



KONGU ARTS AND SCIENCE COLLEGE

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

ERODE – 638 107

M.Sc (Biochemistry)



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2021-2022



KONGU ARTS AND SCIENCE COLLEGE, ERODE - 638 107

(AUTONOMOUS)


M.Sc BIOCHEMISTRY

(For the Candidates admitted during the Academic Year 2021- 2022 and onwards)

SCHEME OF EXAMINATION - CBCS PATTERN

Part	Course Code	Course Title	Inst. Hours /Week	T/P	Examination Details				Credits
					Duration in Hours	CIA	ESE	Total Marks	
SEMESTER I									
I	21PBFCT101	Core I -Biopolymers	5	T	3	50	50	100	4
	21PBFCT102	Core II - Advanced Bioanalytical Techniques and Bioinformatics	5	T	3	50	50	100	4
	21PBFCT103	Core III - Advanced Enzymology	4	T	3	50	50	100	4
	21PBFCT104	Core IV - Cellular Biochemistry	4	T	3	50	50	100	4
	21PBFCT105	Core V - Plant Biochemistry and Biotechnology	4	T	3	50	50	100	3
	21PBFCT106	Core Biochemistry Practicals I	4	P	6	50	50	100	3
	21PBFET107 / 21PBFET108 / 21PBFET109	Elective - I	4	T	3	50	50	100	4
TOTAL			30					700	26
SEMESTER II									
I	21PBFCT201	Core VI - Endocrinology	5	T	3	50	50	100	4
	21PBFCT202	Core VII - Immunology and Immunotechniques	5	T	3	50	50	100	4
	21PBFCT203	Core VIII -Molecular Biology and Molecular Genetics	5	T	3	50	50	100	4
	21PBFCT204	Core IX - Bioethics, Biosafety, TQM & IPR	5	T	3	50	50	100	3
	21PBFCT205	Core Biochemistry Practicals II	5	P	6	50	50	100	3
	21PBFET206 / 21PBFET207 / 21PBFET208	Elective - II	5	T	3	50	50	100	4
TOTAL			30					600	22




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Part	Course Code	Course Title	Inst. Hours /Week	T/P	Examination Details				Credits
					Duration in Hours	CIA	ESE	Total Marks	
SEMESTER III									
I	21PBFCT301	Core X- Advanced Clinical Biochemistry	4	T	3	50	50	100	4
	21PBFCT302	Core XI - Metabolism and Metabolic Regulation	4	T	3	50	50	100	4
	21PBFCT303	Core XII - Genetic Engineering	5	T	3	50	50	100	4
	21PBFCT304	Core XIII - Pharmaceutical Biochemistry	4	T	3	50	50	100	4
	21PBFCT305	Core XIV - Research Methodology and Biostatistics	5	T	3	50	50	100	3
	21PBFCT306	Core Biochemistry Practicals III	4	P	6	50	50	100	3
	21PBFET307 / 21PBFET308 / 21PBFET309 /	Elective - III	4	T	3	50	50	100	4
	21PBFCE310	Online Comprehensive Examination #	-	T	1 hour 40 Minutes	-	100	100	2
	21PBEIT01	Institutional Training*	Grade system						
TOTAL			30					800	28
SEMESTER IV									
I	21PBFCV401	Project Viva-Voce	-	P	-	100	100	200	10
	21PBFEP402 / 21PBFET403 / 21PBFEV404	Elective - IV	5	P	6	50	50	100	4
	21PSWT405/ 21PADT406	SWAYAM (or) Methods in Molecular Biology @	-	-	-	--	50	50	2
TOTAL								350	16
TOTAL								2450	92

***Institutional Training:** Students have to undergo Institutional Training during May - June for a period of 21 days at the end of II Semester and the report of the same to be submitted.

& @ - ESE only



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LIST OF ELECTIVE COURSES			
Elective-I	21PBFET107	A	Animal Biotechnology and Nanotechnology
	21PBFET108	B	Genomics and Proteomics
	21PBFET109	C	Stem Cell Technology
Elective-II	21PBFET206	A	Biochemical and Environmental Toxicology
	21PBFET207	B	Hospital Management and Health Care
	21PBFET208	C	Concepts of Drug Delivery and Clinical Research
Elective-III	21PBFET307	A	Microbial Biochemistry
	21PBFET308	B	Nutritional Biochemistry
	21PBFET309	C	Molecular Basis of Infectious & Non-infectious Diseases
Elective-IV	21PBFEP402	A	Elective Practicals- Cell Culture and Molecular Techniques
	21PBFET403	B	Molecular Diagnostics
	21PBFEV404	C	Elective Project Work*
* Jointly evaluated by Internal and External Examiners			

LIST OF EXTRA CREDIT COURSES			
Advanced Learners Course	21PBFAL311	A	Industrial Biochemistry
	21PBFAL312	B	Fundamental Concepts of Pharmacovigilance

Dr. A.K. Vidya

Dr.A.K.Vidya
Chairman, Board of Studies,
Department of Biochemistry,
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Sem.	Course Code	Core II - Advanced Bioanalytical Techniques and Bioinformatics	Total Marks: 100		Hours / Week	Credits
I	21PBFCT102		CIA: 50	ESE: 50	5	4

Course Objectives:

1. To have a basic understanding of the theoretical principles involved in Bioinstrumentation
2. To become competent in the basic experimental techniques of biochemistry
3. To gain knowledge on how to acquire information and compare sequence and structure information, search databases and interpret protein structure.

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Compile the basic principles and applications of analytical techniques	K1 - K4
CO 2	Discuss the different methodologies of biochemical techniques	
CO 3	Illustrate the instrumental set up of various Bioanalytical techniques	
CO 4	Practice the biological databases and Operate various tools in Sequence alignment methods.	
CO 5	Illustrate the methods of Protein prediction and Drug designing.	

K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

Unit - I | Chromatography and Electrophoresis

Chromatography: Principle, Instrumentation and Applications of Thin Layer, Ion-exchange, Affinity Chromatography, GLC, HPLC, HPTLC, Flow Cytometry, DNA Microarray.

Electrophoresis: Principle, Techniques and Applications of Agarose Gel Electrophoresis, SDS-PAGE, Isoelectric focusing, Capillary electrophoresis.

Principle and Applications of KASPar assay.

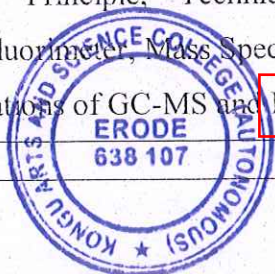
Unit - II | Centrifugation and Spectrophotometer

Preparative Ultracentrifuge: Differential centrifugation and Density gradient centrifugation

Analytical Ultracentrifuge: Instrumental Set-up, applications

Spectrophotometer: Principle, Techniques and Applications of UV-Visible Spectrometer, Flame Photometry, Fluorimeter, Mass Spectrometer and X-ray Diffraction technique.

Principle and Applications of GC-MS and LC-MS.

