Msc. Life Sciences - Syllabus

(M.Sc. BIOTECHNOLOGY, BIOCHEMISTRY, BIOINFORMATICS, MICROBIOLOGY, FOOD SCIENCE & TECHNOLOGY, ENVIRONMENTAL SCIENCE)

SECTION – A

Classification, structure, properties, functions, metabolic pathways and disorders of carbohydrates, lipids, amino acids, proteins, and nucleic acids.

Nomenclature and classification of Enzymes. Factors affecting enzyme activity–Temperature, pH, substrate concentration. Enzyme inhibition, Coenzymes, metalloenzymes, allosteric enzymes and isoenzymes.

DNA replication, transcription and translation in prokaryotes and eukaryotes.

Concepts of immune response, cells and organs of the immune system, Antigen and antibody reactions: Precipitation and agglutination. Principle of vaccination and types of vaccines

SECTION – B

Structure of Prokaryotic and Eukaryotic cells. Structure and composition of Plasma membrane. Cell division - Mitosis and Meiosis. Ultrastructure and functions of Cell organelles. Photosynthesis and photorespiration. Biological nitrogen fixation, Nitrogen cycle and Phytohormones.

Principles of Mendelian inheritance, back cross and test cross. Linkage and crossing over. Sex linkage, Sex determination and Cytoplasmic inheritance. Mutations. Biosphere, Biodiversity, Plant succession, Biological pyramids, food chain, food web. Theories of Organic Evolution.

Classification invertebrates and vertebrates. Structure and function of kidney, liver and heart. Physiology of muscle and nerve.

SECTION – C

Balanced diet, Major and minor food groups, Macro and Micronutrients, their sources and functions. Dietary fibers, sources and their role in human health. Vitamins and deficiency diseases. Food Pyramids, Plants and animals as food sources. Food adulteration and food spoilage.

Structure of bacteria and viruses. Isolation of Bacteria. Pure culture techniques. Airborne, water borne, and food borne diseases. Protozoan parasites. Antibiotics. Fermentation. Bacterial growth curve. Methods of sterilization and pasteurization. Microbiology of water.Clinically important bacteria and viruses. Bacteriophages. Bacterial recombination-transformation, conjugation and Transduction.

Multidisciplinary nature of environmental studies: Definition, Scope and importance, need for public awareness

Natural resources and associated problems: a) *Forest resources*: Use and over-exploitation, deforestation, case studies. b) *Water resources*: Use and over-utilization of surface and ground water, floods, drought. c) *Mineral resources*: Use and exploitation, environmental effects of extracting and using mineral resources. d) *Energy resources*: Renewable and non-renewable energy sources. f) *Land resources:* Land degradation, soil erosion and desertification.

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution.

Disaster management: Floods, Earthquake, Cyclone and landslides.

Global Environmental Issues: Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents.