M.Sc. Biotechnology

Programme Specific Outcomes

At the time of post graduation, the students will be able to-

PSO1: Understand basics of Biotechnology and various techniques involved in it

PSO2: Perform statistical analysis of various data related to biological field

PSO3: Acquire knowledge in fermentation technology, genetic engineering, tissue technology, biochemistry, etc

PSO4: understand various aspects of molecular biology

PSO5: Gain knowledge in structures and functions of bio-molecules

PSO6: Understand concepts of enzymes, coenzymes, their mechanism of action

PSO7: Identify Blood grouping, isolate and detect bacterial Antigen, serum antibodies, etc

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Course Outcomes

F.Y. M.Sc.

Semester I

BT1001-Biomathematics and Biostatistics

At the end of the course, the students will be able to-

CO1: Apply statistical methods for analysis of biological data

CO2: Discuss data representation by histogram, polygon, ogive curves and pie diagram

CO3: Solve problem based on limits, derivatives and integration; derivatives of standard trigonometric and logarithmic functions

CO4: Solve problems based on statistical data by measures of central tendency viz. Mean, median and mode

CO5: Discuss deviation and standard deviation for grouped and ungrouped data

BT1002 – Bioenergetics and Biomolecules

At the end of the course, the students will be able to-

CO1: Describe structures, functions and classification of biomolecules

CO2: Rationalize the energy gain and loss during metabolic process

CO3: Discuss various metabolic pathways, their regulations and associated metabolic disorders

CO4: Give sources and classification of vitamins and deficiency disease

CO5: Elaborate bio-molecules isolation and estimation techniques

BT1003 – Microbiology

At the end of the course, the students will be able to-

CO1: Discuss microbial world, its diversity, its role and the factors affecting on it

CO2: Describe bacterial stress response and related mechanism involved in it

CO3: Define microbial taxonomy

CO4: Discuss mechanism of bacterial sporulation

CO5: Identify microorganism at molecular level

BT1004 – Inheritance Biology

At the end of the course, the students will be able to-

CO1: Explain concept inheritance, variation and genetic diversity

CO2: Identify and calculate ratios of genotypic and phenotypic probabilities based on observations of parents or offspring

CO3: Define gene mutations, chromosomal alterations and spontaneous and induced mutagenesis

CO4: Genotype organisms using different techniques like linkage mapping, interrupted mating, tetrad analysis, somatic cell hybridization and DNA sequencing

CO5: Discuss recombination concept in microorganisms based on transformation, conjugation and transduction

CO6: Describe maternal and extra chromosomal patterns of inheritance in plants, animals and algae

Semester II

BT2001 – Molecular Biology

At the end of the course, the students will be able to-

CO1: Give importance and applications of different genes viz. structural genes and functional genes etc in both prokaryotes and eukaryotes

CO2: Discuss significance of different enzymes in the processes viz. replication, transcription and translations etc. in both prokaryotes and eukaryotes

CO3: Describe types of RNA and their role during translation, tRNA activations etc. in both prokaryotes and eukaryotes

CO4: Discuss Recombination's- transduction, conjugation with types and transformations etc. in both prokaryotes and eukaryotes

CO5: Give various types of operons and their positive and negative regulations

CO6: Give types of mutations and DNA repair mechanism in both prokaryotes and eukaryotes

BT2002 – Enzyme Technology

At the end of the course, the students will be able to-

CO1: Define enzyme, give its classification and mechanism of action

CO2: Describe metabolic role of coenzymes and reaction catalysed by them

CO3: What are industrial applications of free and immobilized enzymes?

CO4: Elaborate clinical, non clinical enzyme based biosensor

CO5: Determine factor affecting enzyme activity the overall enzyme kinetics viz. Km, Vmax, Kcat CO6: Prepare immobilized enzyme

CO7: Design experiments for screening, production and purification enzyme

BT2003 – Cell Biology

At the end of the course, the students will be able to-

CO1: Differentiate Prokaryotes, Eukaryotes, plant cell, animal cell, yeast cell, bacterial cell etc

CO2: Specify internal arrangement of cells, cell organelles and their functions

CO3: Describe structure of cell wall in different organisms, structure of plasma membrane and active-passive transportation of molecules across the cell

CO4: Elaborate cell cycle phase, their check points and importance in prevention of cancer

CO5: Give cellular signaling mechanism involved in controlling of overall physiological activities

CO6: Describe role of various cell surface receptors and their involvement in controlling the cellular transportation and activities

BT2004– Basic Immunology

At the end of the course, the students will be able to-

CO1: Define Immunity and Antigen; give its types

CO2: Discuss Cells and Organs of Immune System: Primary and Secondary Lymphoid Organs

CO3: Describe Antibodies, their biological activity, gene Organization, Recombination, Generation of Monoclonal antibody

CO5: Discuss Lymphocytes (T and B cell) activation and regulation, Effecter Mechanism, and Complement System: Activation and its Regulation

CO6: Apply immunology in Diagnostic applications such as Antigen-Antibody Interaction: Precipitation and Agglutination

CO7: Perform and identify Blood grouping, isolation and detection of bacterial Antigen, serum antibodies etc

S.Y. M.Sc. Semester III

BT3001 – Applied Immunology and Virology

At the end of the course, the students will be able to-

CO1: Describe types of immune Responses like Phagocytosis, Antigen Processing and Antigen Presentation- Endogenous and Exogenous antigen & Non-peptide Bacterial antigen

CO2: Discuss appropriate immune response against bacteria, protozoa and viral infections.

