


**Department of Biotechnology**  
**SR & BGNR Govt Arts and Science College**  
**Curriculum/ Teaching Plan**  
**2018-2019**

Month	Syllabus Topic
	Semester-I
June	1.1 Cell as basic unit of life (Viral, bacterial, fungal, plant and animal cells) 1.2 Ultra structure of prokaryotic cell (Extra Chromosomal Material – Plasmid) 1.3 Ultra structure of eukaryotic cell (Cell wall, cell membrane, Golgi Complexes, Endoplasmic Reticulum, Peroxisome, Lysosomes etc) 1.4 Fluid mosaic model, sandwich model, membrane permeability
July	1.5 Structure of chromosomes-componenets of chromosomes (histone and nonhistone proteins), specialized chromosomes (Polytene and Lamp Brush) 1.6 Chromosomal abberations -structural and numerical 2.1 Bacterial cell division 2.2 Eukaryotic cell cycle phases 2.3 Mitosis stages and significance 2.4 Meiosis stages and significance
August	2.5 Senescence and Necrosis 2.6 Apoptosis 3.1 Mendel's experiments – Factors contributing to success of Mendel's experiments 3.2 Mendel,s laws - Law of segregation – Monohybrid ratio, Law of Independent assortment – Dihybrids, Trihybrids 3.3 Deviation from Mendel's Laws - partial or incomplete dominance,co-dominance, non allelic interaction and modified dihybrid ratios
September	3.4 Penetrance and expressivity (polydactyl and waardenberg syndrome), Pleiotropism, phenocopy - microcephaly, cleft lip 3.5 Multiple Alleles: ABO blood groups & Rh factor 3.6 Sex determination in humans, drosophila, x-linked inheritance (haemophilia, color blindness), X- inactivation 4.1 Linkage and recombination – Discovery of linkage, cytological proof of crossing over, Recombination frequency and map distance. 4.2 Non-Mendelian inheritance - Cytoplasmic inheritance (Shell coiling in snail)
October	4.3 Cytoplasmic male sterility in maize 4.4 Mitochondrial inheritance in humans, poky strains in neurospora 4.5 Chloroplast inheritance in chlamydomonas 4.6 Hardy weinberg equilibrium

  
Incharge

Month	Syllabus Topic
	Semester-II
January	<p>1.1 Carbohydrates-Importance, classification, Structure and functions of Monosaccharides (Glucose and Fructose), Disachharides (Sucrose, Lactose, Maltose) and polysaccharides (Starch, Glycogen, inulin)</p> <p>1.2 Amino acids: Importance, classification, Structure, physical and chemical properties of amino acids, peptide bond formation</p> <p>1.3 Proteins: importance, structure of proteins- primary, secondary, tertiary and quarternary</p>
February	<p>1.4 Lipids: importance, properties and classification, Simple lipids-TAG and waxes, Complex lipids- phosphos lipids and glycolipids, Derived lipids- steroids, terpenes and carotenoids</p> <p>1.5 Nucleic acids: structure and chemistry of DNA (Watson and crick) and RNA (TMV), structure and forms of DNA (A, B and Z forms)</p> <p>1.6 Enzymes-classification and nomenclature. Michaelis Menton Equation-Factors influencing the enzyme reactions and Enzyme inhibition (Competitive and Non-competitive), co enzymes</p>
March	<p>2.1 Glycolysis, TCA Cycle</p> <p>2.2 Electron transport, Oxidative phosphorylation</p> <p>2.3 Gluconeogenesis and its significance</p> <p>2.4 Transamination and Oxidative deamination reactions of amino acids</p> <p>2.5 <math>\beta</math>-oxidation of fatty acid</p> <p>2.6 Glyoxalate cycle</p>
April	<p>3.1 Historical development of microbiology and contributors of microbiology</p> <p>3.2 Microscopy: bright field microscopy, dark field microscopy, phase contrast microscopy, fluorescent microscopy, SEM and TEM</p> <p>3.3 Outlines of classification of microorganisms</p> <p>3.4 Structure and general characteristics of bacteria and virus</p> <p>3.5 Disease causing pathogens and symptoms (Eg: Mycobacterium, Hepatitis)</p> <p>3.6 Structure and general characteristics of micro-algae and fungi</p>

