M. Sc. Biochemistry

Syllabus

AFFILIATED COLLEGES

Program Code: 32H

2021 – 2022 onwards



BHARATHIAR UNIVERSITY

(A State University, Accredited with "A" Grade by NAAC, Ranked 13th among Indian Universities by MHRD-NIRF, World Ranking: Times -801-1000,Shanghai -901-1000, URAP - 982)

Coimbatore - 641 046, Tamil Nadu, India

Instruction: PEOs are:

- Statement of areas or fields where the graduates find employment
- Preparedness of graduates to take up higher studies

Program Educational Objectives (PEOs)			
The M. S expected	Sc. BIOCHEMISTRY program describe accomplishments that graduates are to attain within five to seven years after graduation		
PEO1	To apply the fundamentals of life sciences with all the interdisciplinary fields		
PEO2	To educate the basics of Biochemistry with the need for further innovations in Pharma associated companies		
PEO3	To demonstrate and expertise the ethical perspectives in all the areas related to Clinical Biochemistry and Food industry		
PEO4	To have critical thinking, analysis and predicting solutions for the upliftment of mankind by involving in different researches.		
PEO5	To equip the domain knowledge for successful career in academics, industry research and other health care associated concerns		
PEO6	To promote life- long learning so as to face any unexpected hazards to mankind		
PEO7	To face any sort of global competitions and be the creators of employment opportunities to others		
	்து இந்தப்பாரை உயர்த்திட EDUCATE TO ELEVATE		

Instruction : : Program Specific Outcomes (PSOs)

These are what the students should be able to do at the time of graduation. The PSOs are program specific. PSOs are written by the department offering the program. There usually are five to seven PSOs for a department.

Program	Program Specific Outcomes (PSOs)			
After the	successful completion of M.Sc.,Biochemistry program, the students are expected to			
PSO1	To acquire the in depth theoretical and practical knowledge of Biochemistry and the ability to apply the acquired knowledge to provide cost efficient solutions in Biochemistry			
PSO2	To integrate and apply the techniques of Analytical biochemistry, Clinical Biochemisatry, Micro and Molecular biology and Basics of bioinformatics			
PSO3	To learn the technical aspects of existing technologies that help in addressing the biological and medical challenges faced by humankind			
PSO4	To compare and contrast all the interdisciplinary areas like molecular genetics, microbiology, biotechnology, genetic engineering immunochemistry, enzymology, bioinformatics etc			
PSO5	To practice an individual to work independently or in groups to carry out research investigations in an efficient manner			
PSO6	To understand the Biochemical basis of human diseases, protein structure and conformation, regulatory metabolic pathways, drug development, diagnostic and therapeutic mechanisms			
	ப்பாரை உயர்த்திட EDUCATE TO ELEVATE			

Instruction : <u>Programme Outcomes</u> are narrow statements that describe what the students are expected to know and would be able to do upon the graduation. These relate to the skills, knowledge, and behaviour that students acquire through the programme.

Program	Outcomes (POs)
On succe	ssful completion of the M. Sc. Physics program
PO1	To demonstrate a core knowledge base in the theory and practice of ethical and
POI	modern Biochemistry
DO3	To understand that communication comprises attention, listening, responding, and
F02	collecting information through different formats
PO3	To develop innovative strategies for the challenges faced by healthcare industries
105	and the biochemical approaches to solve them
	To learn and accomplish tasks with proficient skills in group, to lead the academic
104	integrity and intellect independence
PO5	To master the applications of current tools for the best health care and
105	development of Bio markets
PO6	To have the application of contemporary research methods, skills and techniques
100	to conduct independent research works in all possible fields of Biosciences
	To recognize and appreciate the ideas of others, promote interdependence with
PO7	different fields, dissolve disagreements, harness cognitive ability, and resolve the
	conclusions in group settings
POS	To have the ability of understanding the issues of environmental contexts and
100	sustainable developments
	To promote the self responsibility towards the society with social concern,
PO9	sincerity, involved professionalism, dedication and volunteering in civic
	participation
PO10	To motivate the ability of engaging in independence and lifelong learning to
PO10	update the current scenario

BHARATHIAR UNIVERSITY: COIMBATORE 641 046 M. Sc. BIOCHEMISTRY (Affiliated colleges)

(For the students admitted during the academic year 2021 – 22 onwards)

Course	irse mul ful o		Hours			kimum M	larks
Code	Title of the Course	rse Credits		Practic al	CIA	ESE	Total
	ŀ	TIRST SE	MESTER		L		•
13A	Paper-I Biomolecular Chemistry	4	5	-	50	50	100
13B	Paper-II Analytical Biochemistry and Bioinformatics	4	5	- 66	50	50	100
13C	Paper III Enzymes and Enzyme Technology	4	4		50	50	100
13D	Paper-IV Cellular Biochemistry	4	4	ALL S	50	50	100
13E	Paper-V Plant Biochemistry and Biotechnology	4	4		50	50	100
	Practical-I Core Biochemistry Practical-I	See.	···?	5		-	
	Elective – Paper I	4	3	1-5	50	50	100
	Total	24	25	5	<mark>30</mark> 0	300	600
	SE	COND SI	EMESTEI	R		9	/
23A	Paper-VI Microbial Biochemistry	4	5		50	50	100
23B	Paper-VII Immunology	4	5	-581	50	50	100
23C	Paper-VIII Advanced Clinical Biochemistry	தப்பான UCATE T	oft 2_U) ELEVAT		50	50	100
23D	Paper-IX Molecular Biology	4	5	-	50	50	100
23P	Practical-I Core Biochemistry Practical I	4	-	5	50	50	100
	Elective-Paper II	4	5	-	50	50	100
	Summer Training and Industrial visit@	2			50		50
	Total	26	25	5	350	300	650
	Т	HIRD SE	MESTER				

22.1							
33A	A Paper-X Biostatistics and		5		50	50	100
	Research Methodology						
33B	Paper-XI Metabolism and	4	4	-	50	50	100
	Metabolic Regulation						
33C	Paper-XII Genetic	4	5	-	50	50	100
	Engineering						
33D	Paper-XIII Endocrinology	4	4	-	50	50	100
33E	Paper-XIV	4	5	-	50	50	100
	Pharmaceutical Chemistry	ఎదేర	ilo.e.				
	and Neurochemistry		an wall				
	Practical-II Core	-	-	4		1	_
	Biochemistry Practical-II			. %			
	Elective-Paper III	4	3		50	50	100
	77		-)L	-	
	Total	24	26	4	300	300	600
	FC	DURTH SI	EMESTE	R	191		
43P	Practical-II Core	4		5	50	50	100
	Biochemistry Practical-II	1200					
							200
43V	Project Work	8	20	J-R	100	100	200
43V	Project Work	8	20	5	100	100 9	200
43V	Project Work Elective-Practical/Project	8	20	5	100 50	100 50	200 * 100
43V	Project Work Elective-Practical/Project	8	20	5	50	100 50	200 * 100 *
43V	Project Work Elective-Practical/Project	8 4 Colim		5	100 50	100 50	200 * 100 *
43V	Project Work Elective-Practical/Project Total	8 4 16	20	5	100 50 200	100 50 200	200 * 100 * 400
43V	Project Work Elective-Practical/Project Total Grand Total	8 4 16 90	20 - 20 96	- 5 10 24	100 50 200	100 50 200	200 * 100 * 400 2250
43V	Project Work Elective-Practical/Project Total Grand Total	8 4 16 90 0NLINE (20 	5 10 24	100 50 200	100 50 200	200 * 100 * 400 2250
43V	Project Work Elective-Practical/Project Total Grand Total Grand Total	8 4 16 90 0 0 0 16 2 90 6 2	20 	- 5 10 24	100 50 200	100 50 200	200 * 100 * 400 2250 50
43V	Project Work Elective-Practical/Project Total Grand Total Swayam-MOOC-Online course	8 4 16 90 0 NLINE C 2	20 	- 5 10 24	100 50 200	100 50 200	200 * 100 * 400 2250 50
43V	Project Work Elective-Practical/Project Total Grand Total Swayam-MOOC-Online course VALUE	8 4 16 90 0 0 0 16 90 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	20 20 20 96 COURSES COURSES	- 5 10 24	100 50 200	100 50 200	200 * 100 * 400 2250 50
43V	Project Work Elective-Practical/Project Total Grand Total Swayam-MOOC-Online course VALUE	8 4 16 90 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	20 	5	100 50 200	100 50 200	200 * 100 * 400 2250 50
43V	Project Work Elective-Practical/Project Total Grand Total Swayam-MOOC-Online course VALUE Course-1(Optional)	8 4 16 90 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	20 20 20 96 COURSES	5	100 50 200	100 50 200	200 * 100 * 400 2250 50 50

* For Project report - 50%; Viva-voce - 50% [Assessment of Internal marks should be based on Monthly assessment and report by the concerned guide and HOD]

* Includes 50 / 50% continuous internal assessment marks for theory and practical papers respectively.

