MADHYANCHAL
PROFESSIONAL UNIVERSITY

Syllabus

for

Ph. D in Biotechnology

Paper - I

Theories of origin of life, water, concept of pH, buffer, cell Biology-General Structure and Function of Cell and Cell organelles, types of cells, cell theory, membrane transports, cell signaling, motility and shape, cell aging, methods of cell biology.

Biochemistry-Fundamentals of Biochemistry, Structure and function of macro molecules-amino acids and nucleic acids, enzymes as biocatalysts, important metabolic pathways (glycolysis, calvin cycle,TCA, HMP, etc.). Biological oxidation and its coupling to ATP synthesis, vitamins, co-enzymes and co-factors.

Structure, function & diversity of microorganisms, scope of microbiology, prokaryotic and eukaryotic microorganisms, microbial nutrition , sterilization and pure culture techniques, polyphasic and numerical taxonomy. Antibiotics- mode of action and mechanism of drug resistance.

Types of immune response. Major histocompatability system, complement system, molecular mechanisms of antibody diversity, cytokinin and hypersensitivity , autoimmunity and vaccines, co genetical and acquired immuo deficiencies, detection of moleculas using RIA, ELSA, western blot, immuno precipitation, flow cytometry FISG, GISH, hybridoma technology.

DNA structure and replication in prokaryotes and eukaryotes, DNA damage and repair, types of mutation, RNA structure and synthesis, protein synthesis and targeting, regulation of gene expression in prokaryotes and eukaryotes , gene silencing by sense, antisense, RNAi technology.

Recombinant DNA Technology. Molecular tools of genetic engineering, techniques in genetic engineering, gene cloning and gene libraries, and applied aspects of genetic engineering. Large scale expression analysis-microarray based techniques, nucleic

acid, protein sequence database, data mining methods for sequence analysis, web based tools for sequence searches, motif analysis and presentation.

Bio-process technology- microbial stress, screening of and improvement of microbial growth and growth media. Bioreactor, Downstream processing.

Plant tissue culture, Biopesticides and integrated pest management. Animal cell culture, techniques of cell culture, embryo technology, transgenic crops and animal, molecular pharming, Bioethics and Biosafety, IPR, waste water, solid waste management, Bioremediation and detoxification of hazardous chemicals, Biodiversity and its conservation.

Introduction to biostatistics, sampling methods, sample analysis,, basic test- t-test, chi-square test ANOUA, Tukeys HSD part hoc, regression, and coreletion.

PAPER –II

General Aptitude (GA)

Verbal Ability: English grammar, sentence completion, verbal analogies, word groups, instructions, critical reasoning and verbal deduction.

Numerical Ability: Numerical computation, numerical estimation, numerical reasoning and data interpretation.