  
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**Department of Biotechnology**  
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**Co-Curriculum Plan -2018-2019**

MONTH	DATE	ACTIVITY PLANNED
JUNE		
JULY	02/07/18 to 07/07/18	Bridge course for 1 <sup>st</sup> B.Sc biotech students
AUGUST	01/08/2018 to 08/08/2018	Certificate course for 1 <sup>st</sup> B.Sc biotech students
SEPTEMBER	19/9/18	Student seminars 1 <sup>st</sup> B.Sc (BTBC)
OCTOBER	3/10/18	Student seminars 1 <sup>st</sup> B.Sc (BTBC)
NOVEMBER	7/11/18, 14/11/18	Student Seminars 1 <sup>st</sup> B.Sc (BTZC)
DECEMBER	Semester end exams	
JANUARY		Student assignments 1 <sup>st</sup> B.Sc (BTBC)
FEBRUARY		Student assignments 1 <sup>st</sup> B.Sc (BZC)
MARCH	18/03/19 to 23/03/19	Remedial classes for 1 <sup>st</sup> sem
APRIL	08/03/19 to 13/03/19	Remedial classes for 1 <sup>st</sup> sem
MAY	Semester end exams	

  
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**2019-2020**

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Month	Syllabus Topic
	Semester-III
June	1.1 Transcription in prokaryotes: enzymatic synthesis of RNA, basic features of RNA synthesis, E. coli RNA polymerase, classes of RNA molecules 1.2 Transcription mechanism in prokaryotes- promoter, initiation, elongation, proof reading and rho dependent, independent mechanism 1.3 Transcription in eukaryotes: polymerase of eukaryotes, promoters of eukaryotes
July	1.4 Synthesis of hnRNA and post transcriptional modifications 1.5 The genetic code, properties of genetic code, wobbles hypothesis 1.6 Translation mechanism in prokaryotes and eukaryotes 2.1 Gene regulation in prokaryotes 2.2 Transcriptional level regulation- positive and negative regulation 2.3 Auto and co-ordinated regulation 2.4 Operon concept- lac, trp operons
August	2.5 Translation regulation in eukaryotes and prokaryotes 2.6 Inhibitors of protein synthesis- antibiotics and other inhibitors 3.1 Enzymes used in gene cloning: restriction endonucleases, ligases, phosphatases, methylases, kinases 3.2 Cloning vehicles, plasmids, cosmids, phage vectors 3.3 Construction of genomic and cDNA libraries
September	3.4 Identification of cloned genes- Colony hybridisation 3.5 Expression of vectors, bacterial vectors 3.6 Yeast vectors 4.1 Principle, methodology and applications of PCR technology 4.2 Variations of PCR
October	4.3 DNA finger printing technique and its applications in medicine 4.4 Principles involved in blotting techniques- southern, northern and western blotting 4.5 Genome sequencing: Sangers method 4.6 Applications of rDNA technology in medicine