@ No University Examinations. Only Continuous Internal Assessment (CIA)

*Value added course (30-40hours)-extra 2 credits would be given (course is optional). The course is mandatory and shall be completed within third semester

*SWAYAM – MOOC – online course shall be of duration at least 4 weeks with at least 2 credits. The course shall be mandatory and shall be completed within third semester (i.e., before the beginning of fourth semester).

List of Group Elective papers (Colleges can choose any one of the Group papers as electives)

Paper	GROUP A	GROUP B	GROUP C
/ Sem	Elective - Cell Culture and	Elective - Computational	Elective – Nanoscience
	Molecular Techniques	Molecular Biology	S.
Ι	Plant Tissue Culture	Computational Molecular	Fundamentals of Nanoscale
		Biology	Science
II	Animal Tissue Culture	Genomics	Nanomaterials Synthesis
III	Methods in Molecular	Proteomics	Characterization and
	Biology	HIN WINK	Application of Nano
	2	WAR UN	Materials
IV	Elective Practical	Elective Practical	Elective Practical

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			SEMESTER – I PAPER I				
Cou	Course code 13A		BIOMOLECULAR CHEMISTRY	L	Т	Р	С
Core	e/Elective/	Supportive	Core	3	1	-	4
Pre	-reauisite		Basic knowledge in structure of	Syllab	ous	202	1-
	-requisite	, 	biomolecules	Versio	on	202	2
Cou	rse Objec	tives:					
The	main objec	ctives of this	course are:				
1.	This cour	se provides	an overview of the macromolecules that are key t	to all 1	living	syst	em.
	Topics covered include structure, properties and functions of polysaccharides, proteins, lipids						
	and nucleic acids.						
2.	This cours	se is to devel	op sufficient knowledge about higher order structur	es i.e.			
2	Polysacch	arides, prote	ins, lipids and nucleic acids.	1	1 1		л
3.	At the e	nd of this	course students will be able to obtain a keen	know	ledge	on	the
	characteri	zation of bic	logical macromolecules.				
F		0.4					
Expe		rse Outcom	es:				
On	the succes	stul complet	tion of the course, student will be able to:			170 17	
l	Knowled	ge on the co	nformational properties of biological proteins.			K2,K	.1
2	An in dej	oth <mark>understar</mark>	nding on the basic principles, mechanisms and			K2,K	3
	significat	nces <mark>of bio p</mark>	olysaccharides.				
3	Informati	ion about all	lipids and their biological significance.			K1K	3
4	Clear ide	a on the type	es, structure and biological functions of nucleic acid	s		K4,K	.5
5	Clear un	derstanding	on the characterization and nucleic acid recogn	ition b	oy 🖉	K5,K	4
	proteins a	and their rela	ated techniques.	9 /			
K1	- Rememb	oer; K2 - Un	d <mark>estand; K3 - Apply; K4 -</mark> Analyze; K5 - Evaluate;	K6- (Create	;	
		29	Combatore				
Uni	it:1		Polysaccharides		15	hou	irs
Poly	saccharide	es – occurre	nce, structure and biological functions of cellulos	e, chit	in, sta	arch	and
glyco	ogen. A br	ief account of	on chitin, fructans, arabinans and galactans.				
Occu	Irrence,	structure,	solation, purification, properties and biolog		funct	ions	of
Glue	opolysacci	lucone etr	cterial cell wall polysaccharides and blood	l gro ndroit	up a	antige foto	ens.
hena	rin Sialic	acid – stru	sture and significane proteoglycans. A brief account	int on	ni sui glyce	nrot	eins
and t	heir biolo	gical import	ance.	int on	gryce	prou	21115
Uni	it:2		Proteins		14	4 hou	irs
Orde	rs of prote	ein structure.	Primary structure - determination of amino acid se	quenc	e of p	rotei	ns.
The	peptide bo	ond. Second	ary structures – α -helix, β -sheet and β -turns. The R	Ramacl	nandr	an pl	ot,
Pauli	ing and C	orey model	for fibrous proteins. Reverse turns and super se	condar	y str	uctur	es.
Colla	agen triple	e helix Terti	ary structure – α and β domains. Conformational	prope	erties	01 S	IIK vin
allos	m. Quarte	mary struct	ne of proteins. The structure of naemogroun. Mode	218 10ľ	naem	ogiot)111
The Pauli Colla fibro allos	rs of prote peptide bo ing and C agen triple in. Quarte tery.	ond. Seconda orey model e helix Terti rnary structu	Primary structure – determination of amino acid seary structures – α -helix, β -sheet and β -turns. The F for fibrous proteins. Reverse turns and super seary structure – α and β domains. Conformational ure of proteins. The structure of haemoglobin. Mode	amacl condar prope ls for	e or p nandr y stru erties haem	an pl actur of s oglob	ns. ot, es. ilk oin

Un	nit:3	Lipids	14 hours			
Lipi	ds – Introc	luction, fate of dietary lipids, simple lipid, compound lipids a	nd derived lipids –			
stru	cture and fu	inctions.				
Fat	Fatty acids – saturated, unsaturated and hydroxy fatty acids. Phospholipids and glycolipids –					
stru	structure and functions.					
Pla L in	nt and anin	tion and antioxidants. Linoproteins classification and composition	sition			
Lip	iu peroxiu	and antioxidants. Expositionents – classification and composi-				
Un	it:4	Nucleic acids	15 hours			
Nuc	leic acids	DNA double helical structure – Watson and Crick model. A	, B and Z forms of			
DN	A. Triple a	nd quadruple structures. DNA supercoiling and linking number.	,			
Prop	perties of L	NA – buoyant density, viscosity, denaturation and renaturation	on – The cot curve –			
Che	mical synth	hesis of DNA. DNA binding motifs in proteins – the basic heli	x loop helix (bHLH)			
mot	if, zinc fing	of DNA mDNA DNA tDNA on DNA hn DNA of the transformed by the structure of the transformed by the transformed by the structure of the	ature and high-gigal			
func	or classes	of RNA – IIIRNA, IRNA, IRNA, IRNA, Sir RNA, III RNA – Stru binding motifs in proteins Molecular aspects of protein pu	clure and biological			
dire	ct interaction	Techniques characterizing nucleic acid-protein complex –	gel retardation assay			
DNa	ase I footpr	inting.	ger retardation assay,			
	·····					
Un	nit:5	Structural Biology	15 hours			
Prot	ein sequen	ces, Basic polypeptide stereochemistry, Protein structure det	ermination by X-ray			
crys	tallography	7. Principles of protein purification, crystallization,				
RN	A seconda	ry structure prediction and covariation analysis; RNA	secondary structure			
dete	rmination	methods, RNA structure determination and dynamics by X-1	ay and NMR, RNA			
dyna	amics studi	es by other biophysical methods.				
Stru	cture and c	rganisation of genomes; genome sequencing, assembly, annot	ation and functional			
geno Δrti	ficial intell	expression and its regulation.	ing analysis			
AIU		genee-introduction. At in structural prediction and protein fold	ing analysis.			
Un	nit:6	Contemporary Issues	2 hours			
Ex	pert lecture	s. online seminars— webinars	2 110 01 5			
	<u>r</u>	Total Lecture hours	75 hours			
Te	xt Book(s)	தைப்பாரை உயா				
1	Lehninger	Principles of Biochemistry (7 th edition). David L. Nelson; M	lichael M. Cox, WH			
	Freeman F	ublishers, 2017.				
2	Biochemis	try (4 th edition). Donald Voet, Judith G. Voet, John Wiley & So	ons, 2011			
3	Biochemis	try (9th Edition). J. M. Berg, J. L. Tymoczko and L. Str	yer, W.H. Freeman			
	Publishers, 2019					
4	4 P.Kaliraj,T.Devi,Higher Education for Industry4.0 and Transformation to Education5.0,2020					
Re	ference Bo	oks				
1	Textbook	of Structural Biology (2 nd edition). Anders Liljas. World Scien	tific, 2019.			
2	Nucleic ac	id structure and recognition. Neidle, Oxford University Press, 2	2002.			
l						
1						