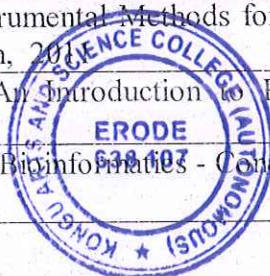


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Unit - III	Cytotoxicity Assays and Radioactivity
<p>Cytotoxicity Assay: Procedure and Applications of Comet and MTT Assay.</p> <p>Radioactivity: Types of radioactive decay - Alpha, Gamma & Beta emission; Principle, Techniques and Applications of GM Counter, Scintillation Counter and Autoradiography. Radiopharmaceuticals. Radioactive and Non-radioactive labeling, Applications of Radioisotopes in Biology.</p>	
Unit - IV	Biological Databases and Sequence Alignment
<p>Bioinformatics: Definition, Objectives, Scope and Applications of Bioinformatics</p> <p>Biological Databases: Primary, Secondary and Composite Databases</p> <p>Sequence Alignment: Local and Global Alignments; Needleman-Wunsch Algorithm and Smith-Waterman Algorithm, Scoring Matrices (PAM and BLOSUM), Similarity Search Tool (FASTA and BLAST), Multiple Sequence Alignment (CLUSTALW) and Phylogenetic Analysis (PHYLIP)</p>	
Unit - V	Protein structure prediction and CADD
<p>Secondary structure prediction: Chou-Fasman Method, Nearest Neighbor method, Neural Network method.</p> <p>Tertiary structure prediction: Ab initio method and threading method.</p> <p>Proteomics: Types; Tools (ExpASY) and Applications of Proteomics</p> <p>Computer Aided Drug Designing: Stages and applications of Molecular docking.</p>	

Skill Development Activities	Max. Marks (10)
Assignment	3
e-Content Creation	3
Case Study	3
Punctuality	1

TEXT BOOKS	
1	P. Asokan, Analytical Biochemistry, China Publications, 3 rd Edition, 2006.
2	A.Upadhyay, K.Upadhyay, N.Nath, Biophysical Chemistry - Principles and Techniques, Himalaya Publishing House Pvt. Ltd, 4 th Edition, 2016.
3	B. K. Sharma, Instrumental Methods for Chemical Analysis, Krishna Prakashan Media Pvt Ltd, 11 th Edition, 2016.
4	D. T. Plummer, An Introduction to Practical Biochemistry, McGraw Hill Education, 3 rd Edition, 2017.
5	S.C. Rastogi <i>et al.</i> , Bioinformatics - Concepts, Skills and Applications, CBS publishers, 1 st Edition, 2003.



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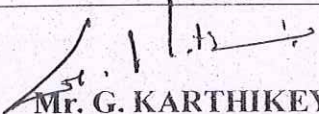

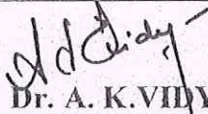
6	K. Mani and N. Vijayaraj. Bioinformatics for Beginners, Kalaikathir Achagam, Coimbatore, 1 st Edition, 2002.
7	Ambika Shanmugam, Fundamentals of Biochemistry for Medical Students, Published by the Author, 7 th edition, 2008

REFERENCE BOOKS

1	Keith Wilson and John Walker. Principles and Techniques of Biochemistry and Molecular Biology, Cambridge University Press, 6 th Edition, 2007.
2	A. Douglas, Skoog, M. Donald West, F. James Holler, Stanley R. Crouch, Fundamentals of Analytical Chemistry, Barkha Nath Printers, 9 th edition, 2008.
3	S. Sundararajan and R. Balaji, Introduction to Bioinformatics, Himalaya publishing house, 1 st Edition, 2002

WEB RESOURCES

1	https://microbenotes.com/category/instrumentation/
2	https://www.onlinebiologynotes.com/electrophoresis-principle-affecting-factors-and-types/
3	https://www.biologydiscussion.com/biodiversity/bioinformatics/notes-on-bioinformatics-genetics/38224

Course Designed By	Verified By	Approved By HOD
 Mr. G. KARTHIKEYAN	 Mrs. T. RADHA	 Dr. A. K. VIDYA

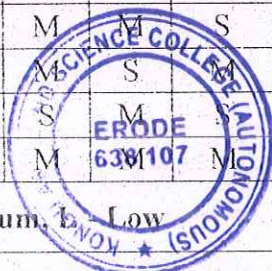
QUESTION PAPER PATTERN

Time: 3 hours	Max. Marks: 50	
SECTION-A (10 X 1 = 10 Marks) Answer ALL the questions Choose the correct answer	SECTION-B (5 X 3 = 15 Marks) Answer ALL the questions Either or type Two questions from each unit	SECTION-C (5 X 5 = 25 Marks) Answer ALL questions Question Number: 16 to 19 (Either or type) Question Number 20 is Compulsory - Case Study

Mapping of COs with POs and PSOs:

PO/PSO CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	M	S	M	S	M	S	S	S	S	M	S
CO 2	S	M	S	M	S	S	S	S	S	S	S	M
CO 3	S	S	S	S	M	S	S	S	S	S	M	S
CO 4	S	S	M	S	M	S	S	S	S	S	S	M
CO 5	S	M	M	M	S	S	S	S	S	S	M	S

S - Strong, M - Medium, L - Low



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Sem.	Course Code	Core III - Advanced Enzymology	Total Marks: 100		Hours / Week	Credits
I	21PBFCT103			CIA: 50	ESE: 50	4

Course Objectives:

1. To acquaint students with fundamental of enzymes and kinetics of enzyme catalyzed reactions.
2. To provide a comprehensive overview about the principles of enzymology and techniques employed in the utilization of enzymes.
3. To acquire a better understanding on the modern approaches of enzyme technology and their applications.

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Recall the fundamentals of concepts of enzymes	K1 - K4
CO 2	Identify the active site of enzyme, catalytic reactions	
CO 3	Evaluate the enzyme kinetic mechanisms. Compare the enzyme inhibitors	
CO 4	Describe the methods for production, purification, characterization and immobilization of enzymes.	
CO 5	Illustrate the industrial applications of enzymes	

K1: Remember ; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

Unit - I Enzymes

Enzymes: Introduction, Nomenclature and Classification of enzymes, Factors affecting enzyme activity.

Active site: Definition, Salient features and Theories of active site – Lock and Key theory and Induced Fit Theory, Investigations of active site structure - Trapping ES complex, Enzyme modification by treatment with proteases, Enzyme modification by site directed mutagenesis.

Isoenzymes: Lactate Dehydrogenase and Creatine Kinase.

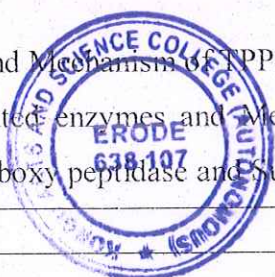
Multi Enzyme Complex: Fatty acid Synthetase complex.

Unit - II Enzyme catalysis, Coenzymes & Cofactors

Enzyme catalysis: Acid-base catalysis and covalent catalysis. Structure and Mechanism of Lysozyme and Chymotrypsin

Coenzymes: Structure and Mechanism of TPP, NAD, FAD, Pyridoxal Phosphate and Coenzyme A.

Cofactors: Metal activated enzymes and Metallo enzymes - Role of metal ions in mechanism of Carbonic anhydrase, Carboxy peptidase and Superoxide dismutase.



