meaning of research - Objectives of research - motivation of research - Types, approaches and significance - Methods versus methodology - Research in scientific methods - Research process - Criteria for good research - Problem encountered by research in India - Funding agencies.

UNIT-II: RESEARCH DESIGN

Research Problem: Selecting the problem - Necessity of defining the problem - Techniques involved in defining the problem - Research design - Needs and features of good design - Different research design - Basic principles of experimental designs.

UNIT-III: DATA COLLECTION AND DOCUMENTATION

Data collection methods - Data types - Processing and presentation of data - Techniques of ordering data - Meaning of primary and secondary data - The uses of computers in research - The library and internet - Uses of search engines - virtual libraries - common software for documentation and presentation.

UNIT-IV: DATA AND ERROR ANALYSIS

Statistical analysis of data - Standard deviation - Correlation - Comparison of sets of data - Chi squared analysis for data - Characteristics of probability distribution - Binomial, Poisson and normal distribution - Principle of least square fittings - Curve

fitting - Measurement of errors - Types and sources of errors - Determination and control of errors.

UNIT-V: RESEARCH COMMUNICATION

Meaning of research report - Logical format for writing thesis and paper - Essential of scientific report: abstract, introduction, review of literature, materials and methods and discussion - Write up steps in drafting report - Effective illustrations: tables and figures - Reference styles: Harvard and Vancouver systems.

REFERENCE BOOKS:

1. Research Methodology, Methods and Techniques - C.R. Kothari - Wishwa Prakasam Publications, II Edition.
2. Research: An introduction - Robert Ross - Harper and Row Publications.
3. Research methodology - P. Saravanavel - Kitlab Mahal, Sixth Edition.
4. A Hand book of Methodology of Research - Rajammal P.A. Devadass - Vidyalaya Press
5. Introduction to Computers - N. Subramanian
6. Statistical methods - G.W. Snedecor and W. Cochran - Oxford and IBH, New Delhi.
7. Research Methodology Methods and Statistical Techniques - Santosh Gupta.
8. Statistical Methods - S.P. Gupta
9. Scientific social surveys and research - P. Young - Asia Publishers, Bombay.
10. How to write and publish a scientific paper - R.A. Day - Cambridge University Press.
11. Thesis and Assignment writing - Anderson - Wiley Eastern Ltd.

PART I
CORE COURSE II
ADVANCED MICROBIOLOGY

UNIT-I:

Discovery of microbes, abiogenesis vs biogenesis, Culture media - types of culture media, special media. Methods of isolating pure cultures, methods of maintenance and preservation of pure cultures. Unculturable microbes, quorum sensing.

UNIT-II:

Microscopy - light microscopy (bright field, dark field, phase contrast, fluorescence, UV microscopy), Electron microscopy (SEM, TEM), and Acoustic microscopy, Microbial stains - Acidic dyes, Basic dyes, neutral dyes; Staining procedures - simple, differential, acid fast and negative staining.

UNIT-III:

Microorganisms in soil fertility, rhizosphere, mycorrhiza, biological nitrogen fixation, biofertilizers, biological control, biopesticides.

UNIT-IV:

Microbes in industry, Industrial fermentation, Bioreactors, batch fermentation, continuous fermentation and Fed-batch fermentation. Production of antibiotics (Penicillin) and vaccines. Food microbiology.

UNIT-V:

Sewage treatment - Physical, biological and chemical process.

Bioremediation: Approaches to bioremediation - environmental modification, microbial seeding, bioengineering; Bioremediation of contaminated soil, aquifers, air pollutants, marine oil pollutants.

REFERENCE BOOKS:

1. General microbiology - Powar & Danginwala Himalaya publications.
2. Microbiology - Concepts and Applications - Paul A. Ketchum, Jhon - Wiley & Sons.
3. Basic and Practical Microbiology - RM. Atlas, Macmillan Publishing Company.
4. Microbiology-Prescott, Harley & Klein, McGraw-Hill Companies Inc.
5. Text book of Biotechnology - RC. Dubey. S. Chand & Co.
6. Microbiology - Peleczar, Chan & Krieg. Tata McGraw-Hill Publishing Company.
7. Industrial Microbiology - LE. Casida, New Age International (P) Ltd. Publishers.
8. Gene manipulation - An introduction to genetic engineering - Old & Primrose, Blackwell Scientific Publication.