  
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Month	Syllabus Topic
	Semester-IV
<b>January</b>	1.1 Introduction to biostatistics, history and applications 1.2 Concept of sampling and sampling distributions 1.3 Measures of central tendency (mean, median, mode) 1.4 Measures of deviation (standard deviation, variance and co-efficient of variation) 1.5 Concept of probability, basic laws and its application to mendelian segregation 1.6 Concept of probability distribution, binomial, poisson distribution, normal distribution and their applications in biology
<b>February</b>	2.1 Concept of test of hypothesis- t-Test and chi square test, their application in biology 2.2 Simple correlation and regression 2.3 Concept of analysis of variance (ANOVA)- one way classification 2.4 ANOVA- Two way classification 2.5 Graphical representation of data 2.6 Importance of statistics in biology
<b>March</b>	3.1 Usage of MS-DOS commands, internal and external commands 3.2 Directory and file commands, copying, erasing, renaming and displaying files 3.3 Microsoft word: concept of toolbar, character, paragraph and document formatting 3.4 Drawing tool bar, header, footer, document editing, page set up, short cut keys, text and graphics 3.5 Microsoft power point: slide presentation, slide layout and design, custom animation, image importing, slide transition 3.6 MS Excel- Applications, Functions, Charts, Pivot Tables, validations, formatting of spread sheet
<b>April</b>	4.1 Introduction to bioinformatics, history and emergence 4.2 Biological databases (nucleic acids and proteins) 4.3 Introduction to Genomics and Proteomics 4.4 Biochips 4.5 Data retrieval tools (BLAST, Pub MED) 4.6 Applications of Bioinformatics

  
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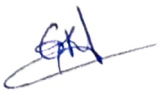
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Month	Syllabus Topic	
	Semester-V	
June	<p>1.1 Historical perspectives of plant tissue culture, and Basic requirement for tissue culture laboratory</p> <p>1.2 Culture mediums for plant tissue culture- MS medium and B5 Medium.</p> <p>1.3 Sterilization of media-steam, dry and filter sterilization- Explants sterilization</p>	<p>1.1 Scope and importance of medical biotechnology</p> <p>1.2 Karyotyping of human chromosomes</p> <p>1.3 Chromosome banding- G banding and R-banding technique</p>
July	<p>1.4 Plant growth regulators and differentiation.</p> <p>1.5 Method of tissue culture-formulation of medium explants collection, surface sterilization, inoculation, Callus induction, subculture and regeneration of plants</p> <p>1.6 organ culture- leaf, root and stem culture</p> <p>2.1. Suspension cultures- growth and subculture, types and synchronization of suspension cultures.</p> <p>2.2 Immobilization of cells and the effect of elicitors on the production of secondary metabolites of commercial value</p>	<p>1.4 Inheritance patterns in Man- Pedigree analysis</p> <p>1.5 Diagnosis using monoclonal antibodies- ELISA</p> <p>1.6 Genetic counselling – calculating risk and discussing the options</p> <p>2.1 Chromosomal disorders caused due to structural chromosomal abnormalities (Deletions, duplications, Translocations)</p> <p>2.2 Chromosomal disorders caused due to numerical chromosomal abnormalities (autosomal and allosomal)</p>
August	<p>2.3 Meristem culture and its uses in production of virus free plants</p> <p>2.4. Clonal propagation, Micro propagation of plants – medicinal plants and endangered plants –method and advantages</p> <p>2.5 Production of secondary metabolites- culture techniques</p> <p>2.6 large scale production of commercially important compounds</p> <p>3.1 Somatic embryogenesis- Principle, protocol and importance.</p> <p>3.2 Artificial seeds – production, applications and limitations.</p>	<p>2.3 Monogenic disorders (autosomal and X-linked diseases)</p> <p>2.4 Mitochondrial diseases – LHON, MERRF</p> <p>2.5 Types and causes of male and female infertility</p> <p>2.6 IVF- methodology</p> <p>3.1 Gene therapy – exvivo and <i>in vivo</i> gene therapy; somatic and germline gene therapy;</p> <p>3.2 Strategies of gene therapy: gene augmentation – ADA deficiency; Prodrug therapy/ suicide gene – glioma</p>
September	<p>3.3 Embryo rescue and its importance</p> <p>3.4 Anther culture and production of androgenic haploids.</p> <p>3.5 Somaclonal variations- applications of somaclonal variations to crop improvement</p> <p>3.6 Cryopreservation of plant cultures and application of plant tissue culture</p> <p>4.1. Protoplast – properties of protoplast, Protoplast – Isolation (mechanical and enzymatic methods)</p> <p>4.2 Culturing and regeneration of protoplasts</p> <p>4.3 Different methods of protoplast fusion (mechanical fusion, chemo fusion, electro fusion)</p>	<p>3.3 Stem cells – potency definitions; embryonic and adult stem cells;</p> <p>3.4 Applications of stem cells – cell-based therapies and regenerative medicine</p> <p>3.5 Encapsulation technology and therapeutics- Diabetes</p> <p>3.6 Human genome sequences – mapping and cloning of human disease genes</p> <p>4.1 Cancer – Types</p> <p>4.2 Oncogenes, tumour suppressor genes, stability of genome, control of cell cycle</p> <p>4.3 Molecular basis of colon cancer and breast cancer</p>
October	<p>4.4 Selection of somatic hybrids and cybrids.</p> <p>4.5 Introduction to <i>Agrobacterium tumifaciens</i>, Features of Ti Plasmid, molecular mechanism of T-DNA transfer.</p> <p>4.6 Physical gene transfer methods – Particle Bombardment, Electrophoration and microinjection</p>	<p>4.4 DNA/RNA based diagnosis– HBV, HIV</p> <p>4.5 Applications of PCR in disease diagnosis</p> <p>4.6 Haemoglobinopathies</p>

