



KONGU ARTS AND SCIENCE COLLEGE

(An Autonomous Institution, Affiliated to Bharathiar University, Coimbatore)

ERODE – 638 107

B.Sc (Biotechnology)



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2020-2021



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SYLLABUS

Semester	Course Code	Core Paper IV Microbiology	Total Marks:100		Hours Per Week	Credits
			CIA: 25	ESE: 75	5	4
III	19UAQCT301					

Objectives

- To obtain an adequate knowledge about various microorganisms and activities.
- To become familiar with the role of microorganisms in different fields.

Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Improve the basic knowledge of development of Microbiology and Microscopic techniques
- CO2 Describe the fundamental organization of an microbial development and characteristics
- CO3 Interpret their ideas related to microbial techniques
- CO4 Outline the ideas of microbial role in spoilage and pathogenic effects on living organisms
- CO5 Summarize the microbial ecology and its application in various forms

UNIT I

Developments in Microbiology: History of Microbiology (Contributions of Louis Pasteur, John Tyndall, Robert Koch, Joseph Lister). Biogenesis and Abiogenesis, Germ theory of diseases. Scope of Microbiology.

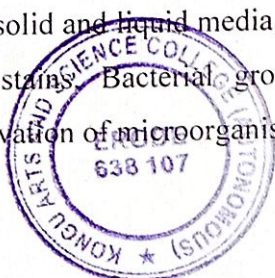
Microscopy – Sample preparation, principle and applications of Light Microscopy - bright field, dark field, fluorescence, phase contrast and confocal microscopy. Electron microscopy –TEM, SEM and AFM. Principle, Instrumentation and uses of Laminar Air Flow chamber and Autoclave.

UNIT II

Microbial Diversity: Ultra structure of Bacteria, classification of Bacteria- morphological and nutritional classification. Structure, classification and reproduction of Fungi. Structure and classification of Virus. Reproduction of bacterial virus (Lambda phage), plant virus (TMV) and animal virus (HIV).

UNIT III

Microbial Techniques: Different culture media - simple, complex, differential and synthetic media. Media preparation- solid, semisolid and liquid media. Sterilization techniques - physical and chemical methods. Pure culture techniques. Types of stains. Bacterial growth curve and environmental factors affecting microbial growth. Maintenance and Preservation of microorganisms.



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UNIT IV

Microbial Spoilage: Spoilage of foods – principles and types of spoilage – microbial spoilage of milk, fresh and processed meats.

Medical Microbiology: Pathogenesis of bacterial disease- airborne diseases (Tuberculosis), food and water borne disease (Cholera, Botulism), fungal disease (Cutaneous and subcutaneous mycosis) and Protozoan disease (Plasmodium).

UNIT V

Microbial Ecology: Microbial flora of soil, factors affecting soil microflora, Biogeochemical role of microorganism- nitrogen and sulphur cycle. Symbiotic and asymbiotic Nitrogen fixation. Biopesticides, Bioremediation, Bioleaching. Role of microbes in alternate energy production. Microbes in biological warfare.

TEXT BOOK

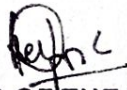
R.C.Dubey and D.K.Maheshwari, Text Book of Microbiology, Revised Edition, S.Chand and Company Ltd, Delhi, 2007.


REFERENCES

1. Albert G.Moat *et al.*, Microbial Physiology, IV Edition, Wiley India Edition, 2009.
2. Gerard J. Tortora *et al.*, Microbiology -An Introduction. Benjamin Cummings, U.S.A, 2001
3. Prescott *et al.*, Microbiology, VII Edition, McGraw-Hill Companies, New York, 2008.
4. R.Ananthanarayanan, Textbook of Microbiology, V Edition, Orient Longman Ltd, Chennai, 1997.
5. P.V. Ramanarao, Essentials of Microbiology, CBS Publishers, New Delhi, 2004.

QUESTION PAPER PATTERN		
SECTION - A	SECTION - B	SECTION - C
10 x 1 = 10 Marks (Multiple Choice. Four options) Two questions from each unit	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3 x 10 = 30 Marks (Answer any three Questions) One Question from each unit




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Semester	Course Code	Core Paper V Genetics	Total Marks: 100		Hours Per Week	Credits
			CIA: 25	ESE: 75		
III	17UAQCT302				4	4

Objectives:

- To have graduates with high knowledge in the field of Genetics
- To become familiar with the advents of genetic development.

Course Outcome:

On successful completion of the course, the students will be able to :

CO1 Summarize the Basic concepts of Genetics

CO2 Generate their perception with genetic interactions

CO3 Develop their knowledge in chromosomal linkage and crossing over

CO4 Outline on various chromosomal variations

CO5 Understand the ideas in population genetics

UNIT I

Mendelian Principles: Definition, history and scope of Genetics, general areas of Genetics (Classical, Molecular and Evolutionary). Basic concept of Genetics - Allele, Locus, Gene, Genome, Haplotype, Genotype, Phenotype. Model organisms in Genetics.

Mendel's Law: Law of Dominance - Monohybrid cross, Law of Independent Assortment - Dihybrid cross, Trihybrid cross, Test cross and Back cross.

UNIT II

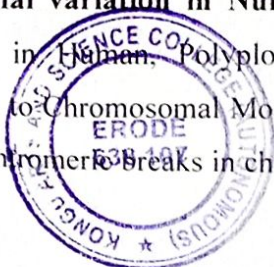
Gene Interactions: Non allelic gene interaction: Epistasis (Dominant, Recessive, Duplicate recessive), complementation, polygeny. Sex determination - Chromosomal, Genetic, and environmental sex determining systems. Allelic gene interaction: complete dominance, partial or incomplete dominance, co-dominance, Multiple Alleles (ABO blood groups and Rh factor), Lethal alleles, penetrance and expressivity, pleiotropism.

UNIT III

Linkage and Crossing over: Linkage, kinds of linkage, linkage groups, types of Crossing over, mechanism of Meiotic Crossing over, significance of Crossing over Bateson & Punnet's Coupling and Repulsion hypothesis. Haploid mapping (2 point cross), Diploid mapping (Tetrad analysis), determination of map distance and gene order.

UNIT IV

Chromosomal variation in Number and Structure: Euploidy, Aneuploidy, Aneuploidy segregation in plants, Aneuploidy in Human, Polyploidy in Plants and Animals, Induced Polyploidy, applications of Polyploidy, Introduction to Chromosomal Mosaics. Deletion, Duplication, Inversion, Translocation, Position Effect, Centromeric and Non-centromeric breaks in chromosomes. Single gene disorders – Autosomal dominant (Huntington), Autosomal



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recessive (cystic fibrosis). X linked trait (muscular dystrophy).

UNIT V

Population Genetics: Genetic variation – Genotypic frequency, Allelic frequency, Random and Non-random mating, Hardy Weinberg law, calculating gene frequencies, changes in allelic frequency (Genetic drift, Natural Selection, Migration, Genome evolution). Pedigree Analysis – Symbols of Pedigree, Pedigrees of Autosomal recessive, Autosomal dominant, X linked recessive and X linked dominant traits. Twin studies, Genetic screening – prenatal and postnatal testing and Genetic counseling.

TEXT BOOK(S)

Dr. P.S. Verma and Dr. V.K. Agarwal, Cell Biology, Genetics, Molecular Biology, Evolution and Ecology I Multicolour Edition, S.Chand and Company, New Delhi, 2014

Benjamin A.Pierce, Genetics- A conceptual Approach, II Edition, W.H.Freeman and Company, New York, 2005.

REFERENCES

1. A.V.S.S. Sambamurty, Genetics, II Edition, Narosa Publication, New Delhi, 2005
2. L.D.Vijendra Das, Genetics and Plant Breeding, Revised II Edition, Newage International Pvt.Ltd, New Delhi, 2005.
3. S.B. Basu and M.Hossain, Principles of Genetics, Books and Allied Pvt. Ltd, Kolkatta, 2006.
4. Gardnar *et al.*, Principles of Genetics, VIII edition, Wiley India, New Delhi.2008
5. D. Peter Sunstad and Michael J.Simmons, Genetics, VI Edition, John Willey and Sons Inc, Singapore, 2012.

QUESTION PAPER PATTERN

SECTION - A	SECTION - B	SECTION - C
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3 x 10 = 30 Marks (Answer any three Questions) One Question from each unit



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Semester	Course Code	Allied Paper – III	Total Marks: 75		Hours Per Week	Credits
III	17UAQAT303	Biomathematics	CIA:20	ESE:55	4	3

Objective:

- To enable the students to understand the concepts of Mathematical and Statistical results and to develop sufficient knowledge to apply in their further studies.

Course Outcome:

On successful completion of the course, the students will be able to

CO1 Apply the concepts of binomial and exponential theorems in summation of series.

CO2 Solve the problems using Matrices.

CO3 Describe different types, collection and presentation of data.

CO4 Determine the measures of central tendency and dispersion.

CO5 Apply Correlation and Regression in statistical analysis.

UNIT I

Binomial and Exponential theorems (Statement only) -Application to summation of series – Simple Problems.

UNIT II

Matrices – Types of Matrix – Operations – Matrix Multiplication - Inverse of a matrix- Rank of Matrix –Linear Equations by Matrix method – Simple Problems.

UNIT III

Statistics: Meaning and Scope- -Collection of Data-Primary and Secondary data - Methods of collecting Primary and Secondary Data-Classification and Tabulation- Presentation of data by Diagrams-Bar diagram and Pie diagram - Graphic Representation of Frequency Distribution.

UNIT IV

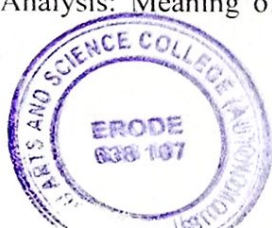
Measures of Central Tendency: Mean, Median and Mode - Geometric Mean and Harmonic Mean (simple problems only).

Measures of Dispersion: Range, Quartile Deviation, Standard Deviation and Co-efficient of Variation.

UNIT V

Correlation: Meaning–Scatter Diagram-Karl Pearson’s Co-efficient of Correlation- Spearman’s Rank Correlation.

Regression Analysis: Meaning of Regression–Regression in Two Variables- Difference between Correlation and Regression.



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TEXT BOOK(S)

1. P.Kandasamy and K.Thilagavathi, "Allied Mathematics", Paper- I First Semester . S.Chand and Company Ltd. New Delhi. 2003.

UNIT I: Page No. 8-27.

UNIT II : Page No. 72-106.

2. P.A Navnitham, "Business Mathematics & Statistics", Jai Publishers, Trichy, 2011.

UNIT III : Chapter 1,3,5,6 : Pages 1 – 5, 9-17, 28-39,61-64, 83-91, 99-119, 131-146

UNIT IV : Chapter 7.8 :Pages 159- 183, 196-209, 212-227, 251-260, 301 -310, 325-340

UNIT V : Chapter 12.13 : Pages 503-508, 518-522, 540-554. 563-569

REFERENCES

1. R.S.N.Pillai and Bagavathi, " Statistics theory and practice", Jai Publishers. Trichy 21, 2013.
2. P.R.Vittal, " Allied Mathematics", Margam Publications, Chennai , 2002.
3. Jerrold H.Zar. " Biostatistical Analysis", Pearson Education, 4th Edition, 1999.
4. S.Prasad, "Elements of Biostatistics",Rastogi publications, Meerut, 2005.
5. P.Raja , " Mathematics and Biostatistics", Subash Publications, 1999.

