

JIIT NOIDA

Syllabus for PGET for Admission in M. Sc. (Microbiology) and M. Sc. (Environmental Biotechnology)

GENERAL SCIENCE

Physics Laws of thermodynamics, Concept of entropy, Applications to compression and expansion processes. Solution thermodynamics - Excess properties of mixtures, Concept of free energy, **Chemistry**: Concept of pH and buffer, Chemical bonding and hybridization, Atomic and molecular structure, Chemical reaction equilibrium, Chemical reaction mechanism (SN1 and SN2), Chemical kinetics (first & second order)

BIOLOGICAL SCIENCES

Biochemistry Biomolecules and their conformation; Enzyme kinetics; Photorespiration; Mechanism of enzyme action; Enzyme kinetics; Enzyme inhibition; Allosteric enzymes; biochemical techniques

Cell and Molecular Biology Cell division; Cell Organelles; Cell Membrane and Cell Wall; Cell cycle, Mitosis and Meiosis; & Molecular controls; Central dogma of molecular biology; Structure of DNA and RNA, DNA super coiling, DNA damage and repair; DNA replication; DNA transcription and RNA processing; Transcription regulation in prokaryotes; Post transcriptional modification of eukaryotic mRNA; Genetic code and protein synthesis

Genetics and Developmental Biology Gene and genome organization, principles of inheritance, Linkage: concept, linkage maps. Crossing over: concept and significance, Types of mutations, effects of physical & chemical mutagens; Population genetics; Genetic disorders, Early Embryonic Development in plants and animal: Gametogenesis, Spermatogenesis, Oogenesis; Fertilization (External and Internal), placentation: In vitro fertilization, amniocentosis

Immunology Basic immunology; Cell and molecules involved in innate immunity Adaptive immunity (Cell mediated and humoral); Antibody structure; Antigen-antibody interactions, vaccines

Physiology and bioenergetics First and second laws of Thermodynamics; Definitions of Gibb's Free Energy, enthalpy, and entropy Diffusion gaseous exchange, Osmosis, Plasmolysis Passive transport mechanism: structure and types of ion channel. Metabolic pathways; Secondary active transport mechanism: Proton-pumps, Symport, Antiport and Uniport, Fundamentals pathways of Pyruvate formation (Embden-Meyerhof pathway (EMP)/glycolytic pathways, pentose phosphate pathway (PPP)/hexose monophosphate shunt, Entner-Doudoroff pathway). TCA cycle. Electron transport chain (ETC): components of respiratory chain. Photosynthetic microbes: Oxygenic photosynthetic bacteria: concept of PSI and PSII, Z-scheme.

Recombinant DNA Technology Restriction and modification enzymes; Vectors: plasmid, bacteriophage and other viral vectors, cosmids, Ti plasmid, yeast artificial chromosome; PCR and its applications

Basic instrumentation techniques Principle and application of microscopy; filtration; centrifugation; spectroscopy, UV/Visible, Electrophoresis; chromatography (TLC, HPLC); Western Blotting.

Microbial growth and applications Microbial nutrition, growth and control; Microbial metabolism (aerobic and anaerobic respiration, photosynthesis); Microbial genetics (plasmids, transformation, transduction, conjugation); Viruses; Host-pathogen interactions, role of microbes in industry, Plant-microbe interactions; Diseases caused by microbes.

Biodiversity& Environmental Biotechnology Biodiversity concept, national and global level significance, species and ecosystems, Biodiversity hotspots, Bio-Prospecting and Bio-Piracy, Bioremediation; Biofertilizers; Recycling of bio-degradable municipal, agricultural and Industrial wastes – biocompost making methods, types and method of vermicomposting, Environmental pollution, GMOs and related ethical issues, sustainability.