  
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Month	Syllabus Topic	
	Semester-VI	
<b>January</b>	1.1 Introduction to environment and pollution 1.2 Types of pollution- air, water and land pollutions 1.3 Types of pollutants- inorganic, organic and biotic sources 1.4 Sources of pollution – domestic waste, agricultural waste, industrial effluents and municipal waste 1.5 Biomonitoring of environmental pollutants by bioindicators 1.6 Emission control biotechnology- air sampling techniques	1.1. Animal tissue culture, history, requirements for animal cell culture 1.2. Substrate, liquids, culture mediums-Natural (Clots, Biological fluids, Tissue extracts), complex natural and chemically defined media 1.3. Explant-culture of explants, Cell culture technique- initiation, preparation and sterilization of media 1.4 Isolation of explants, disaggregation of explants, culture, subculture 1.5 Cell lines, evolution of cell lines, maintenance of cell lines, large scale culture of cell lines- monolayer, suspension and immobilized cell culture, 1.6 Development of primary culture and cell lines, subculture
<b>February</b>	2.1 Renewable and non- renewable energy resources 2.2 Fossil fuels as energy source and their impact on environment 2.3 Non-conventional source – biomass as source of bioenergy 2.4 Types of biomass – plant, animal and microbial biomass 2.5 Biodelignification by enzymes 2.6 Biodesulphurisation of coal	2.1. Cultured cells and evolution of continuous cell lines (established cell lines) 2.2. Commonly used cell lines - their origin and characteristics 2.3. Cell line preservation and characterization 2.4. High level expression of foreign gene in animal cells-expression vectors, enhancers, regulatory sequences. 2.5 Expression foreign genes in animal cells: advantage and disadvantages. 2.6 Properties of cell lines – biology and characterisation of cultured cells
<b>March</b>	3.1 Microbial treatment of waste water (sewage of industrial effluent)- aerobic and anaerobic methods 3.2 Solid waste and management; Bioremediation– concepts and types (in-situ and ex-situ) 3.3 Bioremediation of toxic metal ions– biosorption and bioaccumulation 3.4 Microbial bioremediation of pesticides and Xenobiotic compounds 3.5 Phytoremediation- concepts and application 3.6 Degradative plasmids and genes in biomining	3.1. Transfection methods of animal cells (Calcium phosphate, DEAE-dextran, Lipofection, Electroporation, Microinjection) 3.2 Embryonic stem cell transfer 3.3 Selection of recombinant cells with various marker genes (Thymidine Kinase, Dihydrofolate reductase, CAD protein, XGPRT, HAT, Neomycin phosphotransferase) 3.4 Production of transgenic animals (Mice, Cattle, Sheep, pigs, Fish and Birds) 3.5 Applications, advantages and disadvantages of animal tissue culture 3.6 Ethical issues related to transgenic animals
<b>April</b>	4.1 Climate change, greenhouse gases and global warming, 4.2 Impact of pollution on environment and measurement methods 4.3 Production of biofuels, bioethanol & biomethanol 4.4 Conservation of biodiversity 4.5 Carbon sequestration – vision, methods and management strategies 4.6 GEMS and their impact on environment	4.1 Stem cells: Characteristic features, maintenance, culture and Applications of Embryonic and adult stem cells 4.2 Animal cloning- Nuclear transfer and embryonic stem cell method 4.3 Molecular pharming: Transgenic animals and their applications, 4.4 Methods used for transgenesis with reference to transgenic mice, cattle, sheep, goats, pigs, chicken and fish. 4.5 Animal cells as a bioreactors for the production of commercially important products 4.6 Cryopreservation- principles

