

Department of Biotechnology
Academic planner

Month	faculty	I Sem	III Sem	V Sem / Paper 5	V Sem / Paper 6
July	GK	Chromosomal variation - introduction	Biochemistry: Introduction, Biomolecules, Amino Acid: Introduction, General formula	Genetic engineering: Introduction, Tools of Genetic Engineering- Restriction Enzymes	
	MB	Mendel's Works – Laws of heredity, test cross	Vitamins: Water soluble and fat soluble, dietary source		Scope of animal tissue culture, culture media, natural media- Plasma clot, biological fluids, tissue extract, embryo extracts, Importance of serum in media, chemically defined media.
	SSY	Cell theory, Plasma membrane: structural organization and functions Cell wall	Enzymes: Classification, Kinetics, factors influencing activity, co-enzymes, Co-factors Scope and development of Biophysics, analytical techniques chromatography-introduction		History and scope of immunology. Types of immunity-passive, active acquired, cell and organs of immune response

ACADEMIC PLANNER : BIOTECHNOLOGY

Month	faculty	I Sem	III Sem	V Sem / Paper 5	V Sem / Paper 6
August	GK	Structural and Numerical aberrations Chromosomal evolution of wheat and cotton	Amino acids (cont..) Classification and properties Protein – Introduction	DNA ligases, cloning vectors Invitro construction of rDNA molecule:- Isolation of passenger and vector DNA , creation of rDNA Transformation of r DNA into host cell	
	MB	Incomplete dominance, simple problems Supplementary factors, complementary factors	Carbohydrates: Structure , properties and classification Carbohydrate as a source of energy, Lipids: Structure properties, classification and functions		Primary culture: Cell lines and cloning O's aggregation of tissue, Isolation tissue, Enzyme disaggregation and mechanical disaggregation Secondary culture - Transfection, Expression of cloned protein in animal
	SSY	Endoplasmic Reticulum, Golgi complex, Mitochondria, Chloroplast	Paper and Thin - layer chromatography column and Glc centrifugation- Introduction		Humoral and cell immunity, Antigens types, haptens, epitomes, factors influencing antigenicity antibodies : structure types, properties and function production of antibodies

ACADEMIC PLANNER : BIOTECHNOLOGY

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September	GK	Cytoplasmic inheritance Types of mutations and mutagens	Classification of proteins based on structure and composition. Functional organization structural organization of proteins – Introduction	Screening and selection of recommitment cells. Genomic DNA and CDNA cloning techniques. Expression of cloned DNA in E coli, Electrophoretic technique PCR.	
	MB	Multiple factors, epistasis, Multiple alleles, concept of allosomes and autosomes	Hormones : Steriod hormones-structure and importance in brief pH and buffer concepts spectroscopic techniques		Production of vaccines in animal cells, production and application of monoclonal antibodies, growth factors, promoting proliferation of animal cells, EGF, FGF, PDGF, IL-1, IL-2, NGF, Erythropoetin Techniques and application and transgenic mice and sheep
	SSY	Ribosomes, peroxisomes, nucleus, vacuole, cytosol, cytoskeletal structure, Chromosomes ultra structures	Centrifugation chemical bonding: Ionic, covalent hydrogen, peptide bond		Complement system antigen-Antibody rections, serological reaction, Hypersensitivity and allergic reactions.

ACADEMIC PLANNER : BIOTECHNOLOGY

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October	GK	Mutations at molecular level, mutations for economic benefit of man, Karyotype in man, autosomal and allosomal inherited disorders	Proteins (cont...) Primary, Secondary, tertiary and quaternary structure of proteins	Site directed mutagenesis; Nucleic acid sequencing, blotting techniques Production of insulin, recombinant vaccine, HGH, Biofertilizer	
	MB	Linkage and crossing over, coupling and repulsion hypothesis linkage in Maize and Drosophila, mechanism of crossing over	Isotopes: Types, their importance in biological studies, measure of radio activity, GM counters and scintillation counting	Renewable and non renewable resources of energy conventional fuels and their environmental impact, Modern fuels and their environmental impact	
	SSY	Chromosomes: Euchromatin and heterochromatin, chemical composition, Karyotype, special type of chromosomes : lampbrush / salivary gland chromosome.	Vander - waals forces, chemical bonding, principles of thermo dynamics.	Treatment of municipal waste and industrial effluents	Blood cell components ABO blood grouping RH typing, vaccines and immunization .

