Faculty of Ocean Science and Technology

Subject Code:B1808

Biotechnology

Module. 1	**Biochemistry:** Biomolecules: Carbohydrates- structure, classification- monosaccharaides disaccharides and polysaccharides. Lipids- classification- biological functions of lipids. Proteins- structure and classification of proteins, biological functions of Proteins.Lipid metabolism, beta oxidation alpha and omega oxidation of fatty acids.Carbohydrate metabolism- glycogenesis, glycogenolysis, hexose monophosphate shunt, metabolic pathway of glucose- glycolysis, Kreb's cycle, electron transport cycles.
Module. 2	**Molecular Biology:** DNA replication, enzymology of DNA replication. Gene mutation, molecular mechanism of mutations, DNA repair. Transcription and Transcriptional control: Transcription events, Promoter elements, TATA box, Hogness Box, CAAT box, Enhancers and Silencers, RNA processing in prokaryotes and eukaryotes.
Module .3	Genetic code and wobble hypothesis, mechanisms of initiation, elongation and termination and regulation of translation. Post-translational modifications, proteins transport and trafficking. Control of gene expression in prokaryotes and eukaryotes.Operon model- lac and trp operon.Lytic cascades and lysogenic repression. Stress proteins-heat and cold shock protein, molecular chaperones, Molecular Biology of cancer.
Module. 4	**CellBiology:**Cell and its components: Plasma membrane- structure- structure and functions. Mitochondria- structure and functions. Endoplasmic reticulum - types and functions. Golgi bodies - functions. Lysosomes- polymorphism and functions.Microbodies - peroxisomes and glyoxisomes. Ribosomes-structure and functions.Centrioles and basal bodies.Cytoskeleton- microtubules, microfilaments and intermediate filaments.Nucleolus, euchromatin and heterochromatin, Chromosome, Cell cycle and regulation, Mitosis and Meiosis.Characteristics of cancer cells, carcinogenesis, oncogenes and tumour suppressor genes.
Module. 5	**Genetics:** Mendel and his experiments, Allelic and non-allelic interactions, Linkage, crossing over and recombination, Chromosome mapping. Sex linked inheritance of man (colour blindness and haemophilia), sex determination in man, barr bodies, dosage compensation and Lyon hypothesis. Mutation, mutagens- types and mechanism Bacterial Genetics: Bacterial growth kinetics: Bacterial chromosome. Extra-chromosomal genetic elements: F-factor, Plasmid, Transposons. Mechanism of gene transfer - transformation, transduction and conjugation.
Module .6	**Basic Biotechnology:** Biotechnology history, Microorganisms and applied Biotechnology, Biomass strategy- byproducts and raw materials. Protoplast and cell fusion technologies.Polymerase chain reactions and nucleic acid probes.Biosafety and biohazards in biotechnology industries. Bioreactor technology: Fermentation and types- scale up and downstream processing. Enzyme Technology and Immobilized enzymes.Biofuels- sources and process.
Module. 7	Environmental Biotechnology-waste water, sewage treatment and bio-composting. Bioremediation and environmental monitoring of pollution. Clean technology using microbes. Animal biotechnology and Genetic engineering: production of hormones, proteins and organs. Food biotechnology-microorganisms and food processing.Biopharmaceuticals and disease diagnostics.