  
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OCTOBER	16/04/21, 17/04/21	Student Seminars and assignment 2 <sup>nd</sup> B.Sc
NOVEMBER	16/04/21, 20/04/21	Student Seminars and assignment 1 <sup>st</sup> B.Sc
DECEMBER	Semester end exams	
JANUARY	25/03/21 to 31/03/21	Student study project
FEBRUARY	27/04/21	Extension lecture
MARCH	28/04/21	Field trip
APRIL	02/01/21 to 31/04/21	M.Sc Entrance coaching and career guidance
MAY	Semester end exams	

  
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	Semester-II
January	1.1 Carbohydrates-Importance, classification, Structure and functions of Monosaccharides (Glucose and Fructose), Disachharides (Sucrose, Lactose, Maltose) and polysaccharides (Starch, Glycogen, inulin) 1.2 Amino acids: Importance, classification, Structure, physical and chemical properties of amino acids, peptide bond formation 1.3 Proteins: importance, structure of proteins- primary, secondary, tertiary and quarternary
February	1.4 Lipids: importance, properties and classification, Simple lipids-TAG and waxes, Complex lipids- phosphos lipids and glycolipids, Derived lipids- steroids, terpenes and carotenoids 1.5 Nucleic acids: structure and chemistry of DNA (Watson and crick) and RNA (TMV), structure and forms of DNA (A, B and Z forms) 1.6 Enzymes-classification and nomenclature. Michaelis Menton Equation-Factors influencing the enzyme reactions and Enzyme inhibition (Competitive and Non-competitive), co enzymes
March	2.1 Glycolysis, TCA Cycle 2.2 Electron transport, Oxidative phosphorylation 2.3 Gluconeogenesis and its significance 2.4 Transamination and Oxidative deamination reactions of amino acids 2.5 $\beta$ -oxidation of fatty acid 2.6 Glyoxalate cycle
April	3.1 Historical development of microbiology and contributors of microbiology 3.2 Microscopy: bright field microscopy, dark field microscopy, phase contrast microscopy, fluorescent microscopy, SEM and TEM 3.3 Outlines of classification of microorganisms 3.4 Structure and general characteristics of bacteria and virus 3.5 Disease causing pathogens and symptoms (Eg: Mycobacterium, Hepatitis) 3.6 Structure and general characteristics of micro-algae and fungi