ACADEMIC PLANNER : BIOTECHNOLOGY

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November	GK	Revision classes, discussion of ` question papers	Revision classes, discussion of ` question papers	Bio leaching, Discussion of question papers. Revision classes.	
	MB	Revision classes, discussion of ` question papers	Revision classes, discussion of ` question papers	Bio remediation	
	SSY	Revision classes, discussion of ` question papers	Revision classes, discussion of ` question papers	Environmental significance of GMO	

ACADEMIC PLANNER : BIOTECHNOLOGY

B.Sc. II Semester

JAN	GK 3 HRS	Unit 4. Microbial Taxonomy Concept of microbial species and strains, classification of bacteria based on – morphology (shape and flagella)
	M.B 3 HRS	Unit 1. Importance and application Tabulation and classification of data, Frequency distribution and Graphical distribution of data Unit 2: Measures of central tendencies-Mean
	SSY 6 hrs	Unit 1. Introduction and Scope of Microbiology Definition and history of microbiology, contributions of Antony van Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph lister, Alexander Flemming, Importance and scope of Microbiology as a modern Science , Branches of microbiology
FEB	GK 4 hrs	Classification of bacteria based on staining reaction, nutrition and extreme environment General Account of Viruses and Bacteria A. Viruses – Structure and classification
	M.B 4 hrs	Median, Mode and their properties Unit 3. Measures of Dispersion Mean deviation, Variance
	SSY 8 hrs	Unit 2. Microscopy Construction and working principles of different types of microscopes – Compound, Dark field, Phase contrast, Fluorescence and Electron (Scanning and Transmission) Unit 3. Microbial Techniques A) Sterilization: Principles and Applications of a. Physical Methods. Autoclave, Hotairoven, Laminar airflow.
MARCH	GK 4 hRS	Plant Viruses – CaMV Animal viruses – Hepatitis B Bacterial Virus – Lambda Phage B. Bacteria – Ultrastructure of bacterial cell
	MB 4 hrs	Standard deviation and coefficient of Variation. Unit 4. Hypothesis testing Student T and Chisquare test
	SSY 8 hrs	Seitz filter, Sintered glass filter, and membrane filter. b. Chemical Methods: Alcohol, Aldehydes, Phenols, Halogens and Gaseous agents. c. Radiation Methods: UV rays and Gamma stains. 2 Hours Unit 7. Pathogenic Microorganisms A. Bacterial diseases of man – Tetnus, Tuberculosis, Pneumonia and Cholera
APRIL	G.K 4 HRS	endospore and capsule Unit 6. Eukaryotic microorganisms Salient features, classification and reproduction of fungi, mycoplasma and algae
	M.B 4HRS	Unit 5. Probability and Distribution Concepts and problems on probability, Binomial, Poisson, Normal Distribution and their applications 3 Hours Unit 6. Different models of data presentation with special reference to biological samples
	SSY 8 hrs	B. Viral diseases: AIDS (HIV) Unit 8. Microbial Metabolism A) Respiration: EMP, HMP and ED Pathways, Kreb's cycle, Oxidative Phosphorylation. B) Bacterial Photosynthesis: Photosynthetic apparatus in prokaryotes, Photophosphorylation & Dark reaction.

