

**SYLLABUS FOR PHD ENTRANCE EXAMINATION
SCHOOL OF APPLIED SCINECES (MICROBIOLOGY)**

UNIT1

MICROSCOPY AND MICROBIAL TAXONOMY :

Light microscopy - Bright field microscope, Dark field microscope, Phase-contrast microscope, fluorescence microscope.

Electron microscopy-TEM and SEM

Confocal microscopy, scanning probe microscopy

Specimen preparation and staining for microscopy

Microbial evolution-RNA world, three domains of life, endosymbiont theory

Taxonomy and classification-Phenetic, phylogenetic, genotypic and numerical taxonomy.

Techniques for determining microbial taxonomy and phylogeny

An overview of Bergey's manual of systematic bacteriology

UNIT 2

MICROBIAL PHYSIOLOGY AND MICROBIAL GENETICS:

Growth and cell division ,Aerobic and Anaerobic respiration, fermentation, Chemolithotrophy and Phototrophy, Nitrogen metabolism, Chemotaxis, Intercellular signaling-Quorum sensing.

Genetransfer and mapping by Conjugation, Transformation, Transduction, Transposons, Gene regulation, Lytic and lysogenic bacteriophages.

UNIT 3

MICROBIAL PATHOGENICITY AND IMMUNOLOGY:

Host -parasite relationships , Pathogenesis of Viral diseases and Bacterial diseases, Toxigenicity.

Cells and organs of Immune system, Types of immunity, Complement system ,MHC molecules.

UNIT 4

APPLIED AND INDUSTRIAL MICROBIOLOGY:

Water purification and sanitary analysis , waste water treatment

Major products of industrial microbiology; Antibiotics, Amino acids, Organic acids, Medicine and health.

Biopolymers , Bio surfactants, Bioconversions processes.

Biodegradation and bioremediation by natural communities: biodegradation and bioremediation processes, stimulating biodegradation-hydrocarbon degradation in water and soils.

Phyto remediation and types, Metal bioleaching, Bio augmentation, Microbes as Biosensors, Bio pesticides.

REFERENCES

- 1) Michael Madigan. John Martinko. Kelly Bender ,Daniel Buckley. David stahl. Fourteenth edition. Brock Biology of microorganisms, Pearson publishers.
- 2) Joanne M.Willey, Linda M.Sherwood, Christopher J.Woolverton. Tenth edition. Prescotts microbiology, Mcgraw Hill.
- 3) Stanley R.Maloy, John E cronan, Jr.Davidfreifelder. Second edition. Microbial genetics, Narosa publishing house.
- 4) Gerhard Gottschalk. Second edition. Bacterial Metabolism, Springer Verlag.
- 5) Alexander n Glazer ,HiroshiNikaido. Second edition. Microbial Biotechnology: fundamentals of applied microbiology, Cambridge University press.
- 6) Thomas J.kindt, Richard A. Goldsby, Barbara A. Osborne. Sixth edition. Kuby Immunology, W.H freeman and company.

PART – B

Marks 50

RESEARCH METHODOLOGY

Research and Types of research: Meaning of Research- Objectives of Research- Motivation in Research. Research methods vs Methodology. Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical. Research Process. Criteria of good Research.

Research Formulation – Defining and formulating the research problem - Selecting the problem - Necessity of defining the problem - Importance of literature review in defining a problem – Literature review – Primary and secondary sources – reviews, treatise, monographs-patents – web as a source – searching the web - Critical literature review – Identifying gap areas from literature review - Development of working hypothesis.

Data Collection and analysis: Execution of the research - Observation and Collection of data - Methods of data collection – Modeling, Mathematical Models for research, Sampling Methods- Data processing and Analysis strategies. Data Analysis with Statistical Packages – Hypothesis-testing, Generalization-and-Interpretation.

Reference Books:

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.
2. Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International. 418p.
3. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, EssEss Publications. 2 volumes.