SECTION – A	SECTION – B	SECTION – C
10x1=10 Marks (Multiple choice, Four options) Two questions from each unit	5 x 3 = 15 Marks (Either or choice) Two questions from each unit	3x10 = 30 Marks (Answer any three questions) One question from each unit

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Semester	Course Code	Skill Based Subject-I Lab in Quality Control Techniques	Total Marks:75		Hours Per Week	Credits
			CIA: 30	ESE: 45		
III	19UAQSP304				3	3

Objectives:

- The student should acquire technical skills on quality analysis of various house hold products.

Course Outcome:

On successful completion of the course, the students will be able to:

CO1 Improve their knowledge in concepts of pH and microbiological methods effectively

CO2 Illustrate the knowledge in the quantitative estimations

CO3 Develop the skill in qualitative analysis of soil

CO4 Estimate the quality of household products

CO5 Expertise their knowledge in adulteration

A. Quality control of Food products

- 1 Determination of Moisture content in food
- 2 Quality assessment of chilli powder
- 3 Characterization of turmeric powder – Assessment of curcumin
- 4 Determination of adulterant in oil and milk products
- 5 Determination of Acid Value of Fats
- 6 Determination of iodine value of oil
- 7 Determination of saponification value of oil

B. Quality control of Water

- 8 Basic analysis – Colour, turbidity, odour, pH and BOD
- 9 Determination of TDS
- 10 Determination of total hardness
- 11 Microbiological analysis of drinking water – Total Bacteria, Coliform, Salmonella
- 12 Determination of Chlorine content



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REFERENCES

1. <https://fssai.gov.in/cms/manuals-of-methods-of-analysis-for-various-food-products.php>
2. <https://www.thebetterindia.com/114412/simple-home-tests-food-adulteration-kitchen-ingredients/>
3. <http://www.downtoearth.org.in/news/how-to-check-if-your-milk-is-adulterated-57584>
4. S.Sadasivam and A.Manickam, Biochemical methods, II edition, New Age International, India. 1996
5. https://old.fssai.gov.in/Portals/0/Pdf/Draft_Manuals/WATER.pdf
6. N. Kanan, Laboratory manual in General Microbiology, Panima Publishing Corporation. 2002.

QUESTION PAPER PATTERN

Major Expt	Minor Expt	Set up	Spotters	Viva voce	Record
x 12= 12 Marks	1x8=8 Marks	1x6=6 Marks	5x2= 10 Marks	4 Marks	5 Marks

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Semester	Course Code	Core Practical II - Lab in Microbiology	Total Marks:100		Hours Per Week	Credits
			CIA: 40	ESE: 60		
IV	19UAQCP402				3	4

Objectives:

- On successful completion of the practical the student should have experience in handling microorganisms, identification and characterization of them.

Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Will be able to understand the techniques of media preparation
 - CO2 Develop their skills oriented to enumeration techniques
 - CO3 Interpret the difference in staining techniques
 - CO4 Efficiently perform the biochemical characterization of microbes
 - CO5 Analyze the sensitive and resistant ability of microorganisms.
1. Media Preparation and Sterilization
 2. Pure Culture Techniques
 3. Culturing of Organisms in Differential Media
 4. Enumeration of bacteria from Water
 5. Enumeration of fungus from Soil
 6. Measurement of Growth rate of Bacteria
 7. Staining of Microorganisms - Gram Staining, Spore Staining, Fungal Staining
 8. Biochemical Tests – IMVIC, TSI, Carbohydrate fermentation test
 9. Antibiotic Sensitivity Test
 10. MBRT Test.

REFERENCE

1. N. Kanan, Laboratory manual in General Microbiology, Panima Publishing Corporation. 2002.

QUESTION PAPER PATTERN					
Major Expt	Minor Expt	Set up	Spotters	Viva voce	Record
1 x 15= 15 Marks	1x12=12 Marks	1x8=8 Marks	5x3= 15 Marks	5 Marks	5 Marks



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Semester	Course Code	Core Paper VII	Total Marks:100		Hours Per Week	Credits
V	20UAQCT501	Immunology	CIA: 25	ESE: 75	5	4

Objectives:

- To understand the structure, function and role of immune cells
- To acquire knowledge about immune system and their working mechanism

Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Understand the basics of immunology
- CO2 Develop their perception levels in understanding the concepts of antigen and antibody
- CO3 Interpret their ideas related to antigen presentation
- CO4 Outline the metabolic pathways of immune response
- CO5 Describe their understanding in advanced immunological techniques.

UNIT I

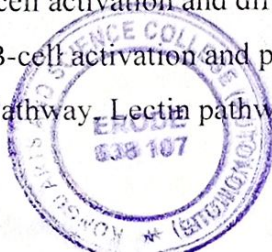
Basics of Immunology: History and scope of immunology. Types of immunity: Innate and Acquired immunity. Hematopoiesis, cells and organs of the immune system, humoral and cell-mediated response. Primary and Secondary immune responses. Defense mechanisms - barriers involved in innate immunity (anatomical, physiological and chemical), second line defense (inflammatory response and phagocytosis).

UNIT II

Antigen and Antibodies: Antigen Biology- Classification, antigenicity, immunogenicity, epitopes, haptens, adjuvants. Antibody – Structure, types, properties and their biological functions, polyclonal sera. Structure and classification of MHC, CD molecules and cytokines.

UNIT III

Antigen Processing and Presentation: Pathways and the role of APC's. T-cell Receptor Complex, T-cell activation and differentiation, immunoglobulin gene rearrangement, B-cell maturation, B-cell activation and proliferation. Complement system - Classical pathway, Alternative Pathway, Lectin pathway.



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UNIT IV

Immune response: Hypersensitivity – Type I, II, III, IV & V. HLA typing, types of grafts, mechanism of graft rejection, immuno suppression and immunotolerance. Immunity to infection – recognition and inactivation of pathogens (Bacteria and Virus). Autoimmune diseases (Hashimoto's thyroiditis, Rheumatoid arthritis). Vaccines – traditional and current vaccines. Production of monoclonal antibodies.

UNIT – V

Tumor Immunology: Tumor Antigen, Immune response to tumors, Cancer immunotherapy, Immunodeficiency disease (AIDS).

Immunodiagnosis: Immunodiffusion, immunoelectrophoresis, agglutination reaction, complement fixation, immunoprecipitation, immunofluorescence, Radio Immuno Assay, ELISA, Western blotting. Tests for detecting autoimmune disorders: CRP, ESR, Coombs Test.

TEXT BOOK

Kuby, J, Immunology – V Edition, W.H.Freeman and Company, 2003.

REFERENCE BOOKS

1. C.Vaman Rao, Immunology II Edition, Narosa Publishing House, New Delhi, 2013.
2. Ian Todd, Gavin Spickett, Immunology V edition, Blackwell Publishing, 2005.
3. S.C. Rastogi, Elements of Immunology, I Edition, CBS Publications, New Delhi, 2002
4. Roitt *et al.*, Essential Immunology, XIII Edition, Elsevier, 2017

QUESTION PAPER PATTERN		
SECTION - A	SECTION - B	SECTION - C
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3 x 10 = 30 Marks (Answer any three Questions) One Question from each unit



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Semester	Course Code	Core Paper VIII rDNA Technology	Total Marks:100		Hours Per Week	Credits
			CIA: 25	ESE: 75		
V	20UAQCT502				5	4

Objectives:

- To understand various recombinant techniques and new advents in Biotechnology
- To acquire knowledge about the molecular level study of living organism.

Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Differentiate the role of various enzymes used in recombinant technology
- CO2 Describe the fundamental features of plasmids
- CO3 Comprehend their knowledge about vectors
- CO4 Identify the recombinant clones
- CO5 Understand the techniques of recombination

UNIT I

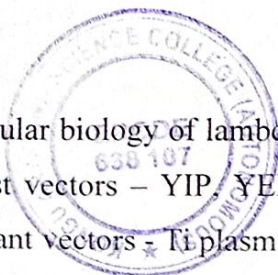
Enzymes in rDNA: Basic steps in cloning, Restriction and Modification systems of Bacteria. Restriction enzyme (Endo- and Exo-nucleases) DNaseI, S1nuclease, RNase H, DNA Polymerases, RNA polymerase, *Taq* and *Pfu* polymerase, Reverse transcriptase, DNA Ligase, Methylase, End-modifying enzymes - Polynucleotide kinase, Alkaline phosphatase, terminal deoxynucleotidyl transferase. End modification by linkers and adapters.

UNIT II

Plasmids – Types of plasmids, properties of plasmid, copy number control. *E.coli* vectors - pBR322 and their derivatives, pUC vectors and their derivatives, BAC. Inducible promoters, selectable markers, reporter genes, shuttle vectors and expression vectors. Cloning in *Bacillus* and *Streptomyces*.

UNIT III

Vectors: Molecular biology of lambda phage and vectors. M13 biology and vectors, cosmid, phagemid. Yeast vectors – YIP, YEP, YRP and YAC. Animal vectors - SV40 and Bacteriophage vectors. Plant vectors - Ti plasmid as vector, CaMV and Gemini viral vectors.



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UNIT IV

Identification of recombinant clones: Probes - construction and labeling. Introduction of cloned genes into cell- Electroporation, lipofection, Ca-mediated transfer, microinjection and particle bombardment. Identification of recombinant DNA (Complementation test, marker inactivation, Blotting and hybridisation techniques and invitro translation). Chromosome walking and jumping. Construction of cDNA and genomic DNA libraries.

UNIT V

Molecular techniques: PCR – design and optimization, Types of PCR - Inverse, Nested, RT PCR, Hot Start PCR, Quantitative, Semi Quantitative and Real Time PCR, Applications of PCR. DNA sequencing – Maxam Gilbert method, Sanger's Dideoxy chain termination method and Automation, Pyrosequencing, NGS methods. Microarray. Site- directed mutagenesis, DNA finger printing, Gene therapy – somatic and germ line gene therapy, viral and non viral gene delivery systems.

TEXT BOOKS

1. T.A.Brown, Gene Cloning and DNA Analysis – An Introduction, VI Edition, A John Wiley & Sons, Ltd., Publication 2010.

REFERENCES

1. S.B. Primrose and R.M. Twyman, Principle of Gene Manipulation and Genomics, VII edition, Blackwell Publishing, 2006.
2. Ernst L. Winnacker, From Genes to Clones, I Edition, Panima Publishing Corporation, 2003.
3. K.Rajagopal, Recombinant DNA Technology and Genetic Engineering, I Edition, Tata McGraw Hill Education, Pvt. Ltd, 2012.
4. Richard M. Myers *et al.*, Recombinant DNA Genes and Genomes III Edition, W.H. Freeman and Company, 2007.

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QUESTION PAPER PATTERN		
SECTION - A	SECTION - B	SECTION - C
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3 x 10 = 30 Marks (Answer any three Questions) One Question from each unit

Semester	Course Code	Core Paper XI Plant Biotechnology	Total Marks:100		Hours Per Week	Credits
			CIA: 25	ESE: 75		
V	20UAQCT503				5	4

Objectives:

- To understand the basic concepts in plant development, the growth mechanism and *in vitro* studies.
- To acquire knowledge about techniques used in the betterment of Agriculture.