Re	Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]					
1	https://nptel.ac.in/courses/102/105/102105034/					
2	https://www.mooc-list.com/course/biochemistry-biomolecules-methods-and-mechanisms- edx					

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO10
CO1	S	М	S	M	S	S	М	M	Μ	S
CO2	S	S	S	M	S	S	S	M	Μ	S
CO3	S	М	S	S	М	S	S	М	S	S
CO4	S	M	S	S	S	M	S	S	Μ	S
CO5	S	М	S	S	S	S	M	S	М	S



Cou	rse code	13B	SEMESTER – I PAPER-II ANALYTICAL BIOCHEMISTRY AND	L	Т	Р	С
			BIOINFORMATICS				_
Cor	e/Elective/	/Supportive	Core	3	1		4
Pré	e-reauisite	`	Basic knowledge in instrumentation	Syllab	ous	202	1-
	c-requisite	·	base knowledge in instrumentation	Versio	n	202	2
Cou	rse Objec	tives:					
The	main objec	ctives of this of	course are to:				
1.	At the end	d of this cours	e students will be able to have a basic understanding	ng of t	ne the	eoret	ical
	principles	involved in E	Bioinstrumentation				
2.	To have the	he practical sk	fills and techniques required in biochemical analysi	S			
3. 4	To becom	le competent i	n the basic experimental techniques of biochemistr	y cos to	han	dla	and
4.	ro gain	kilowiedge in	structure information search databases and Interpre-	t prote	nan sin st	ructu	anu
	compare s		structure information, scaren databases and interpre	<i>i</i> prot	JIII St	luctu	10.
Exn	ected Cou	rse Outcome	s.				
On	the succes	sful completi	on of the course, student will be able to have				
1	Detailed	information c	n the principles and applications of spectroscopic			K1.K	2
	technique	es and centrif	igation methods.			,	
2	Keen kno	owl <mark>edge on s</mark> e	paration of bioactive components by chromatograp	hic		K4.K	5
	and elect	roph <mark>oretic</mark> tec	hniques.			,	_
3	Overviev	v on charactei	ization of biomolecules by diffraction and radio]	K2,K	3
	chemical	methods.	a company of the		\mathcal{L}		
4	Thorough	h knowle <mark>dge (</mark>	on various applications and scopes of Bioinformatic	s.		K4,K	.3
5	In depth	understandi	ng of the concepts of biological databases and	their		K3,K	.6
	application	ons.	ALAR UN				
K1	- Rememb	oer; K2 - Und	erstand; K3 - <mark>Apply; K4 - A</mark> nalyze; K5 - Evaluate;	K6 –	Creat	te	
			Sel a sel				
Un	it:1		Spectroscopic Techniques		15	hou	irs
Basic principles, instrumentation and applications of UV, visible and IR spectrophotometers. Electron spin resonance, Nuclear Magnetic Resonance, Mass Spectrometry and its types. Flame Photometry – principles and applications. Centrifugation techniques: Principle and technique of preparative and analytical centrifugation, differential centrifugation, density gradient centrifugation, ultracentrifuge and its application.							
Un	it:2		Chromatographic Techniques		20) hou	Irs
Prina adso and Elec	ciple, tech orption chr HPTLC trophoresis	nnique and a omatography.	applications of paper, TLC, ion-exchange, mol Principle, components, limitations and application Principle and technique of paper, gels – SDS-PA	lecular ons of GE. H	siev GLC ligh	ve a ,HPI volta	nd JC .ge
and	uiscontinu	ous electroph	oresis. isoelectric locusing.				

Unit:3	Radio and Immunochemical Techniques	15 hours
X-rays, X-	ay diffraction, crystals and detectors - quantitative analysis and	applications. ORD
and circula	dichroism – principles and applications.	
Nature and	units of radioactivity. Radiochemical methods: basic concepts, co	unting methods and
application	autoradiography.	
Immunoch	emical techniques and its applications: RIA, ELISA, MIT, FISH.	
Unit:4	Basics of Bioinformatics	15 hours
Introductio	a: Objectives, Scope and Challenges of Bioinformatics. Connect	ing to Internet and
WWW. Se	rch Engines. Perl/Bioperl and their applications in Bioinformatic	s. NCBI and DNA
Sequence d	atabase (GenBank). Alignments: Pairwise (FASTA, BLAST) and	multiple alignments
(CLUSTAI	W/X). Phylogenetic analysis (PHYLIP and tree building tools).	and annlingting in
Artificial 1	cionces and future espects	and application in
Biological	ciences and Tuture aspects.	
Unit.5	Genome and Protein Database	13 hours
Genome D	atabases Protein Sequence (Swissprot/UniprotKB) and Structure	e (PDB) databases
Structure	prediction (Secondary and Tertiary). Protein Structure	visualization tools
(Rasmol/Py	mol). Genomics, Proteomics and transcriptomics. Protein expression	on profiling.
Unit:6	Contemporary Issues	2 hours
Expert lec	ures, online seminars – webinars	
	- Vernier Standard Street St.	
	Total Lecture hours	75 hours
	Section and the	
Text Boo		9
1 Princip	les and techniques of biochemistry and molecular biology (8th Edi	tion) Wilson
and W	alkers Cambridge University Press, 2018.	
2 Bioinf	rematics - concepts, skills and applications, 1st edition, S.C. Bastos	rietal CBS
2 Diolini publisi	ers 2003	,i et al., CDS
3 Introdu	ction to biginformatics 1st adition S Sundararajon D Dalaji Li	malva nublishing
5 Introdu	tet adition 2002	iliarya puolisiling
nouse,		F1 (* 50.0000
4 P.Kali	aj, I. Devi, Higher Education for Industry4.0 and Transformation to	Education5.0,2020
Reference	Books	
1 Analyt	cal biochemistry - D.J. Homie and H. Peck. Longman group	p – Rastogic CBS
publis	ers, 1st edition, 2003.	
2 Discov	ering genomics, proteomics and bioinformatics - Campbell, H	leyer, Cold Spring
Harbo	Laboratory Press, 2002	

Re	Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]							
1	https://nptel.ac.in/courses/102/103/102103044/							
2	https://swayam.gov.in/nd1_noc20_bt10/preview							
3	http://www.dypatil.edu/schools/biotech-and-bioinformatics/swayam-nptel-local-chapter/							
4	http://www.ncbi.nlm.nih.gov/genbank							

Mappi	Mapping with Programme Outcomes											
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10		
CO1	S	М	S	M	S	S	M	М	M	S		
CO2	S	S	S	S	S	S	S	М	S	S		
CO3	S	M	S	S	М	S	S	М	S	S		
CO4	S	S	S	S	S	M	S	S	M	S		
CO5	S	S	S	S	S	S	M	S	S	S		