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Month	Syllabus Topic
	Semester-III
June	1.1 Transcription in prokaryotes: enzymatic synthesis of RNA, basic features of RNA synthesis, E. coli RNA polymerase, classes of RNA molecules 1.2 Transcription mechanism in prokaryotes- promoter, initiation, elongation, proof reading and rho dependent, independent mechanism 1.3 Transcription in eukaryotes: polymerase of eukaryotes, promoters of eukaryotes
July	1.4 Synthesis of hnRNA and post transcriptional modifications 1.5 The genetic code, properties of genetic code, wobbles hypothesis 1.6 Translation mechanism in prokaryotes and eukaryotes 2.1 Gene regulation in prokaryotes 2.2 Transcriptional level regulation- positive and negative regulation 2.3 Auto and co-ordinated regulation 2.4 Operon concept- lac, trp operons
August	2.5 Translation regulation in eukaryotes and prokaryotes 2.6 Inhibitors of protein synthesis- antibiotics and other inhibitors 3.1 Enzymes used in gene cloning: restriction endonucleases, ligases, phosphatases, methylases, kinases 3.2 Cloning vehicles, plasmids, cosmids, phage vectors 3.3 Construction of genomic and cDNA libraries
September	3.4 Identification of cloned genes- Colony hybridisation 3.5 Expression of vectors, bacterial vectors 3.6 Yeast vectors 4.1 Principle, methodology and applications of PCR technology 4.2 Variations of PCR
October	4.3 DNA finger printing technique and its applications in medicine 4.4 Principles involved in blotting techniques- southern, northern and western blotting 4.5 Genome sequencing: Sangers method 4.6 Applications of rDNA technology in medicine

  
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Month	Syllabus Topic
	Semester-IV
January	1.1 Introduction to biostatistics, history and applications 1.2 Concept of sampling and sampling distributions 1.3 Measures of central tendency (mean, median, mode) 1.4 Measures of deviation (standard deviation, variance and co-efficient of variation) 1.5 Concept of probability, basic laws and its application to mendelian segregation 1.6 Concept of probability distribution, binomial, poisson distribution, normal distribution and their applications in biology
February	2.1 Concept of test of hypothesis- t-Test and chi square test, their application in biology 2.2 Simple correlation and regression 2.3 Concept of analysis of variance (ANOVA)- one way classification 2.4 ANOVA- Two way classification 2.5 Graphical representation of data 2.6 Importance of statistics in biology
March	3.1 Usage of MS-DOS commands, internal and external commands 3.2 Directory and file commands, copying, erasing, renaming and displaying files 3.3 Microsoft word: concept of toolbar, character, paragraph and document formatting 3.4 Drawing tool bar, header, footer, document editing, page set up, short cut keys, text and graphics 3.5 Microsoft power point: slide presentation, slide layout and design, custom animation, image importing, slide transition 3.6 MS Excel- Applications, Functions, Charts, Pivot Tables, validations, formatting of spread sheet
April	4.1 Introduction to bioinformatics, history and emergence 4.2 Biological databases (nucleic acids and proteins) 4.3 Introduction to Genomics and Proteomics 4.4 Biochips 4.5 Data retrieval tools (BLAST, Pub MED) 4.6 Applications of Bioinformatics