Course Outcome:

On successful completion of the course, the students will be able to:

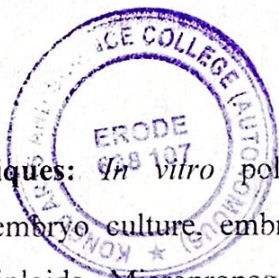
- CO1 Improve their knowledge regarding tissue culture media and its composition
- CO2 Understand the different available explants for tissue culture
- CO3 Describe the features of protoplast and its significance
- CO4 Outline the techniques of plant transformation
- CO5 Summarize the applications of molecular assisted breeding

UNIT-I

Introduction to tissue culture: Introduction and history of plant tissue culture, basic lab requirements, conditions of culture room, culture media – types, composition and preparation. Explant selection, sterilization techniques, growth regulators – types, structure and functions of Auxins, Cytokinins, Gibberellins, Abscisic acid and Ethylene. Callus and suspension cultures-initiation and maintenance of callus and suspension cultures; single cell clones.

UNIT-II

Culture Techniques: *In vitro* pollination and fertilization. Organogenesis: somatic embryogenesis, embryo culture, embryo rescue and applications. Endosperm culture and production of triploids. Micropropagation, axillary bud, shoot-tip, meristem, anther and microspore culture. Micrografting. Haploid production and its applications, somaclonal variations and applications. Seed storage proteins.



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UNIT III

Protoplast: Introduction to protoplast, principle and applications of protoplast isolation, testing for viability of isolated protoplasts, steps in the regeneration of protoplasts, methods for fusing protoplasts, use of markers for selection of hybrid cells. Somatic hybridization and practical applications of somatic hybridization (hybrid vs. cybrids). Synthetic seed technology.

Cryopreservation of germplasm: Short-term and long-term conservation of plant genetic resources, *in situ* and *ex situ* conservation of plants.

UNIT IV

Plant transformation technology: Basis of tumor formation, hairy root, features of Ti and Ri plasmids, mechanism of T DNA transfer, role of virulence genes, use of Ti and Ri as vectors, binary vectors.

Transgenic plants: Genetic modification of plants for herbicide resistance, pest resistance, bacterial, virus and fungal resistance, abiotic stresses, post harvest losses, long shelf-life of flowers, terminator gene technology and antisense technology.

UNIT V:

Molecular marker aided breeding: RFLP maps, linkage analysis, RAPD markers, STS, microsatellite, SCAR (sequence characterized amplified regions), SSCP (single-strand conformational polymorphism), QTL, map-based cloning, molecular marker-assisted selection. Cytoplasmic Male sterility.

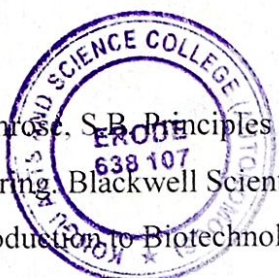
Plant metabolic engineering and industrial products: Primary and secondary metabolites. Hairy root cell cultures. Plant as bioreactors, Industrial enzymes from plant origin, plantibodies and edible vaccines. Biofarming.

TEXT BOOK

Chawlah. S, Plant Biotechnology, III Edition Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi, 2009

REFERENCES


1. Old, R.W., and Primrose, S.B. Principles of Gene Manipulation: An Introduction to Genetic Engineering. Blackwell Scientific Publications, Oxford, 2004.
2. Gupta. P.K, An Introduction to Biotechnology, Rastogi Publications, 2010.
3. Ramawat K G, Plant Biotechnology, III Edition, S.Chand and Company, New Delhi, 2008




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QUESTION PAPER PATTERN

SECTION - A	SECTION - B	SECTION - C
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3 x 10 = 30 Marks (Answer any three Questions) One Question from each unit


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Semester	Course Code	Elective I Environmental Biotechnology	Total Marks:100		Hours Per Week	Credits
			CIA: 25	ESE: 75		
V	20UAQET504				4	4

Objectives

- To have a deep knowledge in ecology and environmental cycles.
- To acquire knowledge about Biodiversity and its aspects.

Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Have a clear idea on biotic and abiotic factors
- CO2 Understand the significance of bioremediation and biodegradation
- CO3 Generate an interest in field of energy sources
- CO4 Identify and involve in waste management
- CO5 Develop a basic idea regarding to Environmental Impact Assessment

UNIT I

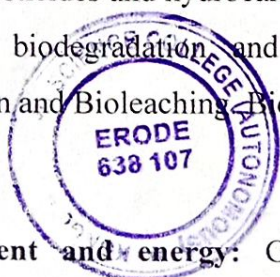
Introduction to Ecology: Scope and branches of ecology, Abiotic factors (water, soil, temperature, light. Biotic factors – Animal relationship, Symbiosis, Commensalisms, Mutualism, Antagonism, Antibiosis, Parasitism, Predation, Competition. Structure of pond and forest ecosystem, primary production, secondary production, food chain, food web, trophic levels, energy flow, ecological pyramids. Ecological succession, Biogeochemical cycle: Nitrogen and Phosphorous.

UNIT II

Bioremediation and Biodegradation: Bioremediation, Biodegradation - Factors affecting process of biodegradation; Methods in determining biodegradability; Biodegradation of plastics, pesticides and hydrocarbons. Xenobiotics - Use of microbes (bacteria and fungi) and plants in biodegradation and Biotransformation. Bioaccumulation, Biomagnifications. Biosorption and Bioleaching. Biosensors and Bioindicators for detection of pollution.

UNIT III

Environment and energy: Generation of energy and fuel using microorganisms (Hydrogen production and Methane production). Biomass –Plant, Animal and Microbial Biomass. Biomass as source of energy. Production of Bioethanol and Biomethanol.



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Applications of Nanotechnology in Environment: Nanotechnology for environmental decontamination – Heavy metal pollution remediation, Solid waste remediation, Groundwater and wastewater remediation, Hydrocarbon remediation. Single enzyme nanoparticles in bioremediation.

UNIT IV

Waste Management: Solid waste – Classification and types of solid wastes and solid waste management. Integrated solid waste management – Components of ISWM and Benefits of ISWM. E-waste: Composition of E- waste, E – waste management, E – waste management in India. Radioactive waste: Classification of radioactive wastes, Management of radioactive wastes. Biohazardous waste management.

UNIT V

Environmental Impact Assessment (EIA): Need of EIA; Scope and objectives; Types of environmental impacts; Steps involved in conducting the EIA Studies; Environmental Impact Assessment techniques-Ad-hoc method, checklist method, overlay mapping method, network method, simulation and modeling technique, matrix method, and system diagram technique; Merits and Demerits of EIA studies.


TEXT BOOK

1. Sharma, P.D, Ecology and environment. XI Edition Rastogi publications, Meerut, 2011.
2. Sulphey MM and Safer MM, Introduction to Environment Management, III Edition, PHI Learning Pvt. Ltd., 2015 (Unit IV)

REFERENCES

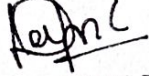
1. Durga Natha Dhar, Shalin Kumar, Triloki Vaish, Environment and Ecology, 1st edition, Vayu Education of India, 2009.
2. M. H. Fulekar, Bhawana Pathak, Environmental Nanotechnology, I Edition CRC Press, 2017
3. Nicholas P. Cheremisinoff, Biotechnology for Waste and Wastewater Treatment, Elsevier Science, 2013.





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QUESTION PAPER PATTERN

SECTION - A	SECTION - B	SECTION - C
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Semester	Course Code	Elective I Marine Biotechnology	Total Marks:100		Hours Per Week	Credits
			CIA: 25	ESE: 75		
V	20UAQET505				4	4

Objectives:

- To develop ideas regarding exploration of Marine Biology
- To gain a deep knowledge in Marine organisms and their related products.

Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Acquire knowledge about the significance of marine organisms
- CO2 Understand the methodology of bacterial cell aquaculture
- CO3 Predict and discover marine enzymes.
- CO4 Identify the usage of various bioactive marine products.
- CO5 Develop a basic knowledge about probiotics

UNIT I

Marine Biotechnology – History of Marine Biotechnology, Marine living resources. Sea ranching of economically important marine organisms. Application in aquaculture, pharmaceutical and biofouling. Bioactive compounds from marine organisms (Microorganisms, Sponges). Seaweeds as a source of polysaccharides. Seaweeds for removal of heavy metal pollutants.

UNIT II

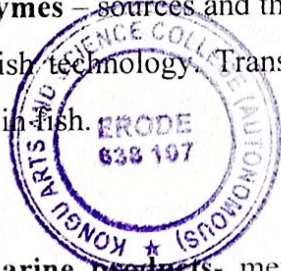
Bacterial cell Aquaculture – Cell communication system - Quorum sensing and its inhibition – types of autoinducers - QS inhibitor compounds and its role in expression of virulence genes among bacterial pathogens.

UNIT III

Marine Enzymes – sources and their application, Marine lipids- source and their application. Transgenic fish technology. Transgenic fishes with growth hormone and antifreeze genes. Transposons in fish.

UNIT IV

Bioactive marine products- membrane receptors, anti tumor compounds, and anti viral agents. Isolation and identification of marine bioactive compounds such as labile protein and carotenoids.



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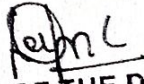
UNIT V

Probiotics: Bacteria and their importance in aquaculture. Vaccines for aquaculture. PCR and other techniques for identification of bacterial and viral pathogen in aquaculture. Gene probes and their applications in disease diagnosis.


TEXT BOOKS

1. David E. Sadava *et al.*, Life: The Science of Biology, W. H. Freeman. 2008
2. Michel J Kaiser and Martin J Attrill, Marine Ecology, II Edition Oxford University Press, 2011
3. I.S. Bright Singh, S. Somnath Pai, Rosamma Philip and A. Mohan Das, Aquaculture Medicine, I Edition , Paico Printing Press, Kochi, India, 2003.
4. Y.K. Lee and S. Salminen, Handbook of Probiotics and Prebiotics Second edition, Wiley, A John Wiley and sons inc publication, 2009 (Unit V)

QUESTION PAPER PATTERN		
SECTION - A	SECTION - B	SECTION - C
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3 x 10 = 30 Marks (Answer any three Questions) One Question from each unit


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Semester	Course Code	Elective I Virology	Total Marks:100		Hours Per Week	Credits
			CIA: 25	ESE: 75		
V	20UAQET506				4	4

Objectives

- To obtain basic knowledge in morphology of virus and its replication
- To have a brief idea on development of vaccines and their applications.

Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Relate the modern and historical aspects of virology
- CO2 Generalize the classification and types of virus
- CO3 Distinguish the replication of virus from other microbes
- CO4 Understand the role of viruses in human diseases
- CO5 Familiarize with the various approaches employed for the control of virus

UNIT I

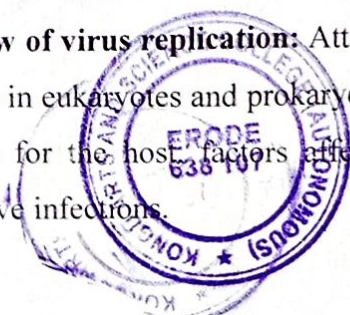
Historical perspectives of virology: Viruses and their importance, Properties of viruses- biochemical and morphological structure of viruses. Methods used in virology - cultivation and purification of viruses, Diagnostic methods - Nucleic acid based diagnosis, Microscopic techniques and Analytical techniques.

UNIT II

Classification and nomenclature of viruses: Modern classification, Baltimore classification of virus, dsDNA virus, ssDNA virus, dsRNA virus, plus and minus-strand RNA virus, retrovirus, human immunodeficiency virus, reverse-transcribing DNA virus, bacterial virus, animal virus and plant virus.