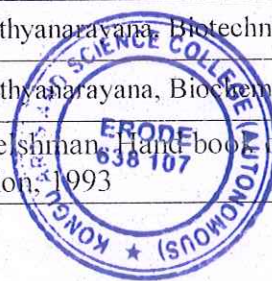
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Unit - III	Enzyme kinetics & Enzyme inhibition
<p>Enzyme kinetics: Michaelis-Menten Equation, Line weaver Burk plot, Eadie - Hofstee plot and Hanes plot.</p> <p>Allosteric enzymes: Definition, Cooperativity, Regulation - Concerted and Sequential Model - Aspartate Transcarbamylase</p> <p>Enzyme inhibition: Types – Difference between the Competitive, Non-competitive and Uncompetitive inhibitions. Ribozyme and Abzyme</p>	
Unit - IV	Applications of enzymes
<p>Industrial applications of enzymes: Extraction and Purification of Amylase and Protease (Bacteria and Fungi).</p> <p>Applications of Enzymes: Enzymes in Brewing, Baking, Meat processing industry. Role of enzymes in Detergent, Leather and Textile Processing.</p> <p>Clinical application of enzymes: Diagnostic and Therapeutic enzymes.</p>	
Unit - V	Immobilization & Biosensors
<p>Enzyme immobilization: Techniques – Adsorption, Cross linking, Covalent bonding, Entrapment and Encapsulation and applications of immobilized enzymes.</p> <p>Biosensors: Principle and applications of Calorimetric, Potentiometric, Optical, biosensors, Immunosensors and Genetic biosensors (For monitoring Plant Stress)</p> <p>Advances in Enzyme Technology: Enzymes in recombinant DNA technology, Protein engineering.</p>	

Skill Development Activities	Max. Marks (10)
Assignment	3
e-Book Review	3
Case Study	3
Punctuality	1

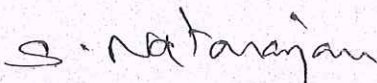
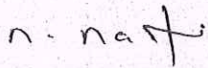
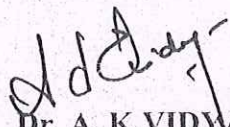
TEXT BOOKS	
1	Palmer, Understanding Enzymes, Printice Hall, 3 rd edition, 1991
2	Trevor Palmer and Philip Bonner, Enzymes, Woodhead publishing, 2 nd Edition, 2007.
3	Dr. U. Sathyanarayana, Biotechnology, Books and allied (P) Ltd, Kolkata, 4 th edition, 2013.
4	Dr. U. Sathyanarayana, Biochemistry, Elsevier Health Sciences, 4 th edition, 2013.
5	Alan Welshman, Hand book of enzyme biotechnology, Cambridge University Press, 2 nd Edition, 1993



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REFERENCE BOOKS	
1	Marangoni, John Wiley. Enzyme Kinetics - A Modern Approach, Wiley Online Library, 1 st Edition, 2002.
2	Chapline. Bucke, Enzyme Technology, Cambridge University Press, 1 st Edition, 1990.
3	Price and Stevens, Fundamentals of enzymology, Oxford University Press, 2 nd edition, 1995
4	Nooralabettu Krishna Prasad, Enzymes technology, PHI Learning Pvt, Kindle Edition, 2011.
5	EE. Conn and PK. Stumpf, G. Bruening and RY. Doi, Outlines of biochemistry, John Wiley and Sons, New York, USA, 5 th edition, 2010

WEB RESOURCES	
1	www.sciencedirect.com
2	www.cheric.org.cybertecture

Course Designed By	Verified By	Approved By HOD
 Mr. S. NATARAJAN	 Mr. R. RASU	 Dr. A. K. VIDYA

QUESTION PAPER PATTERN		
Time: 3 hours	Max. Marks: 50	
SECTION-A (10 X 1 = 10 Marks) Answer ALL the questions Choose the correct answer	SECTION-B (5 X 3 = 15 Marks) Answer ALL the questions Either or type Two questions from each unit	SECTION-C (5 X 5 = 25 Marks) Answer ALL questions Question Number: 16 to 19 (Either or type) Question Number 20 is Compulsory - Case Study

Mapping of COs with POs and PSOs:

PO/PSO CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	M	S	S	S	S	M	S	S	S	M	M
CO 2	S	S	M	S	S	M	S	M	M	S	S	M
CO 3	S	S	S	S	M	S	S	S	S	S	M	S
CO 4	S	S	S	S	M	M	S	S	S	M	S	S
CO 5		M		M	S	M	S	S	S	S	M	S

S - Strong, M - Medium, L - Low



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Sem.	Course Code	Elective I: Animal Biotechnology and Nanotechnology	Total Marks: 50		Hours / Week	Credits
I	21PBFET107		CIA: 50	ESE: 50	4	4

Course Objectives:

1. To understand the components of culture media and various tissue culture techniques
2. To enable the students to have a sound knowledge on advantages of transgenesis
3. To synthesize and characterize nanomaterials using natural sources

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Outline the basic principles of Animal cell culture.	K1 - K4
CO 2	Discuss the properties of various types of animal cell cultures	
CO 3	Investigate the concepts of transgenic animals production	
CO 4	Discriminate the properties and synthesis of Nanomaterials.	
CO 5	Investigate the characterization and applications of Nanomaterials.	

K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

Unit - I Animal Cell Culture Media

Animal Cell Culture: Facilities for animal cell culture - Infrastructure, equipment, Cell sources and cell types required for Animal cell culture.

Culture media: Physico-Chemical properties of culture media. Complete culture media- EMEM and RPMI, Balanced Salt Solution, Composition of Earle's BSS and Hank's BSS.

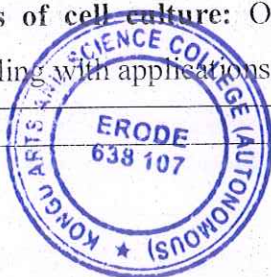
Natural media:- Serum and Tissue extracts. Serum free media- Advantages and Disadvantages. Sterilization of media.

Unit - II Types of Culture

Biology of cultured cells: Cell adhesion. Cell Proliferation, Cell differentiation, Metabolism of cultured cells. Measurement of growth parameters of cultured cells. Cell synchronization. Apoptosis and its measurement.

Primary cell culture: Mechanical and Enzymatic method. Cell line- Finite and Continuous cell line. Subculture

Types of cell culture: Organ culture, Three dimensional culture. Tissue engineering and Tissue modeling with applications.

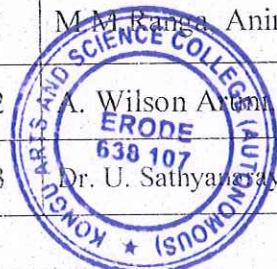


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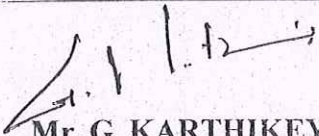
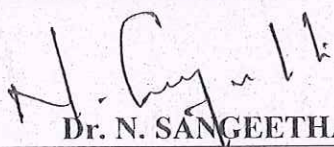
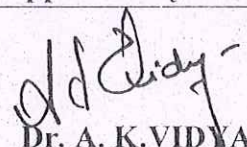
Unit - III	Transgenesis
<p>Embryo Culture: An overview of collection and preservation of embryos - IVF and Embryo transfer.</p> <p>Transgenic animals: Methods - Microinjection method and Embryonic Stem cell method.</p> <p>Transgenesis in Large animals: Transgenic Cattle, Transgenic Sheep, Goat and Chicken</p>	
Unit - IV	Nanotechnology
<p>Nanotechnology: Basics of Nano science and Nano scale.</p> <p>Classification of Nanomaterials: Quantum Dots, Synthesis, Properties and applications of Carbon nanotubes</p> <p>Metal based nanomaterials: Preparation and applications of Nano gold, Nano silver and Silica metal oxide.</p> <p>Properties of Nanostructured materials: Size and Shape dependent properties, Thermal Property, Magnetism, Conductivity and Band Gap.</p> <p>Synthesis of Nanomaterials: CVD, Sol-Gel processing, Biological method - use of Plant extracts, Bacteria and Fungi.</p>	
Unit - V	Characterization and Applications of Nanomaterials
<p>Characterization of Nano phase materials: Principle and Working of Scanning Electron Microscopy, Transmission Electron Microscopy, Scanning Tunneling Microscopy and Atomic Force Microscopy</p> <p>Applications of Nanotechnology: In Medicine, Textile, Cosmetics, Food & Agriculture.</p> <p>Nano remediation: Environmental Cleanup technologies.</p>	

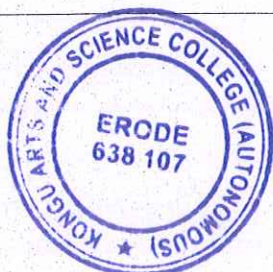
Skill Development Activities	Max. Marks (10)
Journals Review	3
e-Content Creation	3
Case Study	3
Punctuality	1

TEXT BOOKS	
1	M.M.Ranga, Animal Biotechnology, AgroBios, 2 nd edition, 1993.
2	A. Wilson and P.Ramadass, Animal Tissue Culture, MJP Publishers, 1 st Edition, 2011.
3	Dr. U. Sathyavayana, Biotechnology, Books and allied (P) Ltd, Kolkata, 4 th Edition, 2013.



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4	B.S.Murty, P. Shankar, B.Raj, B.B.Rath, Murday, Textbook of Nanoscience and Nanotechnology. Universities Press Pvt Ltd, 1 st Edition, 2013											
REFERENCE BOOKS												
1	T.Pradeep, Nano: The Essentials: Understanding Nanoscience and Nanotechnology, McGraw Hill Education, 1 st Edition, 2017											
2	R. Ian Freshney, Culture of Animal cells-A Manual of Basic technique, A John Wiley & Sons.Inc Publications, 4 th Edition, 2000.											
WEB RESOURCES												
1	https://www.notesonzooology.com/animal-cell-culture/animal-cell-and-cell-culture-notes-introduction-substrates-isolation-types-and-techniques/13503											
2	https://microbeonline.com/animal-cell-culture-introduction-types-methods-applications/											
3	https://www.vedantu.com/biology/transgenic-animals											
Course Designed By				Verified By				Approved By HOD				
 Mr. G. KARTHIKEYAN				 Dr. N. SANGEETHA				 Dr. A. K. VIDYA				
QUESTION PAPER PATTERN												
Time: 3 hours						Max. Marks: 50						
SECTION-A (10 X 1 = 10 Marks) Answer ALL the questions Choose the correct answer				SECTION-B (5 X 3 = 15 Marks) Answer ALL the questions Either or type Two questions from each unit				SECTION-C (5 X 5 = 25 Marks) Answer ALL questions Question Number: 16 to 19 (Either or type) Question Number 20 is Compulsory - Case Study				
Mapping of COs with POs and PSOs:												
PO/PSO CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	M	S	M	S	M	S	S	S	S	M	S
CO 2	S	M	M	S	M	S	S	S	S	S	S	M
CO 3	S	M	S	M	S	M	S	S	S	S	M	S
CO 4	S	S	M	S	M	S	S	S	S	S	S	M
CO 5	S	M	M	M	S	S	S	S	S	S	M	S
S - Strong, M - Medium, L - Low												



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Sem.	Course Code	Elective I: Genomics and Proteomics	Total Marks: 100		Hours / Week	Credits
I	21PBFET108		CIA: 50	ESE: 50	4	4

Course Objectives:

1. To handle the data in analyzing and interpretation including annotation.
2. To provide students a detailed through background various wet lab techniques and data generation tools related to DNA sequences.
3. To educate students on standalone and online software for genetic studies.

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Memorize the structure and functions of Genomes	K1 - K4
CO 2	Outline the concepts of Genome sequencing and mapping	
CO 3	Identify the importance of Genome and Proteome data bases	
CO 4	Compute the techniques of protein-protein interaction	
CO 5	Explain the characteristics of genome annotations	

K1: Remember ; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

Unit - I

Genomics: Introduction to Genomics, Genome topology: Chromatin, super coiling and packaging.
Genome organization: Genome organization in prokaryotic and eukaryotic systems: Operon concept.
Genome Sequencing - Shot gun, clone - contigs, pyrosequencing, Next generation sequencing.
Genome analysis- Chromosome analysis and mapping: Basic strategy for genetic analysis in human, Linkage mapping, physical mapping, genetic mapping and restriction mapping.

Unit - II

Annotation of the Genome: Various approaches in gene prediction, ORF prediction, Gene prediction in prokaryotes, Gene prediction in eukaryotes, Hidden Markov Model, Pattern discrimination, Evaluation of gene prediction method and Prediction of promoter sequences. Applications of Genomics.

Unit - III

Functional Genomics: Gene expression analysis by cDNA micro arrays, GEO, SAGE. EST databases (DBEST, UNIGENE).

Genomic Diversity- General Purpose of Comparative Genomics Database: Cog- Cluster of Orthologous Groups, Kyoto Encyclopedia of Genes and Genomes (KEGG) Microbial Genome Database (MBGD), Tools for Genomic Comparison and functional genomics




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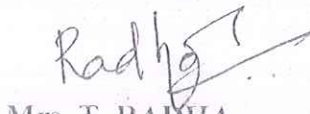
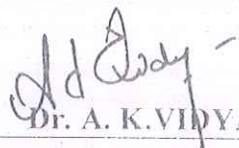
Unit - IV	<p>Principles of Protein classification: Based on Structural features, Phylogenetic relationship, CATH - Classification by Class, Architecture, Topology, Homology, SCOP - Structural Classification of Protein, FSSP – Fold classification based on structure - structure alignment, MMDB - Molecular Modeling Database. Secondary structure prediction: Chou – Fasman / GOR method, Neural network</p>
Unit - V	<p>Protein-protein interactions: Yeast two hybrid technique.</p> <p>Analytical proteomics: Sample preparation and processing, Proteome analysis techniques: 2D PAGE, Capillary Electrophoresis, Spectroscopy: NMR, MS and MALDI-TOF and its variants. 3D structural analysis: X-ray crystallography/X-ray diffraction analysis. Applications of proteomics.</p>

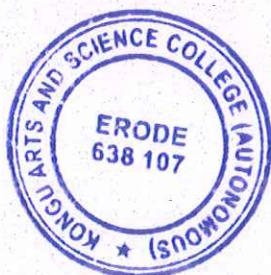
Skill Development Activities	Max. Marks (10)
Assignment	3
Journal Review	3
Group Discussion	3
Punctuality	1


TEXT BOOKS	
1	Andreas D. Baxevanis and B. F. Francis Ouellette, Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Wiley Interscience, 2 nd Edition, 2004
2	A. Malcolm Campbell and Laurie J. Heyer, Discovering Genomics, Proteomics and Bioinformatics, Pearson Education, 2 nd Edition, 2009.
REFERENCE BOOK	
1	R.M.Twyman, Taylor & Francis group, Principles of Proteomics, BIOS Scientific Publishers, 2 nd Edition, 2004
2	Arthur M. Lesk, Introduction to Bioinformatics, Oxford University, 5 th Edition, 2019.
3	Jin Xiong, Essential Bioinformatics, Cambridge University Press, 3 rd Edition, 2014
WEB RESOURCES	
1	https://byjus.com/biology/genome-and-genomics/
2	http://www.genomenetwork.org/resources/whats_a_genome/Chp2.html




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Course Designed By		Verified By		Approved By HOD								
 Mr. A. KARTHIKEYAN		 Mrs. T. RADHA		 Dr. A. K. VIDYA								
QUESTION PAPER PATTERN												
Time: 3 hours			Max. Marks: 50									
SECTION-A (10 X 1 = 10 Marks) Answer ALL the questions Choose the correct answer		SECTION-B (5 X 3 = 15 Marks) Answer ALL the questions Either or type Two questions from each unit		SECTION-C (5 X 5 = 25 Marks) Answer ALL questions Question Number: 16 to 19 (Either or type) Question Number 20 is Compulsory - Case Study								
Mapping of COs with POs and PSOs:												
PO/PSO CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	M	S	M	S	M	S	S	S	S	M	S
CO 2	S	M	M	S	M	S	S	S	S	S	S	M
CO 3	S	M	S	M	S	M	S	S	S	S	M	S
CO 4	S	S	M	S	M	S	S	S	S	S	S	M
CO 5	S	M	M	M	S	S	S	S	S	S	M	S
S - Strong, M - Medium, L - Low												




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Sem.	Course Code	Core VII - Immunology and Immunotechniques	Total Marks: 100		Hours / Week	Credits
II	21PBFCT202		CIA: 50	ESE: 50	5	4

Course Objectives:

1. To provide a clear understanding of the molecular and cellular components that comprise the immune system, including their function and interaction.
2. To enable students to learn diseases caused by disorders of the immune system (failure, aberrant action, and malignant growth of the cellular elements of the system).
3. To gain an insight on the latest methods of detecting disease causing pathogens, its treatment using novel vaccines.

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Locate the components of the immune system and how cells and organs play an important role in the immune responses.	K1 - K4
CO 2	Illustrate the structure and mechanism of action of different immune components and their resultant reaction responses.	
CO 3	Compare the principle and applications of various immuno techniques ranging from precipitation and agglutination reactions to ELISA, Radio immunoassay and flow cytometry.	
CO 4	Complete knowledge of the molecular mechanisms and kinetics of the immune responses, both humoral and cell mediated immunity.	
CO 5	The course will aid in understanding abnormal manifestations of the immune response in the form of Hypersensitive reactions, the mechanisms of transplantation of the various organs the principles of Graft rejection, Autoimmunity, Knowledge of pathogenesis of diseases and designing of immunology based interventions for effective treatment like Antibody based therapy.	

K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

Unit - I Cells and Organs of Immune system

Immunity: Innate and Adaptive immunity. Hematopoiesis

Immune cells: Structure, properties and functions of the T and B - lymphocytes, NK cells, Monocytes and Macrophages, Dendritic cells, Neutrophils, Eosinophil, and Basophils.

Lymphoid organs: Primary and Secondary lymphoid organs (Bursa, Thymus, Bone marrow, Lymph nodes, Spleen, MALT, GALT and CALT).

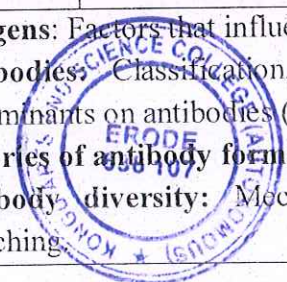
Unit - II Antigens and Antibodies


Antigens: Factors that influence Immunogenicity, Haptens, B and T cells epitopes.

Antibodies: Classification, Structure, Function and Properties of the antibodies: Antigenic determinants on antibodies (isotype, allotype and idio type); Immunoglobulin Superfamily (IgG, IgM, IgA, IgE, IgD).

Theories of antibody formation: Side chain and Clonal selection theory, Sars-Covid2 Spike Protein.

Antibody diversity: Mechanisms contributing to diversity - Somatic Recombination, Class Switching.

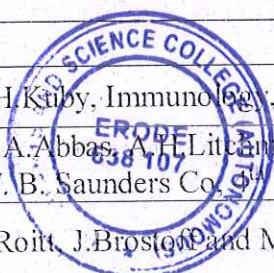



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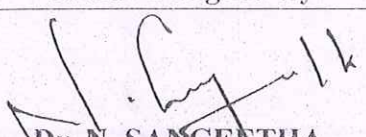
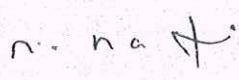
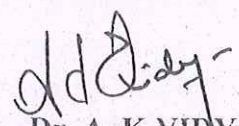
Unit - III	Vaccines and Techniques of Antigen-Antibody Interactions
<p>Vaccines: Subunit vaccines, Attenuated organisms, Recombinant vaccines, DNA vaccines, Synthetic peptide vaccines, Antidiotypic vaccines.</p> <p>Immunological techniques: Affinity and Avidity, Cross reactivity, Precipitation, Agglutination, Principle and Applications of Immunodiffusion, Rocket immuno electrophoresis, ELISA, RIA.</p> <p>Hybridoma technology: Techniques and applications of Monoclonal Antibodies.</p> <p>Experimental Animal models: SCID mice, Knockout mice and Nude mice.</p>	
Unit - IV	MHC, Cell and Antibody mediated immunity and Complement
<p>Major histocompatibility gene complex: Types - Structure and Functions, Structure and cellular distribution of HLA antigens.</p> <p>Cell mediated immunity: Cell types (CTLs, NK cells, macrophages and TDTH cells), Effector mechanisms and Effector molecules of cell mediated reactions.</p> <p>Cytokines: Interleukins and Interferons (outline only).</p> <p>Complement system: Components of the complement activation, Pathways - Classical, Alternative and Lectin pathways. Biological consequences of complement activation and complement deficiencies</p>	
Unit - V	Hypersensitivity, Autoimmunity and Transplantation immunology
<p>Hypersensitivity: mechanism of types I, II, III and IV Hypersensitivity reactions.</p> <p>Autoimmune diseases: Definition, Mechanisms of induction of organ specific (Myasthenia Grave's disease and IDDM) and systemic diseases (Rheumatoid arthritis and SLE).</p> <p>Transplantation immunology: Graft – Definition, Types, Immunologic basis of graft rejection, Properties and types of rejection, Tissue typing, Immunosuppressive therapy.</p> <p>Tumor Immunology: Types of tumors, Tumor antigens, Immune response to tumors, Cancer Immunotherapy (Cytokine Therapy and Monoclonal Antibody Therapy)</p> <p>Diseases weakening immune system: AIDS – Structure of HIV, HIV Transmission and Infection of target cells, Diagnosis and Treatment. An overview on signs and symptoms of Dengue, Swine flu, Sars Covid.</p>	

Skill Development Activities	Max. Marks (10)
Assignment	3
Journal Review	3
Case Study	3
Punctuality	1


TEXT BOOKS	
1	J.H.Kuby, Immunology, W. H. Freeman Publication, 6 th Edition, 2007
2	K.A.Abbas, A.L.Littman and J.S.Pober, Cellular and Molecular Immunology, W. B. Saunders Co., 6 th Edition, 2007.
3	I.Roitt, J.Brosnan and M.David, Immunology, Mos by publisher



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REFERENCE BOOKS													
1	R.I.Tizard. Immunology. Saunders college publishing, 4 th Edition, 2007.												
2	Ivon Roitt. Essential Immunology. Blackwell Publishing, 11 th edition. 2006.												
WEB RESOURCES													
1	https://csmb.co.uk												
2	https://www.roitt.com												
Course Designed By				Verified By				Approved By HOD					
 Dr. N. SANGETHA				 Mr. R. RASU				 Dr. A. K. VIDYA					
QUESTION PAPER PATTERN													
Time: 3 hours						Max. Marks: 50							
SECTION-A (10 X 1 = 10 Marks) Answer ALL the questions Choose the correct answer				SECTION-B (5 X 3 = 15 Marks) Answer ALL the questions Either or type Two questions from each unit				SECTION-C (5 X 5 = 25 Marks) Answer ALL questions Question Number: 16 to 19 (Either or type) Question Number 20 is Compulsory - Case Study					
Mapping of COs with POs and PSOs:													
CO	PO								PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO 1	S	M	M	S	S	M	S	S	S	S	M	M	
CO 2	S	M	M	S	S	M	S	S	S	S	M	M	
CO 3	S	S	M	S	M	M	M	S	S	S	S	M	
CO 4	S	M	M	M	S	M	S	S	S	S	S	S	
CO 5	S	S	S	S	S	S	M	S	S	S	M	M	
S - Strong, M - Medium, L - Low													




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Sem.	Course Code	Core VIII - Molecular Biology and Molecular Genetics	Total Marks: 100		Hours / Week	Credits
			CIA: 50	ESE: 50		
II	21PBFCT203				5	4

Course Objectives:

1. To enlighten the basic principles of genetics and the roles of genes and inheritance.
2. To understand the gene structure, replication, transcription, translation, recombination, mutation and DNA repair.
3. To become familiar with the diagnostic molecular biology.

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Analyze the molecular organization of genes	K1 - K4
CO 2	Evaluate the mechanism of DNA repair and DNA replication.	
CO 3	Distinguish the importance of enzymes in transcription process.	
CO 4	Compute the strategies of synthesis and translocation of proteins.	
CO 5	Explain the basic principles of transmission genetics.	

K1: Remember ; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

Unit - I Organization of Chromosomes

Molecular structure of Genes and Chromosomes: Molecular definition of gene, chromosomal organization of genes and non-coding DNA - Protein coding genes and tandemly repeated genes.

DNA sequence Polymorphism: Single Nucleotide Polymorphism.

Transposons: Bacterial transposons and retroviral transposons.

Structural organization of Eukaryotic chromosomes; Functional elements of Eukaryotic chromosomes;

Epigenetics - Fundamentals only

Unit - II DNA - Mutation, Repair & Replication

Mutation – Definition, Types.

DNA Damage and DNA Repair: Types - Excision repair, Mismatch Repair, Photo reactivation Repair and SOS Repair.

DNA Replication: Modes of Replication - Semiconservative mechanism;

DNA replication Machinery in Prokaryotes and Eukaryotes. Role of Topoisomerase in DNA Replication



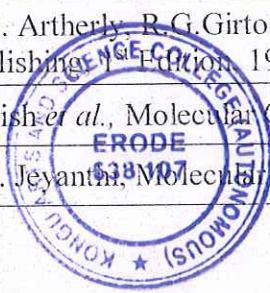
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Unit - III	Transcription
<p>Prokaryotic Transcription: Initiation, Elongation and Termination.</p> <p>Operon Model: Lac operon and Trp operon.</p> <p>Eukaryotic Gene Control: Regulatory sequences in protein coding genes – TATA box, Promoter proximal elements, distant enhancer sites.</p> <p>Eukaryotic RNA Polymerases: I, II & III.</p> <p>Post-transcriptional modification: Processing of Eukaryotic pre-mRNA, rRNA and tRNA.</p>	
Unit - IV	Translation & Recombination
<p>Translation: Activation of amino acids, Initiation, Elongation and Termination.</p> <p>Genetic Code: Salient features and Wobble Hypothesis.</p> <p>Protein Sorting and Targeting of Mitochondria and Chloroplast proteins; Translocation of Secretory products across ER membrane; Post-translational Modification of Proteins; Protein glycosylation in ER and Golgi complex.</p> <p>DNA Recombination: Holliday Model of Recombination.</p>	
Unit - V	Transmission Genetics
<p>Transmission Genetics: Mendelian Analysis of Inheritance.</p> <p>Terms in Genetics: Genes, Chromosomes, Alleles, Homozygous, Heterozygous, Dominance and Recessive. Law of Dominance, Back cross and Test cross.</p> <p>Mendel's law: Law of Segregation and Law of Independent Assortment.</p> <p>Linkage: Definition and Types. Salient features of Autosomal Dominance, Autosomal Co-dominance and Autosomal Recessive, X-linked Recessive and Y-linked characters.</p>	

Skill Development Activities	Max. Marks (10)
Model Presentation	3
e-content creation	3
Case Study	3
Punctuality	1

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TEXT BOOKS		KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) NANJANAPURAM, ERODE - 638 107
1	A.G. Artherly, R.G.Girton, J.F.McDonald, The Science of Genetics, Saunders Publishing Co. Edition, 1999.	
2	Lodish <i>et al.</i> , Molecular Cell Biology, W.H. Freeman and Company, 4 th Edition, 2000.	
3	G.P. Jeyanthi, Molecular Biology, MJP Publishers, 1 st Edition, 2009.	

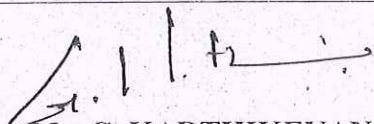
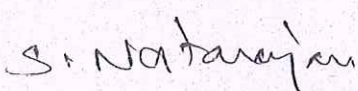
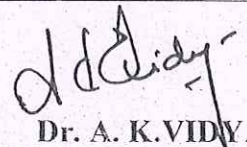


REFERENCE BOOKS

1	Twyman. Advanced Molecular Biology. Viva publication, 2 nd Edition, 1998.
2	Lewin. Genes VIII, Prentice Hall International, 8 th Edition, 2004.
3	Alberts <i>et al.</i> , Molecular Biology of the cell, Garland Science Publications, 4 th Edition, 2002.
4	Watson, Molecular Biology of the gene, Pearson Education, 5 th Edition, 2004.

WEB RESOURCES

1	https://byjus.com/biology/dna-replication-machinery-enzymes/
2	https://byjus.com/biology/genetics/
3	http://www1.biologie.uni-hamburg.de/b-online/library/biology107/bi107vc/fa99/terry/RNAprot.html

Course Designed By	Verified By	Approved By HOD
 Mr. G. KARTHIKEYAN	 Mr. S. NATARAJAN	 Dr. A. K. VIDYA

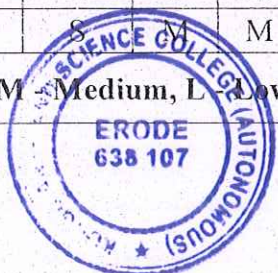
QUESTION PAPER PATTERN

Time: 3 hours		Max. Marks: 50
SECTION-A (10 X 1 = 10 Marks) Answer ALL the questions Choose the correct answer	SECTION-B (5 X 3 = 15 Marks) Answer ALL the questions Either or type Two questions from each unit	SECTION-C (5 X 5 = 25 Marks) Answer ALL questions Question Number: 16 to 19 (Either or type) Question Number 20 is Compulsory - Case Study

Mapping of COs with POs and PSOs:

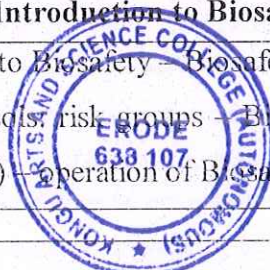
PO/PSO CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	M	S	M	S	M	S	S	S	S	M	S
CO 2	S	M	M	S	S	S	S	S	S	S	S	S
CO 3	S	M	S	M	S	M	S	S	S	S	M	S
CO 4	S	S	M	S	S	S	S	S	S	S	S	S
CO 5	S	M	M	M	S	S	S	S	S	S	M	S

S - Strong, M - Medium, L - Low



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Sem.	Course Code	Core IX - Bioethics, Biosafety, TQM & IPR	Total Marks: 100		Hours / Week	Credits
II	21PBFCT204		CIA: 50	ESE: 50	5	3
Course Objectives:						
To provide basic concepts and importance of biodiversity, bioethics and biosafety, TQM and IPR						
Course Outcomes (CO): On completion of the course, students should be able to						
CO 1	Describe the concepts of Biodiversity in India and global level					K1 - K4
CO 2	Describe the Biosafety levels of microbes, plants and animals					
CO 3	Demonstrate Ethics and Ethical issues in GMO's					
CO 4	Understand the Trade Quality Management					
CO 5	Illustrate the concepts of IPR					
K1: Remember ; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create						
Unit - I	Biodiversity					
Biodiversity: Introduction, levels, values, loss of biodiversity. Species concept - Classification and systematics: biological nomenclature – biological classification;						
Biodiversity conservation: in situ and ex situ - Magnitude and distribution of biodiversity - wild life biology – conservation strategies – measures of biodiversity – biodiversity in India and global level – biodiversity hot spots.						
Unit - II	Introduction to ethics/bioethics					
Introduction to ethics/bioethics: Framework for ethical decision making; biotechnology and ethics – benefits and risks – genetic engineering and bio warfare.						
Ethical implications of cloning: Reproductive cloning, therapeutic cloning; Ethical, legal and socio-economic aspects of gene therapy						
GM crops and GMO's: biotechnology and bio piracy – ELSI of human genome project.						
Unit - III	Introduction to Biosafety					
Introduction to Biosafety – Biosafety issues in biotechnology – risk assessment and risk management – safety protocols, risk groups – Biosafety levels – Biosafety guidelines and regulations (National and International) – operation of Biosafety guidelines and regulations – types of Bioterrorism containment.						




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Unit - IV	Total Quality Management
<p>TQM: Principles, Tools, steps, techniques and methods for TQM (Six sigma, charts, Ishikawa diagram, tree diagram, RCA and PDCA cycle),</p> <p>Requirements for supplementing TQM - steps for supplementing TQM – questionnaire preparation and assessment through questionnaire, mission statement, benefits of TQM, check list for implementing TQM - Introduction to GMP and GLP.</p>	
Unit - V	Intellectual property rights
<p>IPR: protection of biotechnological inventions, patents- types, patenting of genes, biological organisms, plants, animals, microbes and transgenic organisms, trade secrets, copyright, World Intellectual Property Rights organization (WIPO), GATT (General agreement of tariff and trade), biodiversity bill of India.</p>	

Skill Development Activities	Max. Marks (10)
Journal Review	3
e-content creation	3
Case Study	3
Punctuality	1

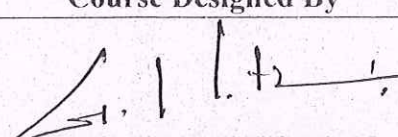
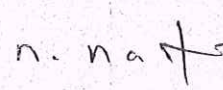
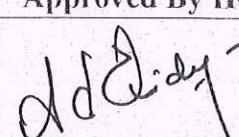
TEXT BOOKS	
1	Radhakrishnan R. and Balasubramanian, S, Intellectual Property Rights: Text and Cases, 1 st edition. Excel Books, 2008
2	Subbaram, N. R., Viswanathan, S, Handbook of Indian Patent Law and Practice. 1st Edition. Printers and Publishers Pvt. Ltd, 1998.
REFERENCE BOOKS	
1	Krishna, V. S, Bioethics and Biosafety in Biotechnology, 1 st Edition. New Age International Publishers, 2007.
2	Cohen.G, Technology Transfer. 1 st Edition. Sage Publications, 2004
3	Ram Narain. Twelve management skills for success. Viva books private limited, Chennai.
4	A. Rao, L.P.Carr, I.Dambolena, R.Kopp, J.Martin, F.Rafii and P.FSchlesinger, Across functional perspectives of TQM. First Edition. John Wiley and sons, New York, 1996
5	Martinez, W. and Schinzinger. R, Ethics in engineering, Tata McGraw-Hill, New Delhi, 4 th Edition, 2004.
6	DEBHELINGS, Biosafety issues related to transgenic crops, Biotech Consortium India Limited, New Delhi, 2005.




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 NANJANAPURAM, ERODE - 638 107.

WEB RESOURCES

1	World Trade Organisation - http://www.wto.org
2	World Intellectual Property Organization - http://www.wipo.int
3	International Union for the Protection of New Varieties of Plants - http://www.upov.int
4	National Portal of India - http://www.archive.india.gov.in
5	National Biodiversity Authority - http://www.nbaindia.org
6	Recombinant DNA Safety Guidelines, 1990 Department of Biotechnology, Ministry of Science and Technology, Govt. of India - Retrieved from http://www.envfor.nic.in/divisions/csurv/geac/annex-5.pdf
7	Guidelines and Standard Operating Procedures for Genetically Engineered Plants, 2008 - http://www.igmoris.nic.in/guidelines1.asp

Course Designed By	Verified By	Approved By HOD
 Mr. G. KARTHIKEYAN	 Mr. R. RASU	 Dr. A. K. VIDYA

QUESTION PAPER PATTERN


Time: 3 hours	Max. Marks: 50	
SECTION-A (10 X 1 = 10 Marks) Answer ALL the questions Choose the correct answer	SECTION-B (5 X 3 = 15 Marks) Answer ALL the questions Either or type Two questions from each unit	SECTION-C (5 X 5 = 25 Marks) Answer ALL questions Question Number: 16 to 19 (Either or type) Question Number 20 is Compulsory - Case Study

Mapping of COs with POs and PSOs:

PO/PSO CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	S	M	S	M	S	M	S	S	S	S	M	S
CO 2	S	M	M	S	S	S	S	S	S	S	S	S
CO 3	S	M	S	M	S	M	S	S	S	S	M	S
CO 4	S	S	M	S	S	S	S	S	S	S	S	S
CO 5	S	M	M	M	S	S	S	S	S	S	M	S

S - Strong, M - Medium, L - Low




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Sem.	Course Code	Elective II: Hospital Management and Health Care	Total Marks: 100		Hours / Week	Credits
II	21PBFET207			CIA: 50	ESE: 50	5

Course Objectives:

1. To understand the basic concepts in hospital management.
2. To learn the Benefits of Hospital management systems
3. To focus the history and impact of Medical Transcription

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Discuss the concepts of modern hospital management system	K1 - K4
CO 2	Prepare the layout for Functioning of modern hospitals	
CO 3	Plan and implement new aspects of medical transcription	
CO 4	Examine the impacts of medical transcription	
CO 5	Focus on web friendly operating system for hospital management	

K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

Unit - I Introduction on Hospital management

Hospital management: Eligibility and personal skills required, Job opportunities in Hospital management. Important hospital management Institutes in India and World.

Concept of Modern Hospital & privatization in Health Sector, Public Sector Hospitals and Level of care offered, facilities, Effects of Globalization in Health care, Concept of Corporate Hospital in developing countries.

Unit - II Hospital management system & Infrastructure

Infrastructure and lay out of an ideal corporate hospital, Functioning of modern hospitals & Hospitality in Hospital Care, Invasive and noninvasive diagnostic facilities in modern hospital Care offered in Specialty and Super specialty Hospitals.

Hospital management system: Benefits and Modules of Hospital management system. Interfacing of analyzer Pathology lab management. Radiology, Blood Bank, Pharmacology management software's.

Unit - III History of Medical Transcription

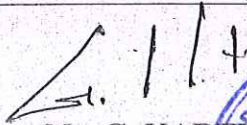
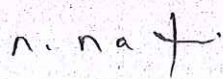
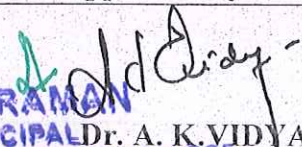
History of Medical Transcription: Drawbacks of MRP system, Advent of Medical Transcription. Web friendly operating system. Market information on companies. Planning on Medical Transcription set up Induction and orientation.

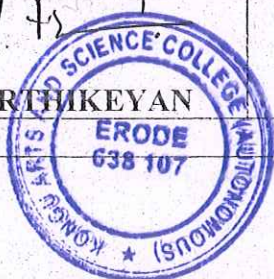


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Unit - IV	Impact of Medical Transcription
<p>Impact of Medical Transcription: Medical Transcription impact on its stock holders Impact during the implementation process. Impact on Departments, Organization as whole, Employment, Nature of job, Information access and Individual employees. Advantages in corporate entity, Disadvantages.</p>	
Unit - V	Medical Transcription implementation
<p>Implementation of Medical Transcription: Medical Re-engineering, Choosing appropriate transcription.</p> <p>Customize to suit the changes Medical Transcription: Best practices Costs, Failure, Gap analysis. Implementation, Life cycle Medical Transcription-Trouble and their solutions.</p>	

Skill Development Activities	Max. Marks (10)
Field Work & Report	3
e-Content Presentation	3
Case Study	3
Punctuality	1

TEXT BOOKS		
1	Hospital Management module II- NIHF, New Delhi	
2	G. D. Kunders. Hospital Administration	
REFERENCE BOOKS		
1	Tabish, Hospital Administration, Calorie malnutrition in children. protein and energy/ requirements Nitrogen balance	
WEB RESOURCES		
1	https://www.healthcare-management-degree.net/top-places-of-employment-health-care-management/	
2	https://searchhealthit.techtarget.com/definition/medical-transcription-software-MTS	
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CO 1	S	M	S	M	S	M	S	S	S	S	M	S
CO 2	S	M	M	S	S	S	S	S	S	S	S	S
CO 3	S	M	S	M	S	M	S	S	S	S	M	S
CO 4	S	S	M	S	S	S	S	S	S	S	S	S
CO 5	S	M	M	M	S	S	S	S	S	S	M	S
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Sem.	Course Code	Elective II: Concepts of Drug Delivery and Clinical Research	Total Marks: 100		Hours / Week	Credits
II	21PBFET208		CIA: 50	ESE: 50	5	4

Course Objectives:

1. To understand the phases of clinical trials
2. To know the basics of approval of new drugs
3. To understand the clinical data management for drug efficacy

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Understand the mechanism of drug designing	K1 - K4
CO 2	Analyze the toxic level of drug	
CO 3	Understand the different methods of clinical trials	
CO 4	Outline the clinical research organizations in India	
CO 5	Describe the ethical guidelines for biomedical research	

K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create**Unit - I**

Biopharmaceutical Product Pipeline: Drug Discovery - Combinatorial chemistry and molecular diversity. Therapeutic targets for drug discovery.

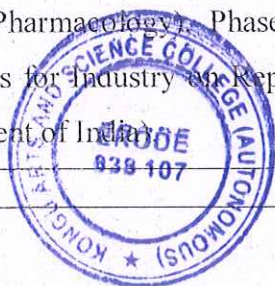
Molecular Docking Drug design: Cheminformatics – Role of computational chemistry in therapeutic drug design. Peptide and peptidomimetic engineering. Structure activity relationship (SAR and QSAR). Applications of pharmacophore-based and structure-based drug design. Use of X-ray, NMR, and computer aided drug design (CADD).

Unit - II

Biopharmaceutical Product Pipeline: Drug Development - Drug Regulation, Phases in Drug Development. PK and ADME (Absorption, Distribution, Metabolism, Elimination) studies - cell-based permeability, uptake and cytotoxicity studies. Animal Toxicity Studies. Regulatory processes in New Drug Development (IND; ANDA).

Unit - III

Overview of Drug Prescribing, Personalized Drugs, Essential Drugs, and Orphan Drugs. Types of clinical trials, observational studies and patient-centered therapeutics. Overview of Phase I (Human/Clinical Pharmacology), Phase II drug reactions (events) and therapeutic drug monitoring. Draft Guidelines for Industry on Reporting Serious Adverse Events Occurring in Clinical Trials (CDSCO, Government of India)

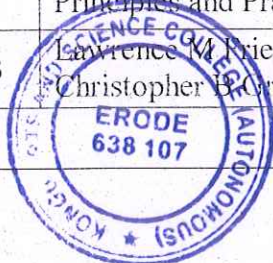


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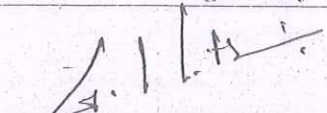
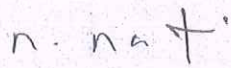
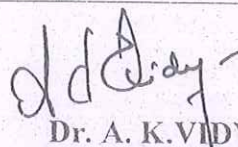
Unit - IV	Clinical Research in India: Clinical Research Organizational Chart (key functions of Data Management, Pharmacovigilance, Regulatory affairs, Biostatistics and SAS), Contract Research Organizations (CROs). The role of MNCs and Indian Pharma companies in Clinical Trials in India. Concepts of cGMP, IPR and Patenting.
Unit - V	ICMR Ethical Guidelines for Biomedical Research on Human Participants - Chapter I (General Principles), Chapter II (Basic Responsibilities, Composition, Review Procedures only of Institutional Ethics Committee), Chapter III (Informed Consent Process, Compensation, Conflict of Interest, Special Groups, Post-Trial Access, International Collaboration), Chapter IV (Drug Trials only). Definitions and Declaration of Helsinki from Guidelines of the CDSCO on Good Clinical Practice. Care and use of Animals in Scientific Research (INSA and CPCSEA Guidelines) only with reference to - sourcing of experimental animals, housing & environment, breeding & genetics, transgenics, nutrition & feeding, hygiene & disease control, personnel & training, recordkeeping and SOPs, anaesthesia & euthanasia, and Institutional Biosafety Committee.

Skill Development Activities	Max. Marks (10)
Assignment	3
e-Content Presentation	3
Case Study	3
Punctuality	1

TEXT BOOKS	
1	Laurence Brunton, Bjorn Knollmann, Randa Hilal-Dandan, Goodman and Gilman's, The Pharmacological Basis of Therapeutics, McGraw-Hill Professional Publishing, 13 th edition, 2017.
2	Satoskar, Nirmala Rege and Bhandarkar, S.D, Pharmacology and Pharmacotherapeutics. Elsevier, 24 th Edition, 2015.
REFERENCE BOOKS	
1	Victoria, F. Roche, S. William, Zito, Thomas Lemke and David A. Williams, Foye's Principles of Medicinal Chemistry, Wolters Kluwer, 8 th edition, 2019.
2	Donald J. Abraham and David P. Rotella, Burger's Medicinal Chemistry and Drug Discovery. Principles and Practice, Wiley, 7 th edition, 2010.
3	Lawrence M Friedman, Cut D Furberg, David L DeMets, David M Reid and Christopher D Granger, Fundamentals of Clinical Trial, Springer, 5 th edition, 2015.
WEB RESOURCES Dr. N. RAMAN PRINCIPAL KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) NANJANAPURAM, ERODE - 638 107.	



1	Handbook on ICMR Ethical Guidelines.pdf
2	https://www.scientific-european-federation-osteopaths.org/different-types-of-clinical-trials/

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