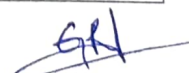
  
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Month	Syllabus Topic	
	Semester-V	
June	<p>1.1 Historical perspectives of plant tissue culture, and Basic requirement for tissue culture laboratory</p> <p>1.2 Culture mediums for plant tissue culture- MS medium and B5 Medium.</p> <p>1.3 Sterilization of media-steam, dry and filter sterilization- Explants sterilization</p>	<p>1.1 Scope and importance of medical biotechnology</p> <p>1.2 Karyotyping of human chromosomes</p> <p>1.3 Chromosome banding- G banding and R-banding technique</p>
July	<p>1.4 Plant growth regulators and differentiation.</p> <p>1.5 Method of tissue culture-formulation of medium explants collection, surface sterilization, inoculation, Callus induction, subculture and regeneration of plants</p> <p>1.6 organ culture- leaf, root and stem culture</p> <p>2.1 Suspension cultures- growth and subculture, types and synchronization of suspension cultures.</p> <p>2.2 Immobilization of cells and the effect of elicitors on the production of secondary metabolites of commercial value</p>	<p>1.4 Inheritance patterns in Man- Pedigree analysis</p> <p>1.5 Diagnosis using monoclonal antibodies- ELISA</p> <p>1.6 Genetic counselling – calculating risk and discussing the options</p> <p>2.1 Chromosomal disorders caused due to structural chromosomal abnormalities (Deletions, duplications, Translocations)</p> <p>2.2 Chromosomal disorders caused due to numerical chromosomal abnormalities (autosomal and allosomal)</p>
August	<p>2.3 Meristem culture and its uses in production of virus free plants</p> <p>2.4. Clonal propagation, Micro propagation of plants – medicinal plants and endangered plants –method and advantages</p> <p>2.5 Production of secondary metabolites- culture techniques</p> <p>2.6 large scale production of commercially important compounds</p> <p>3.1 Somatic embryogenesis- Principle, protocol and importance.</p> <p>3.2 Artificial seeds – production, applications and limitations.</p>	<p>2.3 Monogenic disorders (autosomal and X-linked diseases)</p> <p>2.4 Mitochondrial diseases – LHON, MERRF</p> <p>2.5 Types and causes of male and female infertility</p> <p>2.6 IVF- methodology</p> <p>3.1 Gene therapy – exvivo and <i>invivo</i> gene therapy; somatic and germline gene therapy;</p> <p>3.2 Strategies of gene therapy: gene augmentation – ADA deficiency; Prodrug therapy/ suicide gene – glioma</p>
September	<p>3.3 Embryo rescue and its importance</p> <p>3.4 Anther culture and production of androgenic haploids.</p> <p>3.5 Somaclonal variations- applications of somaclonal variations to crop improvement</p> <p>3.6 Cryopreservation of plant cultures and application of plant tissue culture</p> <p>4.1. Protoplast – properties of protoplast, Protoplast – Isolation (mechanical and enzymatic methods)</p> <p>4.2 Culturing and regeneration of protoplasts</p> <p>4.3 Different methods of protoplast fusion (mechanical fusion, chemo fusion, electro fusion)</p>	<p>3.3 Stem cells – potency definitions; embryonic and adult stem cells;</p> <p>3.4 Applications of stem cells – cell-based therapies and regenerative medicine</p> <p>3.5 Encapsulation technology and therapeutics- Diabetes</p> <p>3.6 Human genome sequences – mapping and cloning of human disease genes</p> <p>4.1 Cancer – Types</p> <p>4.2 Oncogenes, tumour suppressor genes, stability of genome, control of cell cycle</p> <p>4.3 Molecular basis of colon cancer and breast cancer</p>
October	<p>4.4 Selection of somatic hybrids and cybrids.</p> <p>4.5 Introduction to <i>Agrobacterium tumifaciens</i>, Features of Ti Plasmid, molecular mechanism of T-DNA transfer.</p> <p>4.6 Physical gene transfer methods – Particle Bombardment, Electrophoration and microinjection</p>	<p>4.4 DNA/RNA based diagnosis– HBV, HIV</p> <p>4.5 Applications of PCR in disease diagnosis</p> <p>4.6 Haemoglobinopathies</p>