UNIT III

Overview of virus replication: Attachment and entry into cells, transcription, translation and transport in eukaryotes and prokaryotes. Assembly and exit of virions from cells. Outcome of infection for the host, factors affecting outcomes of infection, non-productive infections, Productive infections.



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UNIT IV

Virus and Diseases: Human viral pathogens, factors determining the nature and severity of viral disease, Common signs and symptoms of viral infection, Viral infection of respiratory tract and gastro intestinal tract. Carcinogenesis and tumor viruses. Approaches to viral diagnosis - Serological and Molecular techniques of viral infections.

UNIT V

Modern approaches of virus control: interferons, designing and screening for antiviral compounds and its mechanisms of action, antiretrovirals drug therapy. Phage therapy, Anti-sense RNA, siRNA, ribozymes, in silico approaches for drug designing.

TEXT BOOKS

1. Carter J and Saunders V, Virology: Principles and Applications, II Edition, Wiley Publications, 2013. (UNIT I – III)
2. Ananthanarayanan, R. and C.K.J. Panicker, Text book of Microbiology, XI Edition Orient Longman. New Delhi, 2015. (UNIT I – III)
3. Dimmock *et al.*, Introduction to Modern Virology, VI Edition Blackwell Publishing, 2007. (Unit IV)

REFERENCES

1. Stephen K. Tying, Antiviral Agents, Vaccines, and Immunotherapies. Publisher: Marcel Dekker, 2004.
2. Paul F. Torrence, Antiviral Drug Discovery for Emerging Diseases and Bioterrorism Threats. Wiley, John & Sons, Incorporated, 2005.
3. Steven Specter, Clinical Virology, IV Edition ASM Press, 2010

QUESTION PAPER PATTERN		
SECTION - A	SECTION - B	SECTION - C
10 x 1 = 10 Marks (Multiple Choice. Four options) Two questions from each unit	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3 x 10 = 30 Marks (Answer any three Questions) One Question from each unit



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Semester	Course Code	Skill Based Subject III	Total Marks:75		Hours Per Week	Credits
V	20UAQST507	Biofarming	CIA: 20	ESE: 55	3	3

Objectives:

- To learn innovative ideas on entrepreneurship.
- To acquire knowledge about various business fields in advanced Biotechnology.

Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Get a generalized idea in the basics of farming
- CO2 Familiarized with the requirements of organic farming
- CO3 Formulate various approaches for developing mushrooms and Spirulina
- CO4 Compute the usage of Vermicompost and Biofertilizers
- CO5 Prepare a sericulture and aquaculture farm for economic up gradation

UNIT I

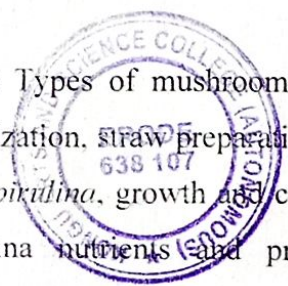
Introduction to Farming: Basic concept and principles of farming, Types of farming- Pure organic farming, Integrated farming, Mixed farming. Advantages and disadvantages of each system. Farming economics- Demand, supply, Economic Viability of a farm. Policies and incentives of organic production, Farm inspection and certification, Conversion to organic farming. Conventional farming v/s organic farming.

UNIT II

Requirements of Biofarming: Organic Production requirements, Biological Intensive Nutrition management, Green manuring, Liquid manuring, Recycling of organic manures, Soil improvement, Soil Fertility Management, Propagating Crops from seed and Greenhouse Management, Disease and Pest management. Process of organic farming.

UNIT III

Mushroom cultivation: Types of mushrooms – edible and toxic preparation of bed-sterilization, straw preparation, environmental preparation of bed-sterilization, straw preparation, environmental
Spirulina: Biology of *Spirulina*, growth and culture conditions, nutritive value of spirulina, enhancement of spirulina nutrients and processing, commercial spirulina products, marketing.



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UNIT IV

Vermicompost: Earthworms used in vermicomposting, culture conditions and raw materials for compost, vermiwash, packaging.

Panchakavya – preparation, applications, importance and marketing.

Biofertilizers: Types, mass production of fertilizers (NPK), uses and applications of biofertilizers, constraints in biofertilizer technology.

UNIT V

Sericulture: Introduction, biology and characteristics of silkworm – types, nutrients, culture conditions. Quality of silk.

Apiculture: Types of honeybees, types of bee culture and environment factors, biological properties of honey and its health aspects.

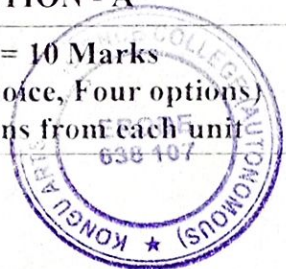
Aquaculture: Pearl culture – types, pearl enhancement conditions, harvesting, economical importance. Fisheries – shrimp culture, prawn culture, ornamental fishes, nutritive value of fish.

TEXT BOOKS

1. Kristensen, P., Taji, A. and Reganold, J. Organic Agriculture: A Global Perspective. CSIRO Press, 2006 (UNIT I)
2. Philip G. Miles, Shu-Ting Chang, Mushrooms: Cultivation, Nutritional Value, Medicinal Effect, and Environmental Impact, 2nd edition, 2004 (UNIT III)
3. M. E. Gershwin, Amha Belay, Spirulina in Human Nutrition and Health, I edition, CRC Press, 2007 (UNIT III)
4. U. Sathyanarayana, Biotechnology, Books and Allied Pvt. Ltd, 2007. (Unit IV)
5. Ganga, J. Sulochana Chetty, An Introduction to Sericulture, II Edition Oxford and IBH Publishing Company, 2008 (UNIT V)
6. R A Dunham, Aquaculture and Fisheries Biotechnology. Genetic approaches, I edition, CABI Publishing, 2004 (UNIT V)
7. SS Rana, Organic farming, India organic, 2016 (UNIT II)

QUESTION PAPER PATTERN		
SECTION - A	SECTION - B	SECTION - C
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3 x 10 = 30 Marks (Answer any three Questions) Two questions from each unit

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Semester	Course Code	Advanced Learners Course Cancer Biology	Total Marks:100		Hours Per Week	Credits
			CIA: -	ESE: 100		
V	20UAQAL508				-	2

Objectives

- To understand the common cellular and molecular mechanisms in cancer cells.
- Encourage the development of critical thinking and analytical skills that enable critical interpretation of primary scientific literature.

Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Analyze the different types of cancer
- CO2 Develop a deep insight about culturing of cells
- CO3 Understand the mechanism of oncogenesis and apoptosis
- CO4 Relate to the concepts of cellular signaling and cell lines
- CO5 Examine the therapies used for cancer diagnosis and therapy

UNIT I

Basics of Cancer: History, Scope and Current scenario of Cancer research. Cancer – Types and their prevalence,–Carcinoma, Lymphoma and Malignancy - Classification based on Origin/Organ: Breast, Colon, Lung, Prostrate, Cervical and Oral cancers.

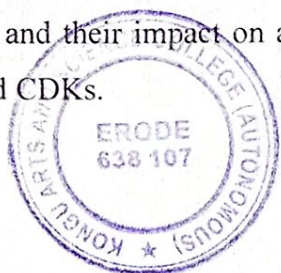
UNIT II

Cell cycle and cell culture: Regulation of the Eukaryotic cell cycle, Cell birth, Lineage and cell death. Cellular morphology, Primary cells and Established cell lines, Kinetics of Cancer cell growth, Genetics of cancer cells. Cancer stem cell culture and their applications.

UNIT III

Molecular mechanism of Oncogenesis: Proto oncogenes, Oncogene, Oncoproteins, Other tumour suppressor proteins and Receptors proteins involved in cancer. Mechanisms of oncogene activation, Role of growth factors and receptors in carcinogenesis

Apoptosis and Cancer: Mechanism of apoptosis - Proteins involved in apoptosis - Signaling pathways: Types and their impact on apoptosis and oncogenesis - Significance of p53, RB, Cyclins, RTK and CDKs.



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UNIT IV

Cell Signalling in Cancer Cell lines: MCF-7, HeLa, HepG2 and A549. Types of Signaling pathways that control gene activity. Integration of signals and gene controls. Moving proteins into membranes and organelles. Vascular traffic. secretion and endocytosis. Metabolism and movement of lipids.

UNIT V

Principle and methods of cancer diagnosis: Biochemical and Histopathological test. Cytotoxic and viability assay.

Cancer Therapy: Cellular level- Gene level- Protein level. Principles of Cancer biomarker and their applications – Chemotherapeutics for Cancer, Phytotherapy and Radiotherapy for Cancer. Cell culture based Vaccines.

REFERENCES:

1. Tannock IF and Hill RP, The Basic Science of Oncology, V Edition, McGraw- Hill, New York, 2013. (Unit I and II)
2. Bronchud MH, Foote M, Giaccone G, Olopade O and Workman P. Principles of Molecular Oncology, Third Edition, Humana Press, New Jersey, 2008 (Unit III)
3. Depatin KM and Fulda S, Apoptosis and Cancer Therapy, WILEY-VCH Verlag GmbH and Co., New York, 2008 (Unit III, IV, V)
4. Hayat MA. Methods of Cancer Diagnosis, Therapy, and Prognosis, Vol-7; Springer, Netherland, 2010 (Unit V)
5. Missailidis S. Anticancer Therapeutics, John Wiley and Sons, Ltd., USA, 2008. (Unit V)

QUESTION PAPER PATTERN		
SECTION - A	SECTION - B	SECTION - C
10 x 2 = 20 Marks (Answer any 10 question out of 12 questions)	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3 x 15 = 45 Marks (Answer any three Questions) One question from each unit



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Semester	Course Code	Advanced Learners Course	Total Marks:100		Hours Per Week	Credits
V	20UAQAL509	Research Methodology	CIA: -	ESE: 100	-	2

Objectives

- To gain a knowledge in the field of research.
- To ensure and develop in various advanced techniques and get a crystal clear ideas in recent advents and to overcome the obstacles faced during research.

Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Infer on the concepts for designing a work of research
- CO2 Familiarize with the methods of data collection
- CO3 Analyze the methods used for sample collection
- CO4 Understand the key facts for writing a thesis
- CO5 Correlate the research data's using statistical methods

UNIT I

Introduction To Research Methodology: Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Research Process, Literature collection, Literature citation, Criteria of Good Research.

UNIT II

Data Collection: Ethics of data collection, methods of data collection – primary data, secondary data, processing of data – Editing, Coding, Classification and Tabulation. Analysis of data – Tables and graphs.

UNIT III

Sampling Methods: Concepts of sampling, Principles of sampling, Aim in selecting a sample, types of sample collection (Random, Non random, Mixed)



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UNIT IV

Statistical Methods: Measures of central tendency and dispersal; probability distributions (Binomial, Poisson and normal); sampling distribution; difference between parametric and non-parametric statistics; errors; p value, levels of significance; regression and correlation.

UNIT V

Report and Thesis Writing: Research report: components, Format of thesis and dissertation. Manuscript/research article, Review monographs, Bibliography and Reference, footnotes. Practice and use of visual aids, importance of effective communication. Plagiarism.

TEXT BOOKS

1. C.R. Kothari, IInd edition, Research Methodology, Methods and techniques, New Age International (P) Ltd, Publishers, New Delhi, 2004 (Unit I,II,IV)
2. Ranjith Kumar, Research Methodology – A step by step guide for Beginners, II Ed. Dorling Kindersky (India) Pvt Ltd, 2007 (Unit III)
2. Jerrod H. Zar, Biostatistical analysis by, Prentice Hall International, Inc. Press, London. 1999. (UNIT V)

QUESTION PAPER PATTERN		
SECTION - A	SECTION - B	SECTION - C
10 x 2 = 20 Marks (Answer any 10 question out of 12 questions)	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3 x 15 = 45 Marks (Answer any three Questions) One question from each unit



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Semester	Course Code	Core Paper X Industrial Biotechnology	Total Marks:100		Hours Per Week	Credits
			CIA:25	ESE: 75		
VI	20UAQCT601				5	4

Objectives:

- To acquire knowledge about various business fields in advanced Biotechnology.
- To enrich students about the current status of development of enzymes and economic importance of biotech products.

Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Identify the requirements for fermentation technology
- CO2 Understand the different types of reactors
- CO3 Describe the process of down streaming and various techniques for product recovery
- CO4 Understand the production and use of industrially important enzymes
- CO5 Get a contented knowledge related to industrial chemicals

UNIT I

General requirements of fermentation processes: Introduction to fermentation. Isolation, screening, strain improvement and preservation of industrially important microorganisms. Types of media for fermentation processes. Development of inocula for industrial fermentations. Methods to achieve sterility- physical and chemical methods. Thermal death kinetics of microorganisms.

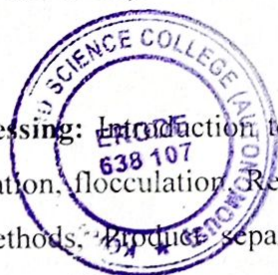
UNIT II

Bioreactor parts and design: Parts of a bioreactor, control systems (speed, temperature, gas supply, pH, dissolved oxygen, antifoam control), manual and automatic control. Types of reactor – Stirred Tank, Airlift, Bubble column, packed bed, Trickle bed and Fluidized bed. Types of fermentation- submerged fermentation (batch, fed-batch, continuous), Solid state fermentation (tower and drum).

UNIT III

Downstream processing: Introduction to downstream processing. Removal of insolubles - centrifugation, filtration, flocculation. Release of intracellular components, mechanical and non-mechanical methods. Bioprocess separation – distillation, liquid liquid extraction and evaporation. Product purification - membrane filtration, precipitation and chromatography.

Product formulation – Crystallization and drying



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UNIT IV

Industrial enzymes: Industrial applications of enzymes (food, paper, beverage and detergent industry), Enzymatic bioanalysis, Enzyme production – amylase, protease and lipase. Enzyme immobilization- Covalent linkage, adsorption, micro encapsulation, entrapment. Immobilization of cells.

UNIT V

Production of fuels and industrial products: Production of alkanes (Methane), industrial ethanol, amino acids – L-Glutamic acid and L-Lysine, Organic acid- citric acid and lactic acid, alcoholic beverages – Beer and Wine. Production of vitamin B12 and Single cell protein. Dairy products – cheese and yogurt. Process wastes - whey, molasses, starch substrates and other food wastes for bioconversion to useful products.

TEXT BOOK

1. Nooralabettu Krishna Prasad, Downstream Process Technology – A New Horizon in Biotechnology, I Edition PHI Learning Private Limited, 2012.
2. Michael. J. Waites *et al.*, Industrial Microbiology- An Introduction, I Edition Blackwell Publishing, 2007.

REFERENCES

1. Wulf Crueger and Anneliese Crueger, Biotechnology A Textbook of Industrial Microbiology- II Edition, Sinauer Associates. Inc., 1990.
2. U. Sathyanarayana, Biotechnology, Books and Allied Pvt. Ltd, 2007.

QUESTION PAPER PATTERN

SECTION - A	SECTION - B	SECTION - C
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Semester	Course Code	Core Paper XI Animal Biotechnology, Bioethics and IPR	Total Marks:100		Hours Per Week	Credits
			CIA: 25	ESE: 75		
VI	20UAQCT602				5	4

Objectives:

- To study about various culture techniques for animal cells.
- To acquire knowledge about principles followed in animal cell culture.

Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Describe the significance of growth media and primary culture
- CO2 Integrate with the methods used for the development of cell lines
- CO3 Apply the cells developed from tissue culture in various fields
- CO4 Know the ethics to be followed for transgenic studies
- CO5 Get a brief idea related to IPR

UNIT I

Introduction to Cell Culture: Scope of animal tissue culture, Lab requirements for aseptic conditions, Culture Media and importance of media components for the growth of animal cells. antibiotic growth supplements, sterilization of glassware and media. Primary culture – Types, Behavior of cells and their properties. Secondary culture, Transformed cell lines, Continuous cell lines, commonly used animal cell lines - their origin and characteristics. Cell line preservation and Large scale culture of cell lines. Cell banks.

UNIT II

Animal Cell Culture Techniques: Enzymatic and mechanical disaggregation of cells. Maintenance and growth kinetics of cells in culture - differentiation of cells, measurement of growth and viability of cells in culture, cytotoxicity assays and their applications, cell synchronization and senescence. Cryopreservation, Thawing. Scaling up of animal cell culture.

Applications: Animal cell culture for *in vitro* testing of drugs and environmental pollutants, application of cell culture technology in the production of human and animal viral vaccines, pharmaceutical proteins.



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UNIT III

Stem cell therapy: Embryonic and adult stem cells, Totipotent, Pluripotent and Multipotent Cells. Testing and generation of embryonic stem cells, Testing for adult stem cells and differentiation, Potential use of stem cells – Cell-based therapies.

Concept of Transgene and Transgenics: Transgene, Methods of gene transfer, Transgenic organisms, Transgenic Mice – expression of foreign genes and their application in research, Transgenic Cattle, Transgenic Fish. *In vitro* fertilization (IVF) in Humans and Embryo Transfer in Livestock, application of Embryo transfer technology

UNIT IV

Bioethics: Patentability of microorganism, animal cloning and experimenting on animals, safety and ethical issues of transgenic animals. Human cloning and their ethical issues, testing drugs on human volunteers. Hazardous materials used in Biotechnology, their handling and disposal. Ethical implications of Biotechnological products and techniques. Public concerns and risks associated with genetic engineering, public education of producing transgenic organism. Social and legal implications of Biotechnology.

UNIT V

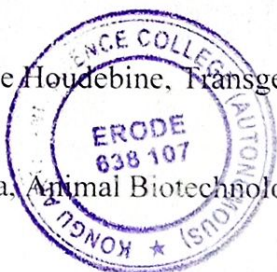
Basic Concepts of Intellectual Property: Introduction to intellectual property rights, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights. Intellectual property laws, Trade Related Aspects of Intellectual Property Rights. Forms of IPR like patent, design, copyright and trademark. Patents: Introduction and types of patents. Patent Filing Procedures and Patent licensing. Indian patent act 1970.

TEXT BOOK

R. Ian Freshney: Culture of Animal cell; 6th edition, Wiley-Blackwell Publishers, 2010.

REFERENCES

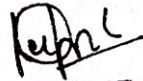
1. B.Hafez and E.S.E Hafez, Reproduction in farm animals, 7th Edition, Wiley Blackwell, 2000.
2. Louis-Marie Houdebine, Transgenic Animals: Generation and Use 5th Edition, CRC Press, 1997.
3. M M Ranga, Animal Biotechnology, III Edition Student edition, 2007.




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QUESTION PAPER PATTERN

SECTION - A	SECTION - B	SECTION - C
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3 x 10 = 30 Marks (Answer any three Questions) One Question from each unit


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Semester	Course Code	Core Practicals III Lab in Immunology and Plant Tissue Culture	Total Marks:100		Hours Per Week	Credits
VI	20UAQCP603		CIA: 40	ESE: 60	4	4

Objectives

- To acquire skills about basic and advanced techniques in immunology.
- To develop hands-on training in plant tissue culture methodologies.


Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Experiment with test animals for immunological purposes
- CO2 Analyze and understand the significance of antibodies
- CO3 Prepare various culture media for plant tissues
- CO4 Compare and contrast the tissue culture techniques using various explants
- CO5 Analyze the phytochemical activity of plants

1. Preparation of serum from blood
2. Heamagglutination test -ABO blood grouping
3. Passive Agglutination test- ASO- Anti-streptolysin O Test
4. Agglutination inhibition test -pregnancy test
5. Single radial Immuno diffusion
6. Ouchterlony double diffusion
7. Quantification of Antigen-Antibody reaction
8. Invitro determination of Anti inflammatory effect of a compound
9. Separation of Ig using chromatography
10. Plant tissue culture media preparation –MS media, Nitsch’s media, White’s media
11. Callus induction and differentiation
12. Micropropagation
13. Meristem Culture
14. Embryo and Anther Culture
15. Isolation of protoplasts




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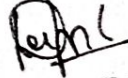
16. Synthetic seed production
17. Qualitative and Quantitative analysis of Phytochemicals
18. Invitro antioxidant study
19. Synthesis of nanoparticles using plant extract

REFERENCES


1. John E. Coligan, Current Protocol in Immunology, Wiley Publishers, 2001.
2. Bhojwan Razdan, Plant Tissue Culture – Theory and Practice Revised Edition, Elsevier, 2011.

QUESTION PAPER PATTERN

Major Expt	Minor Expt	Set up	Spotters	Viva voce	Record
1 x 15= 15 Marks	1x12=12 Marks	1x8=8 Marks	5x3= 15 Marks	5 Marks	5 Marks


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Semester	Course Code	Core Practicals IV Lab in rDNA Technology and Industrial Biotechnology	Total Marks:100		Hours Per Week	Credits
VI	20UAQCP604		CIA: 40	ESE: 60	4	4

Objectives

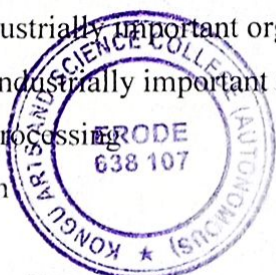
- To get hands-on training on Recombinant DNA Technology.
- To acquire knowledge about various experiments carried out in Industrial sector.


Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Develop their skills in isolating DNA from various tissues
- CO2 Analyze the DNA and quantify it
- CO3 Perform restriction, ligation and transformation experiments
- CO4 Produce enzymes for industrial sectors
- CO5 Understand the blotting procedures of biomolecules

1. Isolation of Genomic DNA from Bacterial cell
2. Isolation of DNA from Animal tissue
3. Isolation of DNA from Plant sample
4. Isolation of Plasmid DNA from bacterial cell
5. Quantification of DNA by UV spectrophotometry
6. Agarose Gel Electrophoresis
7. Restriction digestion of DNA
8. Ligation of DNA
9. Bacterial Transformation
10. Amplification of DNA (PCR)
11. Fermentor – Parts and Design
12. Wine production
13. Alcohol Estimation
14. Isolation of industrially important organism - amylase and lipase producing bacteria
15. Production of Industrially important enzymes – amylase and Lipase
16. Down stream processing
17. SCP production
18. SDS - PAGE
19. Demonstration of Western blotting





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REFERENCES

1. Sambrook and Russell. Molecular cloning A laboratory manual- 3rd Edition. CSHL press. 2001.
2. S.Rajan and Ms. R.Selvi Christy. Experimental Procedures in Life Sciences. Anjanaa Book House. Chennai. 2012.

QUESTION PAPER PATTERN					
Major Expt	Minor Expt	Set up	Spotters	Viva voce	Record
1 x 15= 15 Marks	1x12=12 Marks	1x8=8 Marks	5x3= 15 Marks	5 Marks	5 Marks


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Semest er	Course Code	Elective II Bioinformatics	Total Marks:100		Hours Per Week	Credits
VI	20UAQET605		CIA: 25	ESE: 75	4	4

Objectives

- To attain basic ideas on computational skills
- To acquire knowledge about various databases used.

Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Understand the basic features of Bioinformatics
- CO2 Outline the databases used as a Bioinformatics tool
- CO3 Get familiarized with the methods used for sequence alignment
- CO4 Analyze datas for gene prediction and construction of phylogenetic tree
- CO5 Predict and Characterize the molecules for the development of drugs

UNIT I

Introduction: Definition, Historical overview, Aim and Scope of Bioinformatics, Information search and retrieval systems. Various file formats for biological sequences. Data banks – Gen Bank, PDB, Pub Med, Med line, Ex PASy.

UNIT II

Database: Introduction, definition and importance of databases. Types of database - Biological database (Nucleic acids database – EMBL, DDBJ, NCBI , Protein database – SWISS PROT, PIR, PROSITE). Structural database – KEGG, CATH, SCOP. Specialized database – Genome database, metabolic pathway database and microarray database, EST.

UNIT III

Sequence Alignment: Sequence analysis of biological data. Significance of sequence alignment. Use of scoring matrices (BLOSUM and PAM) and gap penalties in sequence alignments. Types of alignments, Pairwise sequence alignment, Algorithm (Needleman Wunsch and Smith Waterman). Tools for sequence alignment – FASTA, BLAST, Clustal W. Multiple sequence alignment, application of multiple sequence alignment.



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UNIT IV

Gene prediction: Analysis and prediction of regulatory regions. Fragment assembly. Genome sequence assembly. Restriction Mapping. Repeat Sequence finder. Protein prediction strategies. molecular visualization tools (Rasmol, Swiss pdb viewer, Pymol, Jmol). Molecular Docking – Protein - DNA interactions and Protein- Protein interactions. Phylogenetic analysis: Concept of trees and construction of phylogenetic trees. Phylogenetic analysis– UPGMA and NJ methods.

UNIT V

Structure prediction and Drug Discovery: Concepts of structure prediction of protein and tools used. Discovering a drug, target identification and validation, identifying the lead compound, optimization of lead compound, chemical libraries.

TEXT BOOK

S. Ignacimuthu. Text book of Basic Bioinformatics, Alpha Science International, 2005.

REFERENCES

1. T. K. Altwood, D. J. Parry-Smith, Introduction to Bioinformatics, Pearson Education, 2004.
2. S. C. Rastogi, N. Mendiratta and P. Rastogi, Bioinformatics – Methods and application. Third edition. PHI Learning Pvt Ltd, New Delhi, 2006.
3. Andreas, Baxevanis and Francis Ouellette, Bioinformatics – A practical guide to the analysis of genes & protein III Edition, Wiley Publishers, 2005.
4. David H Mount, Bioinformatics – Second Edition. CBS Publishers, New Delhi, 2005.

QUESTION PAPER PATTERN

SECTION - A	SECTION - B	SECTION - C
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3 x 10 = 30 Marks (Answer any three Questions) One Question from each unit



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Semester	Course Code	Elective II Developmental Biology	Total Marks:100		Hours Per Week	Credits
			CIA: 25	ESE: 75		
VI	20UAQET606				4	4

Objectives

- To study the morphogenesis of Plants and Animals.
- To study the experimental approach of Development Biology

Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Get familiarized with the process of development of gametes
- CO2 Understand the concept of fertilization in mammals
- CO3 Identify the reasons for evolution and be familiarize with embryology
- CO4 Characterize the methods used for experimental embryology
- CO5 Summarize the concepts of embryonic development in plants

UNIT I

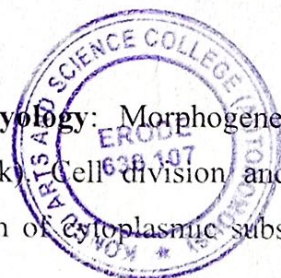
Development of gametes - Spermatogenesis and Oogenesis in mammals. Cell surface molecules in sperm and egg recognition in animals, activation of sperm and egg- interaction of sperm and egg, Sequence of events in sperm entry, egg surface changes. Post-fertilization changes.

UNIT II

Mammalian fertilization: Morphogenetic gradients; cell fate and cell lineages; genomic equivalence and the cytoplasmic determinants. Zygote formation, cleavage, blastula formation, embryonic fields, gastrulation and formation of germ layers in animals; menstrual cycle- monitoring of estrus cycle. Genetic regulations in embryonic development, Artificial Fertilization methods (IVF, IUF, ICSI)

UNIT III

Evolutionary embryology: Morphogenesis and organogenesis in animals (Drosophila, Amphibia and Chick). Cell division and chemical changes during cleavage, pattern of cleavage, distribution of cytoplasmic substances in the egg, metamorphosis of insects and amphibians.



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UNIT IV

Experimental embryology: Artificial insemination, methodology and success rate of invitro fertilization and embryo transfer, Sperm banking, Micropropagation, Embryo cloning.

UNIT V

Developmental biology of plant - Embryogenesis of plant - *Arabidopsis thaliana*. Development of Microsporangium and Mega sporangium, Pollination, Double fertilization, development of Endosperm, Embryo and Seed. Organization of shoot and root apical meristem and development.

REFERENCES

1. Balinsky, B.I, An Introduction to Embryology, W. B. Saunders Co., Philadelphia, 1981.
2. Maheswari.P Introduction to the embryology of Angiosperm, McGraw Hill Publishers, 1981.
- 3.P.S.Verma., V.K. Agarwal and Tyagi, Chordate embryology, S. Chand & Co., New Delhi, 1995.
4. Gilbert, Scott's, Developmental Biology Sinauer Association, Inc., Publishers, 1985.

QUESTION PAPER PATTERN		
SECTION - A	SECTION - B	SECTION - C
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3 x 10 = 30 Marks (Answer any three Questions) One Question from each unit



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Semester	Course Code	Elective II Pharmaceutical Biotechnology	Total Marks:100		Hours Per Week	Credits
			CIA: 25	ESE: 75		
VI	20UAQET607				4	4

Objectives

- To acquire the knowledge of recent development in the field of Genomics
- To study the various techniques used in the field of Proteomics.

Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Validate the development of drugs
- CO2 Compile the ideas of targeting a drug and its modification
- CO3 Identify the role of drugs in various diagnosis and treatments
- CO4 Interpret the novel ideas in developing immunological products
- CO5 Get familiarized with molecular tools used and their applications

UNIT I

Introduction: Pharmacology origins and antecedents, Pharmacology in the 20th century, Pharmacoepidemiology, Pharmacovigilance and Pharmacognosy. Drugs – Sources, dosage forms and routes of administration. Absorption, factors modifying drug absorption, distribution, metabolism – Phase I, II reactions, action of cytochrome P450.

UNIT II

Targets for drug action, receptor proteins, ion channel and drug targets, control of receptor expression, assay of drug potency: Chemical, bioassay and immunoassay-Drug tolerance and drug dependence. Principles of basic Pharmacokinetics, Adverse response to drugs, drug intolerance, drug allergy, tachyphylaxis, drug abuse, vaccination against infection, factors modifying drug action and effect.

UNIT III

Mechanism of action of drugs used in therapy of Respiratory systems cough, bronchial asthma, pulmonary tuberculosis, cancer chemotherapy. Antimicrobial drugs Erythromycin, trimethoprim, penicillins, aminoglycosides and bacterial resistance. Thyroid and anti thyroid drugs, insulin and anti diabetic drugs, anti fertility and ovulation inducing drugs.



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UNIT IV

Immunological Products: Principles, production and storage aspects of conventional and modern vaccines such as DNA vaccines, anticancer vaccines, genetically improved live vaccines, genetically improved sub unit vaccines, synthetic peptide based vaccines.

UNIT V

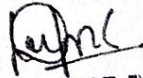
“Omic” technologies and Molecular tools: Overview of proteomics, genomics, pharmacogenomics and biomarkers. Application of biotechnology in pharmacokinetics and pharmacodynamics, recombinant therapeutic enzymes and their applications, isolation and characterization of receptors.

TEXT BOOK

1. O. Kayser and R.H. Muller, Pharmaceutical Biotechnology, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, 2004.

REFERENCES


1. Jens T. Cartensen and C. T. Rhodes, Drug stability principle and practice, 3rd Ed. Vol. 107, Marcel Dekker.
2. Rodney pealman, Y. John wang, Formulation characterization and stability of protein drugs, 1996.
3. Eugene J. McNally, Jayne E. Hasted, Protein formulation and delivery 2nd Ed. Informa-healthcare.
4. Sven frokjaer and lars hovgaard, Pharmaceutical formulation development of peptides and proteins, 2000.
5. Sarfaraz K. Niazi, Handbook of Preformularion, Informa Healthcare, 2007.


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QUESTION PAPER PATTERN

SECTION - A	SECTION - B	SECTION - C
10 x 1 = 10 Marks (Multiple Choice, Fill in the Blanks) Two questions from each unit	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3 x 10 = 30 Marks (Three Questions) (One Question from each unit)




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Semester	Course Code	Skill Based Subject IV	Total Marks:75		Hours Per Week	Credits
VI	20UAQST609	Medical Biotechnology	CIA: 20	ESE: 55	3	3

Objectives

- To study the biotechnological approaches used in the medical field
- To understand the various bio-techniques employed to serve mankind such as *in vitro* fertilization, diagnostics, gene therapy and vaccine.

Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Get familiarized with the field of Red Biotechnology
- CO2 Integrate their skills in diagnostic techniques
- CO3 Acquire knowledge in the steps of stem cell therapies
- CO4 Inculcate the ideology of protein therapeutics
- CO5 Briefly understand the broad field of vaccinology

UNIT I

Introduction: History and scope of Medical Biotechnology, future prospects, tools in Medical Biotechnology.

Identification of disease genes: Functional cloning (Eg. Haemophilia gene), Positional cloning (DMD and CGD genes), Candidate gene approach (Alzheimer's disease). Molecular basis of human diseases: Gain of function mutations (Oncogenes, Huntington Disease), Loss of function (Tumour Suppressor Genes), Gene Dosage Effect.

UNIT II

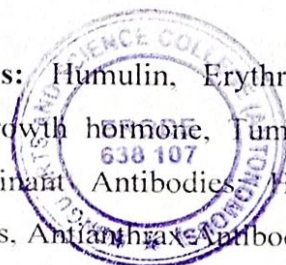
Diagnostics: Prenatal diagnosis - Invasive techniques (Amniocentesis, Fetoscopy, Chorionic Villi Sampling (CVS), Non-invasive techniques (Ultrasonography, X-ray, TIFA, maternal serum and fetal cells in maternal blood). Diagnosis using protein and enzyme markers, monoclonal antibodies. DNA/RNA based diagnosis (Hepatitis, HIV - CD 4 receptor).

UNIT III

Protein therapeutics: Humulin, Erythropoietin, Growth Hormone/Somatostatin, Interferon, human growth hormone, Tumor Necrosis Factor, Engineered Bacteriophages, Interleukin. Recombinant Antibodies, Hybrid Human-Mouse Monoclonal Antibodies, Anticancer Antibodies, Anti-inflam Antibodies, Antiobesity Antibodies.

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UNIT IV

Vaccinology: Active and passive immunization, Live, killed, attenuated, sub unit vaccines. Vaccine technology - Role and properties of adjuvants, recombinant DNA and protein-based vaccines, plant-based vaccines, reverse vaccinology, Peptide vaccines, conjugate vaccines. Antibody genes and antibody engineering – chimeric and hybrid monoclonal antibodies, Catalytic antibodies and generation of immunoglobulin gene libraries.

Drug Development Process: Methods involved in the development of new drugs. Preclinical toxicological studies. Calculation of LD50 & ED50. Acute, subacute and chronic toxicity studies

UNIT V

Nanobiotechnology: Introduction to nanotechnology, Nano particles, Biologically Synthesized Nanoparticles, Characterization of Nanoparticles - FESEM, FTIR and AFM. Nanostructures and Synthetic Nanocomposites, Bionanomachines in action-Modern Biomaterials.

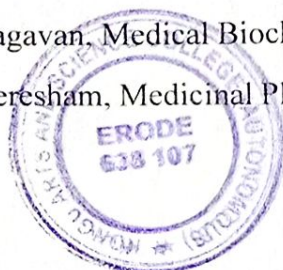
Approaches to Developing Nanomedicines: Various Kinds of Nanosystems in use, Anti-AIDS drugs, Immunotoxins as cell killers, Artificial blood, Cyclic peptides from nanotubes. Nanotechnology in Diagnostic Applications: Materials for Use in Diagnostic and Therapeutic Applications.

TEXT BOOK

Bernard R. Glick, Terry L. Delovitch, Cheryl L. Patten, Medical Biotechnology, I edition, ASM Press, 2013.

REFERENCES


1. Bernard R. Glick, Jack J Pasternak, Cheryl L. Patten, Molecular Biotechnology: Principles and Applications of Recombinant DNA, 4th edition, ASM press, 2009.
2. M.M. Ranga, Animal Biotechnology, Agrobios India, 2006.
3. N. V. Bhagavan, Medical Biochemistry, IV Edition, Harcourt Academic Press, 2002.
4. Ciddi Veeresham, Medicinal Plant Biotechnology, CBS Publishers and Distributors, 2006.




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QUESTION PAPER PATTERN

SECTION - A	SECTION - B	SECTION - C
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	5 x 3 = 15 Marks (Either or choice) Two questions from each unit	3 x 10 = 30 Marks (Answer any three Questions) One Question from each unit


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KONGU ARTS AND SCIENCE COLLEGE

(An Autonomous Institution, Affiliated to Bharathiar University, Coimbatore)

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ACTIVITIES

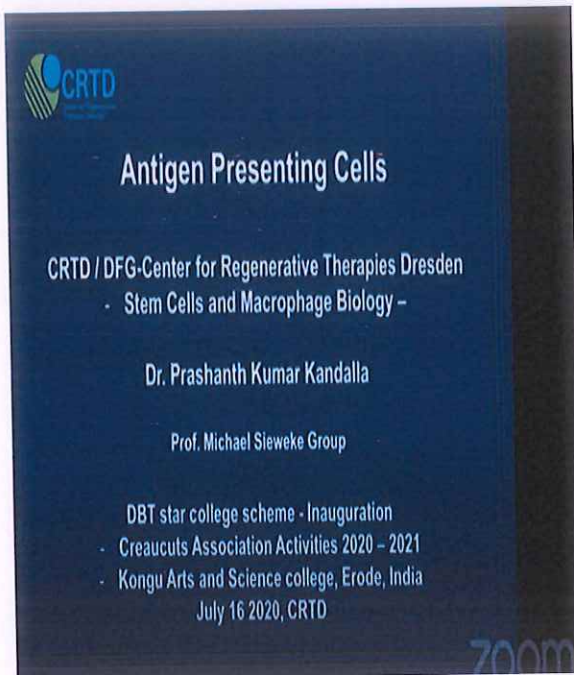


KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS), ERODE

DEPARTMENT OF BIOTECHNOLOGY

Inauguration of Creautus Association Activities 2020-2021 and a special talk on Immunological responses of Humans against Viral Infections.

REPORT




**Inauguration of Creautus Association Activities
2020-2021 and a special talk on Immunological
responses of Humans against Viral Infections**


DATE: 16.07.2020

BENEFICIARY: UG Students of Biotechnology
RESOURCE PERSON: Dr. Prashant Kumar
Kandalla,
Staff Scientist and Senior Postdoc,
Stem cell and Macrophage
Biology Lab Technical University Dresden,
Germany.

The Mechanism of Human Immunological responses against Viral Infections was detailed through Animations in virtual mode. The session was very interesting. It explained various viral diseases. Even in this virtual mode, the session did not failed to explain the criteria very clearly. This made us to learn about Viral Infections and diagnosis of thatdiseases. Here we have to appreciate the programmer for displaying the correct videos for the viral diseases. The life cycle of some viruses were clearly explained. The session was very effective. And it gave a wide knowledge about various viruses.


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KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS), ERODE

DEPARTMENT OF BIOTECHNOLOGY

DBT STAR COLLEGE SCHEME ACTIVITIES – REPORT

REPORT



“ A talk on “Colors of Life”


Date of the Program : 25.08.2020 .

Resource Person Details : Dr.V.Anbumani
Associate Professor,
Department of Hindi &
Other Languages,
KASC, Erode.


Beneficiaries: I UG Students of Biotechnology (50)

Students were guided to enrich their knowledge in various areas and were addressed about the importance of skill development and the ways to overcome the fear and obstacles. This session was very useful for enhancing the skills. We learned how to develop skills and how to apply those skills at the right time. We got a clear knowledge through this lecture.

Moreover the session was very interesting and we enjoyed a lot. And now it will be easy for us to face different situations and difficulties in life. Life is full of colors.


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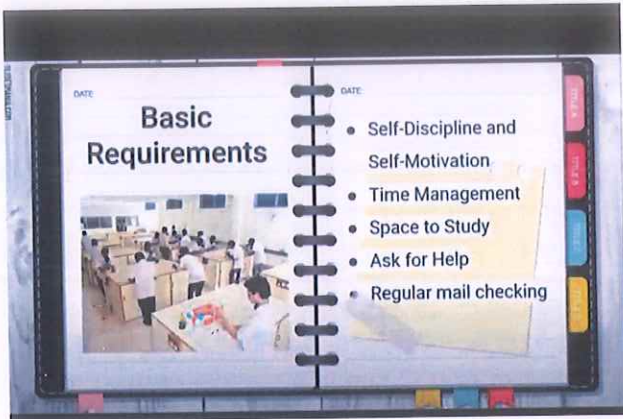

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KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS), ERODE

DEPARTMENT OF BIOTECHNOLOGY

DBT STAR COLLEGE SCHEME
REPORT



Importance of “Communicative English”

DATE: 26.08.2020

Beneficiary : I UG Students of
Biotechnology and Physics


Resource person: Ms.B.Sivaranjini

Assistant Professor


Department of English

KASC, Erode.

A special talk to enhance the way of communication, the mode of delivering their language gently was given. Moreover it's too useful for our higher studies and also in office. We learned something different in this lecture. We clearly understand how to behave in office like how to speak in meeting.


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Dr. N. RAMAN
PRINCIPAL,
KONGU ARTS AND SCIENCE COLLEGE
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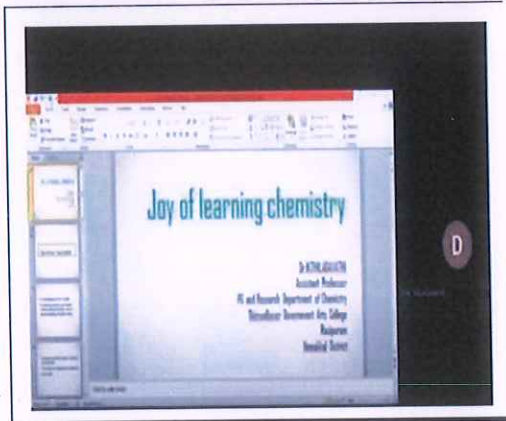


KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS), ERODE

DEPARTMENT OF BIOTECHNOLOGY

DBT STAR COLLEGE SCHEME

REPORT



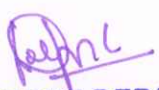
**Webinar on “Joy of learning
Chemistry”**

DATE: 28.08.2020


Beneficiary : I B.Sc Biotechnology Students

Resource person: Dr.N.Thilagavathi
Assistant Professor,
Department of Chemistry ,
Thiruvalluvar government Arts
College,
Rasipuram.

Interesting ways to understand the subject was clearly described. Chemistry is a branch of science that involves the study of the composition, structure and properties of matter. Often known as the central science, it is a creative discipline chiefly concerned with atomic and molecular structure and its change, for instance through chemical reactions. Chemistry, the science of the properties, composition, and structure of substances (defined as elements and compounds), Chemistry is the scientific study of the properties and behavior of matter


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DEPARTMENT OF BIOTECHNOLOGY

DBT STAR COLLEGE SCHEME ACTIVITIES – REPORT

REPORT



Alumni Guest Lecture series 1
Date and of the Program : 30.10.2020
Resource Pearson Details :Ms. P. Abirami
Alumni
(2011-2014 Batch)
Beneficiaries :UG Students of
Biotechnology(100)

The importance of Personal Skills, Ethics, Family Relationship, Friendship, Societal behavior was addressed.

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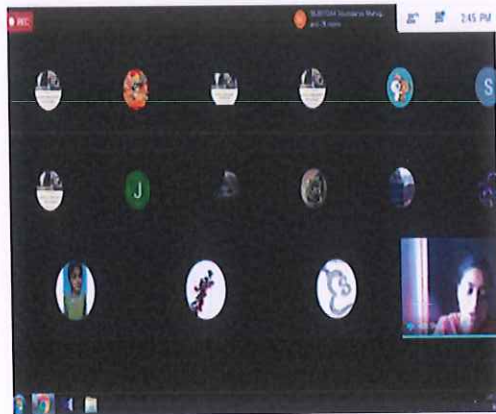
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DEPARTMENT OF BIOTECHNOLOGY

Alumni Guest Lecture series 2 Application
of Nanotechnology in Agriculture and
Environment
REPORT



**Alumni Guest Lecture series 2 Application of
Nanotechnology in Agriculture and Environment**

DATE: 06.11.2020

BENEFICIARY: UG Students of Biotechnology

RESOURCE PERSON: Ms.R.Nila
Alumni (2014-2017 Batch)

Scientific Curator,
CuradigmDatalytics.

The students were explained about the significance of nanotechnology and its application in the field of agriculture and environment. The students were very beneficial by this webinar and they gained much knowledge about the nanotechnology.

R.N.C.
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N.R.
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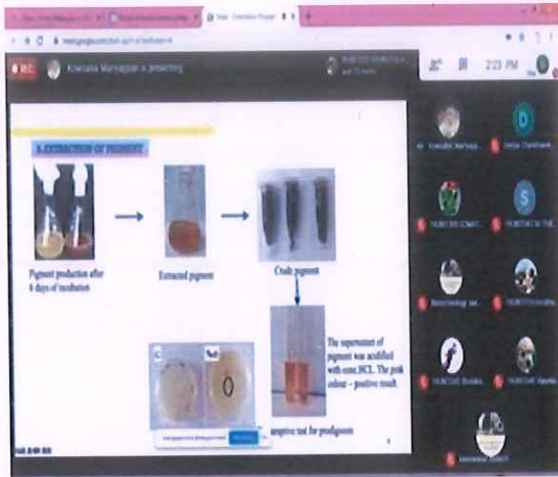
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DBT STAR COLLEGE SCHEME

DBT STAR COLLEGE SCHEME ACTIVITIES – REPORT

REPORT



Alumni Guest Lecture series 4

Colors from Bacteria

Date and of the Program : 20.11.2020

Resource Pearson Details :Ms.M.Kowsalya

Alumni(2013-2016 Batch)

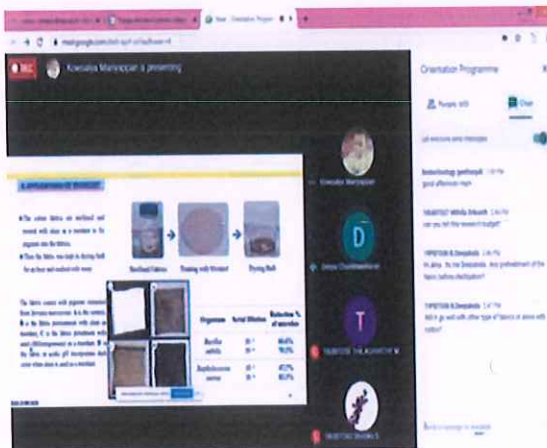
ResearchScholar

Department of Biotechnology

K.S.Rangasamy College of Arts and Science (Autonomous)

Beneficiaries : UG Students of Biotechnology(100)

Students were addressed about the various pigments produced by different strains of Bacteria, the methods to isolate the pigments, application of pigments in textiles etc., Engineered Bacteria Produce a Rainbow of Colors ... Researchers have modified a common bacterium to spit out an entire rainbow of dyes for food. Natural dyes like turmeric with the most amazingly vibrant colors are also available to be mixed in with the bacteria dye.



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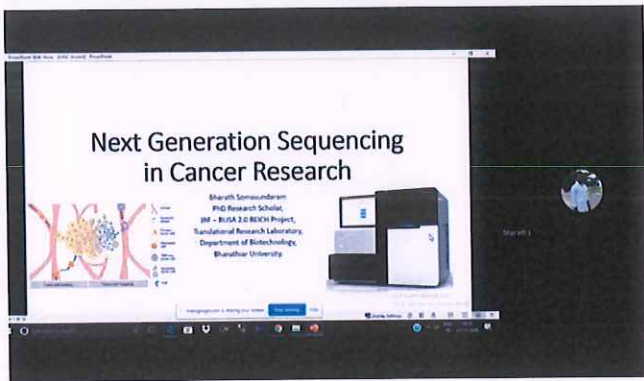
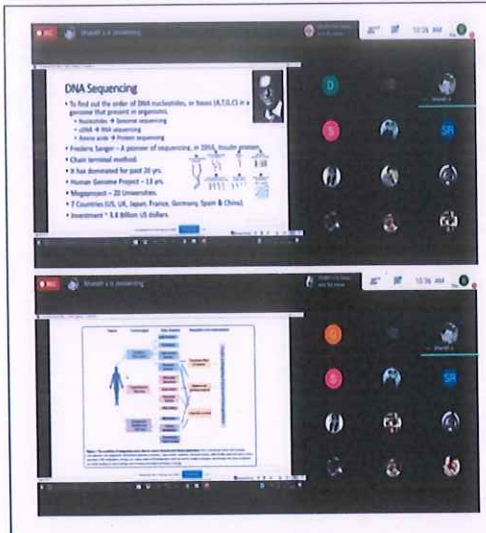
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DEPARTMENT OF BIOTECHNOLOGY

DBT STAR COLLEGE SCHEME

Aluminized Guest Lecture Series 5

REPORT



Next Generation Sequencing in Cancer

DATE: 27.11.2020

Beneficiary : I B.Sc Biotechnology Students

Resource person: Mr. BharathSomasundaram

Alumini(2010 – 2013 batch)

JRF RUSA 2.0 BEISCH

Project Department of

Biotechnology

Bharathiyar University,

Coimbatore.

The importance of Nucleic acid sequencing, NGS methods and its application in recent cancer research was explained. Successful outcomes in structure-based drug design are not always given. For instance, structures of membrane proteins or large macromolecular complexes cannot be obtained quickly enough with crystallography or NMR to impact the dry design process. Despite the fact that membrane proteins accounts for over 60% of drug targets, they make up only 2% of existing crystal structures.

Bharath
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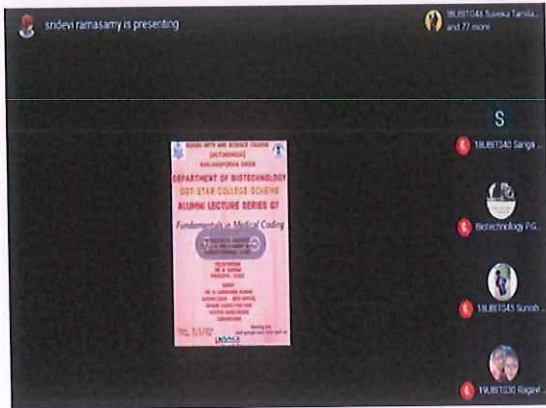


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DEPARTMENT OF BIOTECHNOLOGY

**Alumni Guest Lecture series 7
Fundamentals in Medical Coding**

REPORT



Alumni Guest Lecture series 7 Fundamentals in
Medical Coding

DATE: 11.12.2020

BENEFICIARY: UG Students of Biotechnology
(100)

RESOURCE PERSON: Mr. N. Saravana Kumar
Alumni (2012-2015 Batch) Senior Client Partner
Access Healthcare, Coimbatore

The basics, Career Opportunities in Medical coding
field were elaborated. Medical coding involves
extracting billable information from the medical
record and clinical documentation, while medical
billing uses those codes to create insurance claims
and bills for patients. Creating claims is where
medical billing and coding interest to form the
backbone of the healthcare revenue cycle.

Rajapal

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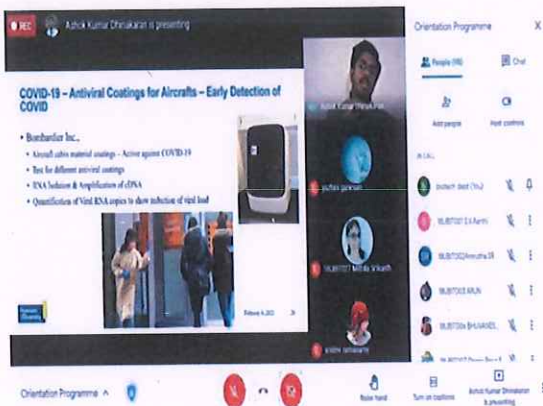


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DEPARTMENT OF BIOTECHNOLOGY

WEBMINAR ON “REPLICATION PATTERN ON PROKARYOTES AND EUKARYOTES”

REPORT



Webinar on “ Replication pattern on Prokaryotes and Eukaryotes”

DATE: 06.02.2021

BENEFICIARY:UG Students of Biotechnology

RESOURCE PERSON: Mr. Ashok Dhinakaran Doctoral ResearCandidate,Nanobio Interface Facility Ryerson University, Toronto, Canada.

The students were detailed on the main goal of replication, the elements of replication, enzyme involved and the process, the difference between eukaryotic and prokaryotic pattern. The DNA replicates before the cell division occurs. Both prokaryotic and eukaryotic DNA replicate in a semi-conservation manner. It helps in making sure that both the cells get an exact copy of the genetic material of their parents.

Rajpr
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HANDS ON TRAINING ON CLINICAL MICROBIOLOGY

REPORT



Hands on Training on Clinical Microbiology

DATE: 09.03.2021

BENEFICIARY: UG Students of Biotechnology
(100)

RESOURCE PERSON: Ms. N.KanchanaSudha
Micro Lab Erode

The students were trained to handle microorganisms required for their lab work. Basic screening test and identification of microorganisms from clinical samples using differential media, staining and biochemical test were taught. How the microorganisms are developed was also taught.

Rajni

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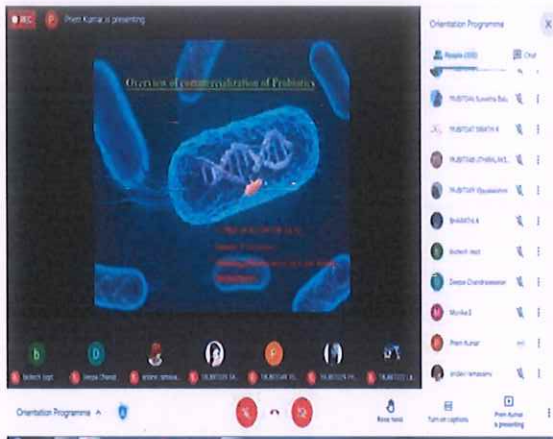
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DEPARTMENT OF BIOTECHNOLOGY

DBT STAR COLLEGE SCHEME

Guest Lecture - Probiotics and its commercialized products

REPORT



Guest Lecture - Probiotics and its commercialized products

DATE: 23.03.2021

BENEFICIARY: UG Biotechnology Students(100)

RESOURCE PERSON::Mr.V.Prem Kumar Senior

Executive Sunberg life Science Pvt,Ltd

Puducherry

Students were able to understand the basics of Probiotics, their benefits, side effects, current research in the field, large scale production process and the job opportunities. Getting probiotics from supplements is popular, but you can also get them from fermented foods. There are well known probiotic products well known in India till now but still there are many of them apart from these that are available in market. Since this program have brought awareness of the probiotic products among the students, we believe that they will find it interesting and will use them in their day to day life.

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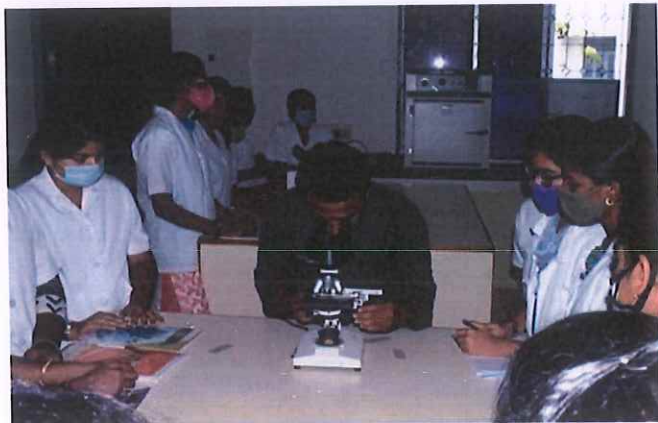


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DBT STAR COLLEGE SCHEME

REPORT



A one day workshop on Bioinstrumentation

DATE: 23.03.2021

Beneficiary : I B.Sc Biotechnology Students

(50)

Resource person: Mr.M.Maharaj

Service engineer,

The precision scientific co,

Coimbatore.

- The workshop equipped the students with skills required to handle instruments, the working principle, the dos and don'ts of an instrument.
- Bioinstrumentation or Biomedical Instrumentation is an application of biomedical engineering, which focuses on the devices and mechanics used to measure, evaluate, and treat biological systems.
- They all are now able to operate the instruments available in our lab not only they learned its working they also learned its principle as well.
- This program was the most useful one since the students didn't have any lab experience owing to the pandemic. This workshop made the learn all at once that too not making it look difficult.

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