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	Paper I	5
Unit	Title	Credits
	Cell biology and Animal tissue culture	
I	Cytoskeleton: Overview of the major functions of the cytoskeleton Signal transduction: Basic elements of cell signalling systems G proteins and secondary messengers such as cAMP, phosphatidyl inositol Cell membrane: Fluid mosaic model, Cell permeability, Transport mechanism.	
II	Animal tissue culture: Introduction to tissue culture. Advantages and limitations. Design and layout: Concept of sterility and sterile handling Tissue culture media: Physiochemical properties, Balance Salt Solution, complete media, Serum, Serum Free Medium -Advantages and Disadvantages Types of cell culture: Organ culture, primary cultures and cell lines with examples, Stem cell cultures and their uses	
Unit	Title	Credits
	Immunology and Biochemistry	
I	Innate and acquired immunity: First, second and third line of defence. Mechanism of innate immune response. Natural - Active and passive immunity. Artificial immunity - Active and passive immunity. Cells and organs of immune system: Cells of immune system – lymphoid cells, NK cells, mononuclear phagocytes, granulocytic cells Organs of immune system – primary lymphoid organs, secondary lymphoid organs. Antigens and Antibodies: Properties of antigen, adjuvant, epitopes. Basic structure classes & sub- classes of antibodies with their biological activity (tabulated), complement, antigenic determinants on immunoglobulins.	
II	Carbohydrate metabolism: Biosynthesis of starch, sucrose, glycogen from glucose. Gluconeogenesis. Conversion of galactose into glucose, galactosemia. Biosynthesis of heteropolysaccharides - peptidoglycan synthesis	
Unit	Title	Credits
	Biostatistics & Bioinformatics	
I	Biostatistics: Central tendency, Standard deviation, t Test, z test	
II	Bioinformatics: An overview of the basics of bioinformatics. Nucleotide and protein data bases. Tools of bioinformatics: BLAST, FASTA	
Unit	Title	Credits
	Instrumentation	
I	Centrifugation: Principle of centrifugation. Rotor design and selection.	

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	Preparative centrifugation - differential, rate-zonal, isopycnic, equilibrium isodensity centrifugation with applications. Density gradient centrifugation – nature of gradient, formation, sample application and collection. Column Chromatography: Principle, working and applications of GC, affinity, ion exchange, gel permeation, HPLC	
II	Spectroscopy and Tracer technique: Principle of Beer and Lambert's law. Visible and ultraviolet spectroscopy – instrumentation, applications. Double beam spectroscope Detection techniques – GM counter, scintillation counter, autoradiography.	
	Paper II	5
Unit	Title	Credits
	Genetics and Molecular Biology	
I	Genetic mapping in bacteria: Molecular basis of transformation, conjugation and transduction. Operon concept: Regulation of gene expression in bacteria - Lac operon and trp operon. Transposable elements: Prokaryotes and Eukaryotes.	
II	Transgenic plants: Artificial (Direct DNA uptake by protoplast, electroporation, liposome mediated, and particle gun transformation) and Natural method of gene transfer (Agrobacterium and virus). Transgenic animals: Transgenic (mice) methodology, retroviral method, DNA microinjection method, engineered embryonic stem cell method.	
Unit	Title	Credits
	Industrial Biotechnology	
I	Dairy microbiology: Milk - normal flora, changes in the flora, enumeration, oxidation reduction potential, factors affecting bacteriological quality, pasteurization, Fermented milk products- cultured butter milk, yogurt. Butter- composition, types, manufacture, sweet cream and ripened cream butter, spoilage and defects in butter. Cheese- Principle of cheese making, steps of manufacture, types, spoilage and defects.	
II	Fermentations and DSP Beverages: Beer- types, element of the brewing process, fermentation, spoilage. Wine- introduction, parameters, yeast, bacterial processes during wine making-malolactic fermentation, wine defects. Recovery and purification, strategies, separation of insoluble products (filtration), cell disruption, separation of soluble products (centrifugation, chromatography, solvent extraction), finishing steps for purification(drying, crystallization)	

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	Whole broth processing.	
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Unit	Title	Credits
Molecular Biology		
I	<p>Details of enzymes involved in gene cloning and their mode of action: Restriction endonucleases, Ligases, Alkaline phosphatases, polynucleotide kinase, Terminal transferase, Reverse transcriptase. DNA Polymerase with applications – Klenow fragment (synthesis of probe using random priming and nick translation), T4 DNA polymerase, Taq polymerase. Cloning vectors: Plasmid cloning vectors – pUC 19 and pBR322, Lambda phage, M13 bacteriophage vector, Cosmid vector, Shuttle vector,</p>	
II	<p>cDNA and genomic DNA cloning: construction of cDNA and genomic libraries. Analysis of gene and transcripts- Southern hybridization, DNA sequencing (Sanger's method), Polymerase chain reaction, DNA fingerprinting. Application of recombinant DNA technology: Diagnosis of genetic diseases – Sickle cell anaemia. Gene therapy – somatic and germ line gene therapy, Commercial products – insulin. Vaccines-Subunit Vaccines</p>	
Plant Tissue Culture and Environmental Biotechnology		
I	<p>Introduction to PTC: Initiation and maintenance of callus, organogenesis, virus elimination. Plant cell culture as a system for production of fine chemicals, why culture plant cells, plant suspension cultures, Permeabilisation of plant cell for product release, biotransformation Micropropagation, somatic embryogenesis, synthetic seed.</p>	
II	<p>Environmental Biotechnology: Renewable energy sources: Hydrogen gas production, biogas production, Biofuel Industrial waste and their management: Nature of industrial waste, industrial waste treatment of dairy, distillery (brewery), antibiotic industry. Monitoring methods and criteria used for measure success of waste treatment, COD, BOD, Total solid, pH, temp, TDS, heavy metals. Biofertilizer and biopesticide: Introduction, advantages over chemical, enlist and production of Rhizobium and Bacillus thuringensis</p>	

Instructions

The Examination for the Bridge Course will be conducted by the Respective College

The course will consist of TWO PAPERS of 100 Marks Each

The Questions Papers will be set by the Senior Teachers of the Department

Answer Papers will be corrected in the college

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The Mark List should be submitted to the University before the commencement of the Masters Programme