CO3: Give details of Immunization, Vaccines - types and its Designing

CO4: Discuss Cancer and Cell Cycle of cancerous cell, Cancer Cells vs. Normal Cells

CO5: Give general properties, classification, cultivation, purification and enumeration of Viruses. Practical approach: Virus isolation

CO6: Describe genome, particle arrangement, mode of transmission and life cycle of Animal and plant viruses

BT3002 – Gene Expression and Adv. Genetic Engineering

At the end of the course, the students will be able to-

CO1: Discuss expression in prokaryotes and eukaryotes and their differences

CO2: Give applications of different restriction enzymes and different Modifying enzymes

CO4: Describe various vectors and their respective potential applications

CO5: What are the different technologies that are developed in genetic engineering to get the expressions of desired genes?

CO6: Perform experiments on PCR machines, gel electrophoresis of nucleic acids and their documentation

CO7: How DNA sequencing are carried out? Give applications of different identified sequences for the welfare of human beings

BT3003 – Developmental Biology

At the end of the course, the students will be able to-

CO1: Classify stem cells and discuss their potency level, cell specification, germ layers and fate mapping of the embryo

CO2: Differentiate oogenesis and spermatogenesis at chromosomal level, internal and external fertilization in animals and plants, cleavage-blastulation-gastrulation in different model organisms

CO3: Explain role of different genes, m-RNAs and proteins during developmental pathways in animals and plants

CO4: State and explain concept of aging and senescence in plants as well as animals with respect to their affecting parameters like genetic, epigenetic, environmental etc

CO5: Describe effect of environment on normal development, metamorphosis, teratogenesis etc

CO6: Experimentally prove totipotent nature of plant cells

BT3004 – Bioinstrumentation

At the end of the course, the students will be able to-

CO1: Describe working principles of Colorimeter, PH meter, Spectrophotometer, FTIR, HPLC, etc

CO2: Give applications of Colorimeter, PH meter, Spectrophotometer, FTIR, HPLC, etc

CO3: Discuss potential uses of microscope

Semester IV

BT4001 – Industrial Technology

At the end of the course, the students will be able to-

CO1: Elaborate fermentation technology and its working mechanism

CO2: Describe various methods of screening of desired microorganism

CO3: Discuss types of fermenter and its design, role of engineering principles in microbiology

CO4: Give various methods of preservation of microorganism

CO5: Elaborate ways of downstream processing

CO6: Describe methods of sterilization of media and fermenter

BT4002 – Recombinant DNA Technology

At the end of the course, the students will be able to-

CO1: What are of different enzymes and vector systems for construction of genomic and cDNA libraries of different organisms?

CO2: Design primers and reaction mixture to run PCR for amplification of desired segment from double standard DNA

CO3: Discuss DNA sequencing and chemical synthesis of DNA molecule with desire nucleotide sequence

CO4: Describe techniques behind site directed mutagenesis and genome mapping by RAPD, SNPs, RFLP, AFLP, etc

CO5: Discuss high throughput techniques like DNA and Protein microarray to analyze transcriptome and protein expression

CO6: Analyze protein spots by various sophisticated techniques viz. Mass Spectroscopy, Electro spray ionization Peptide Mass fingerprinting and XRD with NMR for Structural analysis

BT4003 – Tissue Technology

At the end of the course, the students will be able to-

CO1: Elaborate technical aspects of tissue culture laboratory design and required facilities

CO2: Formulate tissue culture media, understand the role of media constituents

CO3: Define totipotency; describe stages of explant procurement, media and explant sterilization

CO4: Describe various techniques and methods of plant tissue culture

CO5: Give various methods of gene transfer and tissue engineering

CO6: Discuss animal cell culture aspect for production of biopharmaceutical products viz, hormone, vaccines, interferons, embryonic stem cells

BT4004 – Bioinformatics

At the end of the course, the students will be able to-

CO1: Discuss basics of nucleotide databases- like EMBL, Gene Bank, DDBJ and protein databases- like SWISSPROT, PROSITE, PDB, etc

CO2: Elaborate proteomics with respect to their structure, functions and

CO3: Proficient in handling of various public domain databases for nucleic acid and protein sequences with different software

CO4: Get acquaint with DNA Microarray preparations and tools required for analysis of same by SAGE, SOFT finder, etc

CO5: Describe 2D and 3D structures of sequence identified proteins with their active site and functionalities

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