  
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Month	Syllabus Topic	
	Semester-VI	
<b>January</b>	1.1 Introduction to environment and pollution 1.2 Types of pollution- air, water and land pollutions 1.3 Types of pollutants– inorganic, organic and biotic sources 1.4 Sources of pollution – domestic waste, agricultural waste, industrial effluents and municipal waste 1.5 Biomonitoring of environmental pollutants by bioindicators 1.6 Emission control biotechnology- air sampling techniques	1.1. Animal tissue culture, history, requirements for animal cell culture 1.2. Substrate, liquids, culture mediums-Natural (Clots, Biological fluids, Tissue extracts), complex natural and chemically defined media 1.3. Explant-culture of explants, Cell culture technique- initiation, preparation and sterilization of media 1.4 Isolation of explants, disaggregation of explants, culture, subculture 1.5 Cell lines, evolution of cell lines, maintenance of cell lines, large scale culture of cell lines- monolayer, suspension and immobilized cell culture, 1.6 Development of primary culture and cell lines, subculture
<b>February</b>	2.1 Renewable and non- renewable energy resources 2.2 Fossil fuels as energy source and their impact on environment 2.3 Non-conventional source – biomass as source of bioenergy 2.4 Types of biomass – plant, animal and microbial biomass 2.5 Biodelignification by enzymes 2.6 Biodesulphurisation of coal	2.1. Cultured cells and evolution of continuous cell lines (established cell lines) 2.2. Commonly used cell lines - their origin and characteristics 2.3. Cell line preservation and characterization 2.4. High level expression of foreign gene in animal cells-expression vectors, enhancers, regulatory sequences. 2.5 Expression foreign genes in animal cells: advantage and disadvantages. 2.6 Properties of cell lines – biology and characterisation of cultured cells
<b>March</b>	3.1 Microbial treatment of waste water (sewage of industrial effluent)- aerobic and anaerobic methods 3.2 Solid waste and management; Bioremediation– concepts and types (in-situ and ex-situ) 3.3 Bioremediation of toxic metal ions– biosorption and bioaccumulation 3.4 Microbial bioremediation of pesticides and Xenobiotic compounds 3.5 Phytoremediation- concepts and application 3.6 Degradative plasmids and genes in biomining	3.1. Transfection methods of animal cells (Calcium phosphate, DEAE-dextran, Lipofection, Electroporation, Microinjection) 3.2 Embryonic stem cell transfer 3.3 Selection of recombinant cells with various marker genes (Thymidine Kinase, Dihydrofolate reductase, CAD protein, XGPRT, HAT, Neomycin phosphotransferase) 3.4 Production of transgenic animals (Mice, Cattle, Sheep, pigs, Fish and Birds) 3.5 Applications, advantages and disadvantages of animal tissue culture 3.6 Ethical issues related to transgenic animals
<b>April</b>	4.1 Climate change, greenhouse gases and global warming, 4.2 Impact of pollution on environment and measurement methods 4.3 Production of biofuels, bioethanol & biomethanol 4.4 Conservation of biodiversity 4.5 Carbon sequestration – vision, methods and management strategies 4.6 GEMS and their impact on environment	4.1 Stem cells: Characteristic features, maintenance, culture and Applications of Embryonic and adult stem cells 4.2 Animal cloning- Nuclear transfer and embryonic stem cell method 4.3 Molecular pharming: Transgenic animals and their applications, 4.4 Methods used for transgenesis with reference to transgenic mice, cattle, sheep, goats, pigs, chicken and fish. 4.5 Animal cells as a bioreactors for the production of commercially important products 4.6 Cryopreservation- principles

  
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**Department of Biotechnology**  
**SR & BGNR Govt Arts and Science College**  
**Co-Curriculum Plan -2021-2022**

MONTH	DATE	ACTIVITY PLANNED
JUNE		
JULY	23/10/2021 to 30/10/2021	Bridge course
AUGUST	21/02/2022 to 26/02/2022	Certificate course
SEPTEMBER	16/09/21, 17/09/21	Student seminars and assignment 3 <sup>rd</sup> B.Sc
OCTOBER	20/12/21, 21/12/21	Student Seminars and assignment 2 <sup>nd</sup> B.Sc
NOVEMBER	08/12/21	Student Seminars and assignment 1 <sup>st</sup> B.Sc
DECEMBER	Semester end exams	
JANUARY	03/12/21	Extension lecture
FEBRUARY	11/04/22	Field trip
MARCH	18/04/22 to 23/04/22	Student study projects
APRIL	01/02/22 to 31/05/22	M.Sc Entrance coaching
MAY	Semester end exams	

  
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