ACADEMIC PLANNER : BIOTECHNOLOGY

B.Sc. IV Semester

JAN	GK 3hours	Unit 7: Transcription in prokaryotes and Eukaryotes Mechanism, Promoters and RNA polymerase,
	SSY 3hours	Unit 5. Recombination in prokaryotes Transformation, Conjugation.
	MB 6hours	Molecular basis of life – an introduction. Experimental Proof of DNA and RNA as genetic material. Nucleic Acids Structure and functions of DNA and RNA Watson and Crick model of DNA and other forms for DNA (A and Z)Functions of DNA and RNA including ribozymes
FEB	GK 4hours	Transcription Factors, Transcription in prokaryotes and eukaryotes, Post transcriptional modifications of eukaryotic mRNA
	SSY 4hrs	Transduction. Unit6: Structure of Prokaryotic gene- genetic code, Properties and Wobble hypothesis.
	MB 8hrs	DNA Replication Prokaryotic and Eukaryotic – Enzymes and proteins involved in replication, Theta model and Rolling circle model DNA Repair: Causes and mechanism-photoreactivation, excision repair, mismatch repair, SOS repair
MARCH	GK 4hrs	Unit8: Translation Mechanism of translation in Prokaryotes and Eukaryotes
	SSY 4hrs	Structure of eukaryotic gene
	MB 8hrs	Unit 9. Regulation of Gene expression Regulation of Gene expression in Prokaryotes – Operon concept (Lac and Tryp) Regulation of Gene expression in Eukaryotes - transcriptional activation, galactose metabolism in yeast.
APRIL	GK 3hrs	Post translational modifications of proteins
	SSY 3hrs	Unit 11. Insertional elements and transposons. Transposable elements in Maize and Drosophila
	MB 6hrs	Unit 10. Gene organization and expression in Mitochondria and Chloroplasts

ACADEMIC PLANNER : BIOTECHNOLOGY

B.Sc. VI Semester

JAN	GK 5hrs	Unit 1. Introduction to industrial Biotechnology, basic principles of fermentation technology Unit 2. Screening and Isolation of Microorganisms, maintenance of strains, Strain improvement (Mutant selection, Recombinant DNA methods).
	SSY 5hrs	Unit 8. Role of tissue culture in agriculture, horticulture and forestry Unit. 8 Enzyme Biotechnology Characteristics of enzymes – amylases. Industrial uses of enzymes – Detergents,
	MB 5hrs	Unit 1. In-vitro Methods in plant tissue culture, Aseptic Techniques, Nutrient media, and use of growth regulators (Auxins, Cytokinins and Gibberellins) Unit 2. In-Vitro fertilization – Ovary and Ovule culture
FEB	GK 8hrs	Unit 3. Fermentation Media Natural and synthetic Media. Sterilization techniques – Heat, Radiation and Filtration method. Unit 4. Fermenters Process of Aeration, Agitation , Temperature regulation and Filtration method
	SSY 8hrs	Unit 9. Transgenic plants Technique of transformation – Agrobacterium mediated and physical methods (Microprojectile and electroporation) Applications of transgenic plants Leather, Beverage, food and Pharmaceutical Bioreactors for enzyme production – Stirred tank, membrane reactors and continuous flow
	MB 8hrs	Unit 3. Clonal Propagation of elite species (Micro Propagation). Unit 4. Organ Culture – Anther, Embryo and Endosperm culture and their applications Organogenesis and Somatic Embryogenesis – Techniques and applications
MARCH	GK 7hrs	Unit 5. Type of Fermentation Solid State, submerged fermentation and continuous fermentation Immobilized enzyme and cell bioreactors. Unit 6. Process Development – Shake flask fermentation, Down stream processing (DSP), Disintegration of cell Separation, Extraction, Concentration and purification of products
	SSY 7hrs	Unit 10. Edible Vaccines from plants – Banana, Watermelon Unit 11. Technique of mass culture of Algae - spirulina
	MB 7hrs	Unit5. Protoplast Culture – Isolation, regeneration and viability test, somatic hybridization, methods of protoplast fusion –chemical and electro fusion, practical application of somatic hybridization and cybridization Unit 6. Somaclonal Variation and their significance. Unit 7. <i>In-Vitro</i> production of secondary metabolites – Techniques and significance

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APRIL	GK 7hrs	Unit7. :Production of Microbial products Brief account of the following products obtained by industrial microbiological fermentation Alcohol Alcoholic Beverage – Beer Organic acid – Citric acid Antibiotic – Penicillin Amino acids – Glutamic acid Vitamin – B12 Brief account of Steroid biotransformation
	SSY 7hrs	Unit 11. Biotechnology and Intellectual property rights Patents, trade secrets, copyright, trademark, choice of Intellectual property (IPr) and plant genetic resomes (PGr) , GAA TRIPS Unit 12. Microbial polysaccharides and polyesters; production of xanthan gum and polyhydroxyalkonoides (PHA)
	MB 7hrs	Unit 6. Somaclonal Variation and their significance Unit 7. <i>In-Vitro</i> production of secondary metabolites Techniques and significance Unit 10. Plant cell suspension culture for the production of food additives – Safforn and Capasicin