



MASTERS OF PHILOSOPHY (M. PHIL.)
BIOCHEMISTRY
DETAILED SYLLABUS
SESSION 2013-14



PAPER I

RESEARCH METHODOLOGY THEORY AND TECHNIQUES

UNIT - I

Research: Definition, Importance and Meaning of research, Characteristics of research, Types of Research, Steps in research, Identification, Selection and formulation of research problem, Research questions – Research design – Formulation of Hypo Dissertation, Review of Literature.

UNIT – II

Sampling techniques: Sampling theory, types of sampling – Steps in sampling – Sampling and Non-sampling error – Sample size – Advantages and limitations of sampling.

Collection of Data: Primary Data – Meaning – Data Collection methods – Secondary data – Meaning – Relevances, limitations and cautions.

UNIT – III

Statistics in Research – Measure of Central tendency, Dispersion, Skewness and Kurtosis in research, Hypo Dissertation, Fundamentals of Hypo Dissertation testing, Standard Error, Point and Interval estimates, Important Non-Parametric tests: Sign, Run, Kruskal, Wallis tests and Mann, Whitney test.

UNIT – IV

Para metric tests: Testing of significance, mean, Proportion, Variance and Correlation, testing for Significance of difference between means, proportions, variances and correlation co-efficient. Chi-square tests, ANOVA, One-way and Two-way.

UNIT– V

Research Report: Types of reports, contents, styles of reporting, Steps in drafting reports, editing the final draft, evaluating the final draft.

Reference Books:

1. Statistical Methods - S.P. Gupta
2. Research Methodology Methods and Techniques - C.R. Kothari
3. Statistics (Theory and Practice) - B.N. Gupta
4. Research Methodology Methods and Statistical Techniques - Santosh Gupta



PAPER-II

PRINCIPLE OF BIOCHEMISTRY

UNIT I

Living Organism: The molecular logic of Living Organism, Water- properties, Electrolytic dissociation into cations and anions – Henderson – Hasselbalch equation, Proteins – General structural design. Aminoacids and peptides – covalent structure, three – dimensional structure and subunit structure. Fibrous proteins and Globular proteins. Structure and function of Haemoglobin and Myoglobin, Carbohydrates – structure and biological function, Enzymes – classification of enzymes. Specificity of enzyme action. Allosteric enzymes, enzyme inhibition and regulation of enzyme activity. Enzyme kinetics. Factors affecting enzyme activity. Vitamins as Coenzymes. Isoenzymes (LDH), Lipids – Saturated and unsaturated fatty acids. Triglycerides, phospholipids, glycolipids. Sterols – prostaglandins.

UNIT II

Cellular Metabolism and Metabolic Cycles & Energy Production: Thermodynamics of cellular reactions. Redox potential, Energy rich compounds and their biological significance, Biological oxidation, Mitochondrial Electron transport, Oxidative phosphorylation and ATP synthesis, Chemiosmotic theory. **Metabolic Cycles and Energy Production:** Glycolysis – A central pathway of glucose catabolism, TCA cycle and its significance, Hexose – Mono-phosphate shunt, Fatty acid oxidation, ketone bodies, ketosis and metabolism of ketone bodies, Glycogenolysis, Glycerol metabolism

UNIT III

Glycogenesis and Protein Metabolisms: Glycogenesis, Gluconeogenesis, Regulation of carbohydrate metabolism, Biosynthesis of fatty acids, Interrlationship between carbohydrate and lipid metabolism, Cholesterol synthesis and degradation. **Protein Metabolisms:** Deamination, transmination, decarboxylation, Urea cycle

UNIT IV

General characteristics of hormones: Chemistry and function of hormones, hormone receptors and hormone action, Hormonal control of cellular metabolism.



UNIT V

Nucleic acids structure and function: Purine and pyrimidine derivatives, Nucleosides, nucleotides and internucleotide linkages, Chemical nature of DNA and RNA, Biological functions of nucleic acids

References Books:

1. Biochemistry - L.Stryer
2. Principles of Biochemistry - A.L.Lehninger
3. Concepts in Biochemistry - Conn & Stumpf
4. Principles of Biochemistry - E.L.Smith, R.L.Hill et al
Vol. I & II (7th Edn.)
5. Harper's Biochemistry - Murray, R.K., Granner, D.K.,
Mayes, P.A. & Rodwell, V.W.

PAPER-III INDUSTRIAL BIOTECHNOLOGY

UNIT I

Introduction To Industrial Bioprocess: A historical overview of industrial fermentation process – traditional and modern biotechnology. A brief survey of organisms, processes, products relating to modern biotechnology. Process flow sheeting – block diagrams, pictorial representation.

UNIT II

Production Of Primary Metabolites: A brief outline of processes for the production of some commercially important organic acids (e.g. citric acid, lactic acid, acetic acid etc.); amino acids (glutamic acid, phenylalanine, aspartic acid etc.) and alcohols (ethanol, butanol etc.)

UNIT III



Production Of Secondary Metabolites: Study of production processes for various classes of secondary metabolites: antibiotics: beta-lactams (penicillin, cephalosporin etc.), aminoglycosides (streptomycin etc.), macrolides (erythromycin), vitamins and steroids.

UNIT IV

Production Of Enzymes And Other Bioproducts: Production of industrial enzymes such as proteases, amylases, lipases, cellulases etc., Production of biopesticides, biofertilisers, biopreservatives (Nisin), cheese, biopolymers (xanthan gum, PHB etc.), single cell protein.

UNIT V

Production Modern Biotechnology Products: Production of recombinant proteins having therapeutic and diagnostic applications, production of vaccines. Production of monoclonal antibodies. Products of plant and animal cell culture

References:

1. Wulf Cruger and Anneliese Crueger, "Biotechnology: A Textbook of Industrial Microbiology", Panima Publishing Corporation.
2. Murrey Moo & Young, "Comprehensive Biotechnology", Pergamon.
3. Casida Jr, L.E., "Industrial Microbiology", New Age International (P) Ltd. Presscott, Dunn, "Industrial Microbiology", Agrobios (India).

PAPER-IV DISSERTATION