			SEMESTER – I PAPER-III							
Course	e code	13C	ENZYMES AND ENZYME	L	Т	Р	С			
			TECHNOLOGY							
Core/E	Elective/	Supportive	Core	3	1	-	4			
Pre-r	eanisite		Basic knowledge in Enzymology	Syllab	ous	202	1-			
	equisite		Dusie mowiedge in Emzymology	Versio	on	202	2			
Course	e Object	tives:								
The ma	ain objec	ctives of this	course are to:							
1. Demonstrate an understanding of the kinetics of enzyme-catalysed reactions										
 Describe how enzymes can be used in the laboratory and industrially. Demonstrate an understanding of the mechanism of enzyme action 										
3. D	emonstr	ate an under	standing of the mechanism of enzyme action.	icad an		<i>.</i>				
4. De	emonstra	ate a critical	appreciation of the preparation and use of immoon	ised en	izyme	S				
Evnor	tad Can	rea Outaam								
On the		sful complet	ion of the course student will be able to:							
	c succes	ge on the ba	sic concept and recent advances in Enzyme studies			K 1				
$\frac{1}{2}$ I	n denth i	understandir	of current issues in enzyme catalysis antioxidant	s etc		$\frac{1}{1}$	3			
	3 Comprehensive understanding on enzyme kinetics and inhibition K2 K3									
	4 Knowledge on emplications of enzymes in various industries K4 K2									
4 N 5 C	loorido	ge on toobnig	use of immobilization and biosensors			K4,N V5 V	.5			
	Rememb	a on teening $\mathbf{K2} = \mathbf{Un}$	destand: K3 Apply: K4 Applyze: K5 - Evaluate:	K6 -	Creat	к <u>э</u> ,к				
K1 - 1	Kemenne)ci, K 2 - Oli	destand, KS - Appry, K4 - Anaryze, KS - Evaluate,	<u>K0</u> –	Cicat	~				
I Init•	1	2	Outline of Enzymes	3	10	hou	re			
Enzym	es- Intro	duction Cla	assification of enzymes Eactors affecting enzyme a	ctivity	Acti	ve si	te-			
Definit	tion: inv	vestigations	of active site structure. Trapping ES complex	use, use	of su	ibstra	ate			
analog	ues. Mo	dification by	y sing chemicals procedures, enzyme modification	by tre	eatme	nt w	ith			
proteas	ses, enz	yme modif	ication by site directed mutagenesis. Isoenzyn	ies, M	Iulti-0	enzyı	ne			
comple	ex.		SSULITON 2-WIPP							
Tin:te	2		EDUCATE TO ELEVATE		10	hav				
	<u> </u>	lucia covalo	ent entelysis Mechanisms of reaction entelyzed by	007330						
chymor	ase cata trynsim	Metal activ	ated enzymes & metalo Enzyme Role of metal id	ons in	mech	ozyn anisn	1e, 1 -			
carbon	ic anhy	drase, super	oxide dismutase, carboxy peptidase, Coenzymes	and	cofac	tors	in			
enzyme	e catalys	sed reaction.								
Unit:	3		Enzyme Kinetics		10	hou	Irs			
MM K	inetics, I	LB plot, Eac	lie - Hofstee plot and Hanes plot. Allosteric enzyme	es – Co	o-oper	ativi	ty,			
Hill ple	UI, K &	v series of	Enzyme. K & I states. BI substrate reaction. Co	ive ut	I, Sec	luent				
non-co	mpetitiv	e inhibitions	Allosteric inhibition and regulation.	ive, ul	icom	Juli	ν,			

Unit	:4	Enzymes and its Application	15 hours
Applic	cation of	f enzymes in industry; Industrial scale enzyme extraction	n, purification and
stabili	zation.	Industrial application of carbohydrases, proteolytic enzy	me, lignocellulose
degrad	ling enzy	me, pectin and pectic enzyme. Enzyme in animal nutrition.	
Non -	catalyti	c industrial proteins, Animal & microbial proteins. Sweet a	nd taste modifying
protein	ns. Applı	cation of enzymes in food Industry. Ribozyme, abzyme.	
Unit	.5	Immobilised Enzymes	13 hours
Immol	bilised or	vzymes. Techniques of immobilization and applications of imm	obilized enzyme
Role o	of enzym	es in diagnostic and therapeutic applications	ioomzeu enzyme.
Bioser	isors: ca	alorimetric biosensors: potentiometric biosensors: Ampero	metric biosensors:
immur	nosensor	5.	
Applic	cations of	Monoclonal antibodies.	
Unit	:6	2 hours	
Expe	rt lecture	s, onlin <mark>e seminars</mark> – webinars	
		Total Lecture hours	60 hours
Text	Book(s)		
1 M	Iolecular	Enzymology (Tertiary Level Biology) by Christopher W. What	rton; Springer 2013
2 E	nzymes:	Biochemistry, Biotechnology, Clinical Chemistry, Palmer	T. and Bonner P.
Н	lorwood i	Publishing Ltd., United Kingdom 2007.	
3 H	and bool	c of Enzyme technology 3rd edition – Weisman, Printice Hall.	
Refe	rence Bo	oks	
1 I	Fundame	ntals and Application of New Bioproduction Systems (Advan	ces in Biochemical
1	Engineer	ing/Biotechnology). An-Ping Zeng; Publisher: Springer 2016.	S
2 I	Enzyme	kinetics. A modern approach – Marangoni, John Wiley, 2002	
		Coimbatore Co	
Relat	ted Onli	ne Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1 1	https://np	otel.ac.in/courses/102/102/102102033/	
2 1	https://sv	vayam.gov.in/nd2_cec20_bt20/preview_unit	
	https://w	www.ebi.ac.uk/training/online/course/enzymes_uniprot	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	М	S	М	S	S	М	М	М	S
CO2	S	S	S	М	S	S	S	М	М	S
CO3	S	М	S	S	М	S	S	М	S	S
CO4	S	М	S	S	S	М	S	S	М	S
CO5	S	М	S	S	S	S	М	S	М	S

G	120	SEMESTER – I PAPER-IV	т	T	n	0			
Course co	ie ISD	CELLULAR BIOCHEMISTRY	L	I	P	C			
Core/Elec	ive/Supportive	Core	3	1	-	4			
Pre-reau	isite	Knowledge about Cell organelles and	Syllabı	IS	202	1-			
110 1040		their functions V	Versio	n	2022	2			
Course O	ojectives:								
The main of the ma	bjectives of this	course are to:							
1. Demo	nstrate an under	standing of the major types of living organisms and	tho ob	l. oroct	rictic	20			
2. Define of and	fundamental di	fferences in their body plans/organisation and function	ions	aracu	ensuc	28			
3. Demo	nstrate an under	standing of the various types of microfilaments and	micro	tubule	es.				
4. Demonstrate an understanding of the structures and functions of the major cell and tissue									
types of higher animals, particularly humans.									
5. Demonstrate an understanding of the cell cycle, its control through apoptosis, and explosion									
of cancer and its mechanism.									
Expected Course Outcomes:									
On the successful completion of the course, student will be able to:									
1 Disseminate knowledge about the chemistry and functions of cell membrane. K1,K2									
2 Unde	rstand about the	transport in cell membrane.			K2				
3 Know	vledge on the po	wer house of the cells.		1	K2,K	3			
4 Gain	knowledge on c	ell to cell signalling and interactions.	2		K3,K	4			
5 Brain	storming about	the programmed cell death and cancer cell propertie	es.		K4,K	5			
K1 - Rem	ember; K2 - Un	derstand; K3 - Apply; K4 - Analyze; K5 - Evaluate	; K6 –	Crea	te				
		Coimbatore							
Unit:1		Membrane Bilayers		10	hou	rs			
Membrane	bilayer - Model	s, Membrane lipids - fluidity, Asymmetry phase tran	nsition	, Lipo	osome	es.			
Membrane	proteins - Typ	es, Orientation, Mobility - Experiments, flippases	, prote	ens (or RE	SC vid			
anchored r	roteins Carbohy	drates - cell surface carbohydrates – Lectins.	r or p	otem	is, np	'nu			
Unit:2		Membrane Transports		15	hou	rs			
Membrane	transport - Ove	rview, Passive diffusion, Facilitated diffusion in ery	ythrocy	rtes, (Carrie	rs			
and Ion - C	channels. Ion co	ne. gradients. Uniporter Catalyzed transport. Active $x \in ATP$ for $B_{1} = B_{1} = B$	e transp	port s	ysten	1S.			
Gastric H+	K+ ATP ase. A'	P ases that transport peptides and drugs.	11 ase;	IVICCI	nams	.11,			
ABC supe	rfamily - Bacte	rial PM permeases, Mammalian MDR proteins:	Trans	port	proce	ess			
driven by	driven by light and ion gradients. Co-transport by Symporters and antiporters, Group								
translocati	on Osmosis and	Receptor mediated endocytosis.							

TT •4									
Unit	t:3	Mitochondrial System	10 hours						
Mitoc	chondria ·	- Reduction potentials, electron transport chain Overview, C	complexes, Q-cycle,						
Cyt.C	coxidase	complex, Translocation of Protons and the establishment of a p	roton, motive force,						
Mach	inery for	ATP formation. Chemi-osmotic mechanism, ATP Synt	thase Experiments,						
Inhibi	itors and	Uncouplers of oxidative phosphorylation. Microfilaments -	Actin – Structures,						
Assen	nbly, My	osin. Microtubules - Organisation and dynamics, Kinesin a	nd dynein. Striated						
muscl	le - struct	ure, excitation - contraction.							
			1						
Unit	t :4	Cell Matrix and Signaling	13 hours						
Cell -	matrix a	dhesion, metallo proteinase types and its importance. Cell-Cel	l, interaction:- ECM;						
Collag	gen, hyalı	ironan&proteolycans, laminin, integrins, adeponectin and fibro	onectins.						
Cell-C	Cell-Cell adjunction: Specialised junctions Desmosomes, Gap junctions, - Cadherins -								
Conne	exins. Cel	ll-Cell signaling - Signaling molecules and their receptors: func	ctions of cell surface						
recept	tors, path	ways of intracellular signal transduction, second messengers -	G -protein coupled						
recept	tors, recep	otor tyrosine kinases, Ras, MAP kinases, PEP-CK.							
.			401						
Unit	t:5	Subcellular Organelles and Cell Cycle	10 hours						
Subce	ellular org	anelles – structure and biochemical functions of ER, Lysosome	es, Chloroplast						
and G	olgi appa	ratus a second a s							
Cell C	Cycle: Ov	erv <mark>iew and it</mark> s phases. Regulation of cell cycle and regulatory p	o <mark>r</mark> oteins (Cyclins						
and C	CDKCs). S	Studies of frog oocyte maturation and the discovery of Cyclins.	Cell cycle control						
and cl	heck poin	ts i <mark>n ye</mark> st and mamalian cells.							
Unit	Unit:6 Contemporary Issues 2 hours								
Expert lectures, online seminars – webinars									
Expe	ert lecture	s, online seminars – webinars	2 hours						
Expe	ert lecture	s, online seminars – webinars	2 nours						
Expe	ert lecture	s, online seminars – webinars Total Lecture hours	60 hours						
Expe	ert lecture	s, online seminars – webinars Total Lecture hours	60 hours						
Expe	t Book(s)	s, online seminars – webinars Total Lecture hours	60 hours						
Expe	t Book(s)	s, online seminars – webinars Total Lecture hours call biology 8 th adition. Lodich. Bark et al. Ergeman and Co.	2 hours 60 hours						
Expe Text	t Book(s)	s, online seminars – webinars Total Lecture hours cell biology 8 th edition- Lodish, Berk et al., Freeman and Co.,	60 hours						
Expe	ert lecture t Book(s) Molecular	s, online seminars – webinars Total Lecture hours cell biology 8 th edition- Lodish, Berk et al., Freeman and Co., Biology of the Gene, 7 th edition, James D. Watson, A. Ba	2 hours 60 hours 2016 aker Tania, P. Bell						
Expe	t Book(s) Molecular Molecular	s, online seminars – webinars Total Lecture hours cell biology 8 th edition- Lodish, Berk et al., Freeman and Co., Biology of the Gene, 7 th edition, James D. Watson, A. Ba Gann Alexander, Levine Michael and Losick Richard, Pearson I	2 nours 60 hours 2016 aker Tania, P. Bell Education. 2017						
Expe	t Book(s) Molecular Molecular Stephen, C	s, online seminars – webinars Total Lecture hours Cell biology 8 th edition- Lodish, Berk et al., Freeman and Co., Biology of the Gene, 7 th edition, James D. Watson, A. Ba Gann Alexander, Levine Michael and Losick Richard, Pearson I	2 nours 60 hours 2016 aker Tania, P. Bell Education. 2017						
Expe	t Book(s) Molecular Molecular Stephen, C	s, online seminars – webinars Total Lecture hours Cell biology 8 th edition- Lodish, Berk et al., Freeman and Co., Biology of the Gene, 7 th edition, James D. Watson, A. Ba Jann Alexander, Levine Michael and Losick Richard, Pearson I Biology of the Cell, 6 th edition, Bruce Alberts, Alexander W. Nattar & Generary 2014	2 nours 60 hours 2016 aker Tania, P. Bell Education. 2017 D. Johnson, Julian						
Expe	t Book(s) Molecular Molecular Stephen, C Molecular Lewis, W.	s, online seminars – webinars Total Lecture hours Cell biology 8 th edition- Lodish, Berk et al., Freeman and Co., Biology of the Gene, 7 th edition, James D. Watson, A. Ba Gann Alexander, Levine Michael and Losick Richard, Pearson I Biology of the Cell, 6 th edition, Bruce Alberts, Alexander W. Norton & Company., 2014	2 nours 60 hours 2016 aker Tania, P. Bell Education. 2017 D. Johnson, Julian						
Expe	t Book(s) Molecular Molecular Stephen, C Molecular Lewis, W.	s, online seminars – webinars Total Lecture hours Cell biology 8 th edition- Lodish, Berk et al., Freeman and Co., Biology of the Gene, 7 th edition, James D. Watson, A. Ba Jann Alexander, Levine Michael and Losick Richard, Pearson I Biology of the Cell, 6 th edition, Bruce Alberts, Alexander W. Norton & Company., 2014	60 hours 2016 aker Tania, P. Bell Education. 2017 D. Johnson, Julian						
Expe	t Book(s) Molecular Molecular Molecular Lewis, W.	s, online seminars – webinars Total Lecture hours Cell biology 8 th edition- Lodish, Berk et al., Freeman and Co., Biology of the Gene, 7 th edition, James D. Watson, A. Ba Gann Alexander, Levine Michael and Losick Richard, Pearson I Biology of the Cell, 6 th edition, Bruce Alberts, Alexander W. Norton & Company., 2014 oks	60 hours 2016 aker Tania, P. Bell Education. 2017 D. Johnson, Julian						
Expe	t Book(s) Molecular Molecular Stephen, C Molecular Lewis, W.	s, online seminars – webinars Total Lecture hours Total Lecture hours cell biology 8 th edition- Lodish, Berk et al., Freeman and Co., Biology of the Gene, 7 th edition, James D. Watson, A. Bi Gann Alexander, Levine Michael and Losick Richard, Pearson I Biology of the Cell, 6 th edition, Bruce Alberts, Alexander W. Norton & Company., 2014 oks	60 hours 60 hours 2016 aker Tania, P. Bell Education. 2017 D. Johnson, Julian						
Expe Text	ert lecture t Book(s) Molecular Molecular Stephen, C Molecular Lewis, W.	s, online seminars – webinars Total Lecture hours Total Lecture hours cell biology 8 th edition- Lodish, Berk et al., Freeman and Co., Biology of the Gene, 7 th edition, James D. Watson, A. Ba Gann Alexander, Levine Michael and Losick Richard, Pearson I Biology of the Cell, 6 th edition, Bruce Alberts, Alexander W. Norton & Company., 2014 oks 8 th edition, Campbell, N.A. and Reece J.B., Pearson Benjam	60 hours 60 hours 2016 aker Tania, P. Bell Education. 2017 D. Johnson, Julian nin Cummings, San						
Expe Text 1 N 2 N S 3 N L Refe 1 E F	ert lecture ert lecture t Book(s) Molecular Molecular Stephen, C Molecular Lewis, W. erence Bo Biology, & Francisco	s, online seminars – webinars Total Lecture hours Total Lecture hours cell biology 8 th edition- Lodish, Berk et al., Freeman and Co., Biology of the Gene, 7 th edition, James D. Watson, A. Ba Sann Alexander, Levine Michael and Losick Richard, Pearson I Biology of the Cell, 6 th edition, Bruce Alberts, Alexander W. Norton & Company., 2014 oks 8 th edition, Campbell, N.A. and Reece J.B., Pearson Benjam 2008.	2016 aker Tania, P. Bell Education. 2017 D. Johnson, Julian						
Expe Text 1 N 2 N S 3 N L Refe 1 E F 2 R	t Book(s) Molecular Molecular Stephen, C Molecular Lewis, W. erence Bo Biology, 8 Francisco Raven Bio	s, online seminars – webinars Total Lecture hours Total Lecture hours Cell biology 8 th edition- Lodish, Berk et al., Freeman and Co., Biology of the Gene, 7 th edition, James D. Watson, A. Bi Gann Alexander, Levine Michael and Losick Richard, Pearson I Biology of the Cell, 6 th edition, Bruce Alberts, Alexander W. Norton & Company., 2014 oks 8 th edition, Campbell, N.A. and Reece J.B., Pearson Benjam 2008. logy, 12 th edition, Raven, P.H., Johnson, G.B., Mason, K.A.,	60 hours 60 hours 2016 aker Tania, P. Bell Education. 2017 D. Johnson, Julian in Cummings, San Losos, J., Singer, S.						
Expe Text 1 N 2 N S 3 N L Refe 1 E F 2 F N	ert lecture ert lecture t Book(s) Molecular Molecular Stephen, C Molecular Lewis, W. erence Bo Biology, 8 Francisco Raven Bio McGraw F	s, online seminars – webinars Total Lecture hours Total Lecture hours cell biology 8 th edition- Lodish, Berk et al., Freeman and Co., Biology of the Gene, 7 th edition, James D. Watson, A. Ba Gann Alexander, Levine Michael and Losick Richard, Pearson I Biology of the Cell, 6 th edition, Bruce Alberts, Alexander W. Norton & Company., 2014 oks 8 th edition, Campbell, N.A. and Reece J.B., Pearson Benjam 2008. logy, 12 th edition, Raven, P.H., Johnson, G.B., Mason, K.A., 1 Hill Education, St. Louis, 2018.	60 hours 60 hours 2016 aker Tania, P. Bell Education. 2017 D. Johnson, Julian hin Cummings, San Losos, J., Singer, S.						
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Expe Text	ert lecture ert lecture t Book(s) Molecular Molecular Stephen, C Molecular Lewis, W. erence Bo Biology, & Francisco Raven Bio McGraw H	s, online seminars – webinars Total Lecture hours Total Lecture hours cell biology 8 th edition- Lodish, Berk et al., Freeman and Co., Biology of the Gene, 7 th edition, James D. Watson, A. Ba Jann Alexander, Levine Michael and Losick Richard, Pearson I Biology of the Cell, 6 th edition, Bruce Alberts, Alexander W. Norton & Company., 2014 oks s th edition, Campbell, N.A. and Reece J.B., Pearson Benjam 2008. logy, 12 th edition, Raven, P.H., Johnson, G.B., Mason, K.A., 1 Hill Education, St. Louis. 2018.	60 hours 2016 aker Tania, P. Bell Education. 2017 D. Johnson, Julian hin Cummings, San Losos, J., Singer, S.						

Related Online Contents	[MOOC,	SWAYAM,	NPTEL,	Websites etc.]

- 1 <u>https://nptel.ac.in/courses/102/103/102103012/</u>
- 2 <u>https://swayam.gov.in/nd2_cec19_bt12/preview</u>
- 3 <u>https://www.edx.org/learn/cellular-biology</u>

Mappi	Mapping with Programme Outcomes											
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10		
CO1	S	М	М	M	S	S	М	М	М	S		
CO2	S	S	S	M	S	S	M	М	М	S		
CO3	S	М	S	М	М	S	M	М	S	S		
CO4	S	M	S	S	S	М	S	S	М	S		
CO5	S	S	S	S	S	S	М	S	М	S		



		SEMESTER - L PAPER-V		П							
Course co	le 13E	PLANT BIOCHEMISTRY AND	L	т	Р	С					
		BIOTECHNOLOGY			-	C					
Core/Elect	ive/Supportive	Core	3	1	-	4					
Due ne su		Basic facts about the biochemistry of	Syllabı	us	ıs 2021-						
Pre-requ	site	plants	Versio	n	202	2					
Course Ob	jectives:										
The main o	bjectives of this	s course are to:									
1. To obtain knowledge on production of transgenic plants.											
2. To un	derstand the fur	ctions and regulations of major biosynthetic pathw	ays of p	olant	ts.						
3. To be	come familiar w	with the exciting topics in plant biology research.									
Expected	Course Outcon	nes:									
On the su	ccessful comple	tion of the course, student will be able to:		- 1							
1 Unde	rstand about	the photosystem of plants and chemical synth	iesis o	f	K1,K	12					
photo	phosphorylatio	n.									
2 Analysis cognizant of different types of plants based on their carbon K4,K3											
absorption.											
3 Gain	3Gain basic knowledge about nitrogen and sulphur metabolism.K2,K6										
4 Over	view of Stru <mark>ctu</mark>	al organization of plant genome.			K2						
5 Clean	idea about the	plant organelle development.	10		K2,K	.5					
K1 - Rem	ember; K2 - Ur	iderstand; K3 - Apply; K4 - Analyze; <mark>K5 - E</mark> valuat	e; K6 –	Cre	eate						
N.	9	HIAD INNY 25		£5							
Unit:1	05	Photo System		1	l0 hou	irs					
Photosynth	esis – photos	nthetic appara <mark>tus; organisat</mark> ion of thylakoid; r	ole of	chl	lorphy	lls,					
carotenoid	and other phot	osynthetic pigments; light absorption and energy c	onserva	atior	n. Ligh	t –					
properties	of both particle	and wave; light absorbed by pigment molecules	; the rea	actio	on cen	tre					
ΔTP synth	ne photo syste	ens I and II. Electron transport pathways in chic	ropiasi	me	moran	es.					
TTT Synth		ists, cyclic and noncyclic photophosphorylation.									
Unit:2		Plant Metabolism			10 hou	irs					
Carbon re	actions in C3	, C4 and CAM plants - Calvin cycle; Ha	tch-Sla	ck	pathwa	ay.					
Photorespi	ation: role of p	hotorespiration in plants; biochemical basis of PR	pathway	y – (Č2 cyc	le;					
pathways o	f glucose oxida	tion in plants; starch biosynthesis and degradation;	metabo	olic	transp	ort					
between of	ganelles; Over	view of lipid and protein metabolism in plants;	biolum	ines	scence	in					
Gonyaulax	Gonyaulax										
Unit:3		Plants and Nitrogen Cycle		1	l0 hou	irs					
Nitrogen f	xation – svmb	iotic and non-symbiotic. Symbiotic nitrogen fixa	tion in	leg	umes	by					
Rhizobia -	biochemistry a	and molecular biology of nitrogen fixation – enzy	mology	y of	nitrog	gen					

fixation; Nitrogen metabolism - Nitrate and ammonium assimilation, regulation of nif and nod genes of nitrogen fixation. Interaction between nitrate assimilation and carbon metabolism. Sulphur chemistry and functions; reductive sulfate assimilation pathway. Synthesis and function of glutathione and its derivatives.

U	nit:4	Plant Genomics	15 hours							
Stru	ucture of	plant genes. Organisation of plant chromatin. The nuclea	r, chloroplast and							
mit	ochondrial	genomes. Interaction between nuclear and organellar genom	ne. Biosynthesis of							
org	organelles – development of chloroplast and plastids. Gene transfer to plants; Agrobacterium									
mee	mediated transformation – 11 plasmids. Ri plasmids. Direct DNA transfer to plants – protoplast									
tran	transformation. Plant viruses as vectors – CaMV, Gemini viruses, RNA viruses (TMV, potato									
VIII	virus X) as vectors. Advantages and uses of transgenic plants.									
T I.	-:+.5	Plant Call and Tiggue Culture	12 hours							
		Hant Cell and Hissue Culture	13 nours							
Plai Mic	Micropropagation: some culture. The sub-culture media – composition and preparation.									
nro	toplasts Pi	cotoplast fusion: genetic modification of protoplasts. Anther	nollen and overv							
cult	ture for pr	oduction of haploid plants and homozygous lines. Uses of	haploids in plant							
bree	eding. Sele	ction of hybrid cells and regeneration of hybrid plants, cybrids.	Uses of plant tissue							
cult	ture.		F							
U	nit:6	Contemporary Issues	2 hours							
Ex	pert lecture	es, online seminars – webinars								
	and the second state of th									
		Total Lecture hours	60 hours							
Те	ext Book(s)		9							
1	Plant Phys	siology and Development – Taiz, L., Zeiger, E., Moller, I.M., N	Iurphy, A., Sinclair							
	Associates	s. 2015.								
2	Plant Biot	echnology The Genetic Manipulation of Plants, Slater A. S.	cott NW Fowler							
2	M R O v f	ard University Press, 2016	.ou, 11. W., Powier,							
		The Oniversity (1953, 2010.								
3	Lehninger	Principles of Biochemistry (7 th edition). David L. Nelson; M	ichael M. Cox, WH							
	Freeman I	Publishers, 2017. EDUCATE TO THE SUME								
		SAILE TO ELEV								
Re	eference Bo	ooks								
1	Plant Bioc	hemistry and Molecular Biology, Lea, P.J. and Leagood, R.C. J	ohn Wiley and Sons							
	Ltd., New	Jersey, 1999.								
2	Plants, ger	nes and crop biotechnology 2nd edition – Chrispeels et al., Jone	s and Bartlett, 2002							
Re	elated Onli	ne Contents [MOOC, SWAYAM, NPTEL, Websites etc.]								
1	https://n	otel.ac.in/courses/102/103/102103016/								
2	https://sv	vayam.gov.in/nd2_cec20_bt01/preview								

Mapping with Programme Outcomes											
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	
CO1	S	М	М	М	S	S	М	М	М	S	
CO2	S	S	S	М	S	S	S	М	М	S	
CO3	S	М	S	S	M	S	S	М	S	S	
CO 4	S	М	М	S	S	Μ	М	S	М	S	
CO5	S	M	М	М	M	S	М	S	M	S	





		1								
Cou	rse code	23A	SEMESTER – II PAPER VI MICROBIAL BIOCHEMISTRY	L	Т	Р	С			
Core	e/Elective/	Supportive	Core	3	1	-	4			
Pre	e-requisite		Fundamentals of microbial techniques	Syllabu Fundamentals of microbial techniques Version						
Cou	rse Objec	tives:								
The	main objeo	ctives of this	course are to:							
1. U	nderstand	the basic prin	ciples of metabolic processes within the cell.							
2. G	ain theoret	ical knowled	ge about the fermentation techniques and the synthe	esis of	interr	nedi	ary			
com	ponents.									
3. A	cquire theo	oretical <mark>know</mark>	ledge on bio process technology.							
4. G	ain insight	on microbial	production of fermented products.							
5. O	btain know	vledge on the	in vitro cultivation of cells.							
		-2	1/1/ Merk Man P							
Exp	ected Cou	rs <mark>e Outcom</mark> e								
On	the succes	sf <mark>ul comple</mark> ti	on of th <mark>e course</mark> , student will be able to:		N					
1	Understa	nd <mark>the basic</mark> J	principles of metabolic processes within the cell		K	(1, K	2			
	Theoretic	cal knowledg	e about the fermentation techniques and the synthes	sis of	K	K2, K3				
2	intermed	iary compone	ents.		n					
3	Knowled	lge on bio pro	ocess technology.	9	K	(4, K	.5			
4	Insight o	n microbial p	roduction of fermented products.		K	5, K	6			
5	Knowled	ge on the in v	vitro cultivation of cells.		K	(3, K	5			
K1	- Rememb	oer; K2 - Unc	erstand; K3 - Apply; K4 - Analyze; K5 - Evaluate:	; K6 –	Creat	e				
			Souther Street							
Un	it:1		Microbial Growth And Metabolism		15	hou	irs			
Tran	sport of s	sugars into l	pacterial cell - the bacterial phosphotransferase	syste	m. G	rowt	h –			
bala	nced and u	inbalanced; r	neasurement of growth; continuous culture, fed ba	atch cı	ulture;	gro	wth			
and	environme	ent; growth c	ycle of bacterial culture; growth of single cells -	- cell	cycle.	Ene	ergy			
yield	ling meta	ıbolism – o	carbohydrates – EMP, HMP, TCA – impor	tance	in	bacte	eria.			
Phos	phoketola	se pathway, I	ED pathway, characteristics of electron transport in	bacter	ia					
		1								
Un	it:2		Fermentations		15	5 hou	I rs			
Fern	nentations:	alcoholic fe	rmentation, propionic acid, formic acid, butyric a	icid ar	nd lac	tic a	cid			
ferm	entation;	oxidation of	aliphatic and aromatic hydrocarbons; metabolism	of on	e carb	on a	ind			
two	carbon co	ompounds. A	mino acid biosynthesis; biosynthesis of cell wal	ll – p	eptido	oglyc	an,			

teichoic acid, lipids; biosynthesis of straight and branched chain fatty acids, unsaturated fatty									
acids and cyclopropane fatty acids. Synthesis of triacylglycerols, phospholipids, glycolipids and									
polyisoprenoids. Metabolism of purines and pyrimidines									
Uı	nit:3	Bioprocess technology	13 hours						
Bioprocess technology – screening for industrially important microbes, strain improvement for									
bett	er yield; de	sign of fermenter- parts of the fermenter and their functions; ty	pes of fermentation						
pro	cesses. Ana	lysis of batch and continuous bioreactions; stability of microb	bial reactors; Tower						
ferr	nenter; air	lift fermenter; specialized bioreactors; solid substrate ferme	entation and media						
forr	nulation. In	ocula prepation; Recovery and purification of products; monito	ring of downstream						
pro	cessing.								
		തരായന്നുകും							
Uı	nit:4	Microbial products	15 hours						
Mic	robial proc	lucts – production of organic acids – source, production of	microbial process,						
reco	overy and a	pplications. Production of organic acids – source, recovery an	d uses of citric acid						
and	lactic acid	. Production of antibiotics – source, production, recovery and	d uses of penicillin,						
tetra	acycline, ar	noxicillin. Production of bioinsecticides from bacteria and f	ungi; production of						
bac	terial and fu	ingal polysaccharides; commercial production of xanthan gum.							
U	nit:5	Infections and microbes	15 hours						
Pat	hophysiolo	gy of Infectious microbes (Biochemical and Molecular triger	ring). Bacteria- TB,						
UT	. Virus- S	wine flu, Ebola, Fungus- Candidiasis, Aflatoxicosis, Parasi	te- Malaria, Dengu.						
Мо	difications	of host metabolism by viral and bacterial pathogens. Endo	crine and metabolic						
asp	ects of the C	COVID-19 pandemic.	9						
I			5						
		San Allan and S							
		Contemporary Issues							
Ex	pert lecture	s, online seminars – webinars	2 hours						
		S An Inspire							
		SCILITION Total Lecture hours	75 hours						
		COUCATE TO ELEVATE							
Te	xt Book(s)								
1	Microbial	biotechnology – Alexander et al., -W.H. Freeman Publishers, 1	995						
2	Biology of	f microorgansisms – Madigan <i>et al.</i> , - Printice Hall, 2002							
3	Biochemis	try of bacterial growth – Mandelstram, Blackwell Scientific Pu	blishers						
4	Principles 1995	of fermentation technology 2nd edition - Stanbury et al., P	ergamon Publishers,						
5	Concepts i	n biotechnology – Balasubramanian et al., Universities Press (1	India) Ltd., 2004						
	1								

Re	eference Books
1	Basic biotechnology 2nd edition – Ratledge, Kristiansen Cambridge University Press, 2001
2	Elements of biotechnology – Gupta, Rastogi Publication, 1998
3	Bioprocess engineering – basic concepts 2nd editon – Schuler, Karg, Printice Hall, 2001
Re	elated Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1	https://onlinecourses.swayam2.ac.in/cec20_ag09/preview
2	https://onlinecourses.swayam2.ac.in/cec20_bt14/preview

Марріі	Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO10	
CO1	S	M	M	S	S	S	M	S	S	S	
CO2	S	M	M	S	S	S	М	S	M	S	
CO3	S	M	S	S	S	S	М	S	М	S	
CO4	S	M	S	S	S	S	М	S	М	S	
CO5	S S	M	S	S	S	S	М	S	М	S	
			R	1	Charles .	POLK.					

*S-Strong; M-Medium; L-Low

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Cour	se code	23B	SEMESTER – II PAPER – VII IMMUNOLOGY	L	Т	Р	С
Core	/Elective/	/Supportive	Core	3	1	-	4
Pre-	-requisite	2	Fundamentals of Immune system	Syllab Versic	us)n	202 202	21- 22
Cour	se Objec	tives:					
The n	nain obje	ctives of this	course are				
1. Ke	y knowle	dge about the	lymphoid organs and their products.				
2. Im	prove the	development	of antibodies and their detection.				
3. Un	derstandi	ng about the j	immune cell receptors.				
4. Sig	gnificant k	knowledge de	velopment in over expression of immune system.				
5. De	tailed stu	dy on th <mark>e im</mark> n	nunological disorders of life threatening diseases.				
		7.5					
Expe	cted Cou	irse Out <mark>come</mark>					
On t	the succes	ssfu <mark>l completi</mark>	on of the course, student will be able to:				
1	Gain tho	rou <mark>gh knowle</mark>	dge on the immune cells.		K2, K1		
2	Understa	nd <mark>abo</mark> ut Ag	and Abs interactions and their expression.			K2, K	3
3	Pathway understo	of i <mark>mmunolo</mark> od.	gical reactions using complement system was			K2,K	4
4	Develop	knowledge o	n the cytotoxic assay and vaccine production.			K2, K	5
5	Attain kr	nowledge <mark>on i</mark>	nvestigation of life threatening diseases.	2110		K5, K	36
K1 -	- Rememl	oer; K2 - Und	erstand; K3 - Apply; K4 - Analyze; K5 - Evaluate	; K6 –	Cr	eate	
		200	ARUNAR				
Unit	t:1		Immune system			10 hou	urs
Histo Exper assay haem	ory of Im rimental A c. Cells of atorpoies	munology an Animal Mode the immune is, clinical use	d Immune system.Primary and Secondary lympho els: inbred strains, SCID mice, nude, knockout mic system: haematopoiesis. haematopoietic growth fa es of stem cells. Leucopoiesis	oid org ce. hen actors.	ans nol Re	and c ytic pla gulatio	ells. aque n of
Unit	t:2		Immunoglobulins			15 hou	urs
Antig adjuv detern applic immu	gens : Fac yant tech minants o cations. I moglobul	tor influencin nology; Imn on lmmunoglo Immunoglobu in genes. MI MHC and it	g immunogencity B cell epitopes, T cell epitopes, nunoglobulins: domains classes and biological obulins. Immunoglobulins superfamily, Monoclona ilin genes - Multigene family, antibody diver HC: Organization, MHC molecules and genes, C	Hapter ly act al Anti sity, o Cellula	ns : ive boc exp r d	Mitog antig lies an ression istribut	enic d its 1 of tion, and
prese	ntation.	ivitic allu ll	minune responsiveness. Mine and disease. And	gen pi	.000	essing	anu

Un	it:3	Complement Activation	15 hours						
Con	nplement A	ctivation: Pathways, regulation of complement system, Biolog	gical consequence of						
complement activation, complement deficiencies. Cytokines: IL, IFN, TNF, CSF, Cytokine,									
rece	receptors, Cytokine antagonists, Cytokines related diseases. B&T cell maturation, activation,								
pioi	promeration & differentiation. Nutritional influences on minimulogementy.								
Un	it:4	Hypersensitivity reactions	16 hours						
Нур	ersensitivi	y reactions - Type I, II, III & IV. Hypersensitivity dise	ase. Cell mediated						
imm	nunity: CTI	L mediated cytotoxicity, NK cell mediated toxicity. Delayed ty	pe hypersensitivity.						
Imn	nunological	tolerance. Vaccines: Active and passive immunization, whole	organism vaccines,						
reco	ombinant v	ector vaccines, DNA va <mark>ccines, Synthe</mark> tic peptide vaccines, m	ultivalent sub-units						
vaco	cines. Imm	unodeficiency diseases.							
	•. =	600000000000							
Un	ilt:5	Autoimmunity	I' hours						
Au	immunity	Thereasy Transplantation immunology aligned manifestation	there and here						
mar	row transp	ants, organ transplants, Cancer immunology, Tumor antigans	immune response to						
tum	ors tumor	evasion Cancer immuno therapy AIDS: Structure of HIV d	estruction of T cells						
imm	unological	symptoms of AIDS AIDS vaccine gene therapy for treatment	struction of 1 cens,						
	lunologicu	symptoms of 7 mbs. 7 mbs vacenie, gene morapy for a cannent							
1									
		Contemporary Issues							
Ex	pert lecture	es, online seminars — webinars	2 hours						
		Total Lecture hours	75 hours						
Te	xt Book(s)		9						
1	Kuby imm	nunology 4th edition – Goldsby <i>et al.</i> , Freeman and Co. 2013	5						
2	Immunolo	gy V-The im <mark>mune system in health and disease. Jane</mark> way Jr.Pa	ul Travels and Co.,						
	2001	29							
3	Immunolo	gy 3rd edition – Roitt et al., Mosby publishers 2001							
4	Immunolo	gy 4th edition - Zubay, W.M.C. Brown publishers, 1992							
5	Textbook	of Immunology-A Paul 2018 - II 6070							
		SOCATE TO ELEVAT							
Re	ference Ro	noks							
1	Cellulor	and molecular immunology and edition Abbas at al. W.D. Sour	ders 2000						
1		The molecular minimulology 2nd cultion Abbas et al., W.D.Sauli	ucis 2000						
2	Cellular a	and Molecular Immunology 7 th Edition,Abul K,2011							
3	Introduct	ion to Medical immunology 4th edition, Virella, Marcel Dekke	r Ltd., 1999						
Re	lated Onli	ne Contents [MOOC, SWAYAM, NPTEL, Websites etc.]							
1	https://or	linecourses notel ac in/noc20 bt43/preview							
1	<u>maps.//or</u>	inneeourses.inpretide:in/inoezo_bt+5/preview							

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO10
CO1	S	S	Μ	М	М	S	М	М	S	S
CO3	S	S	S	S	Μ	S	S	М	S	S
CO3	S	S	M	M	Μ	S	М	М	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S



		SEMESTER – II PAPER – VIII								
Course code	23C	ADVANCED CLINICAL	L	Т	Р	С				
		BIOCHEMISTRY								
Core/Elective	/Supportive	Core	3	1	-	4				
Duo uoquisito			Syllab	us	202	l-				
Fundamentals of Clinical Biochemistry Version 20										
Course Objectives:										
The main obje	ctives of this	course are to:								
1.Understand t	he physiologi	cal and clinical importance of Hb and its disorders	••							
2. Gain detaile	ed knowledge	on the biological sample collection and its interpre-	etation							
3. Understand	the impo <mark>rtanc</mark>	e of enzymes in diagnosis of diseases.								
4. Obtain clini	ical Knowled	ge on physiological organs and its related disordes.								
5. Have an dep	pth idea on or	cologic aspects and anti- oxidants.								
Expected Cou	rse <mark>Outcome</mark>	es:								
On the succes	ssfu <mark>l co</mark> mpleti	on of the course, student will be able to:								
1 Understa	nd the physic	plogical and clinical importance of Hb and its disor	ders		K	2				
2 Gain deta	ailed knowled	lge on the biological sample collection and its inter	pretati	on.	K	2				
3 Understa	nd the import	ance of enzymes in diagnosis of diseases			K	2				
4 Acquire	clinical k <mark>now</mark>	ledge on physiological organs and its related disord	ders.	Λ	K	3				
5 Obtain ir	n depth id <mark>ea o</mark>	n oncologic aspects and anti oxidants.	a l		K	1				
K1 - Rememl	oer; K2 - Und	erstand; K3 - Apply; K4 - Analyze; K5 - Evaluate	; K6 –	Creat	te					
	29	Cointerton								
Unit:1	10	Specimen collection and processing		15	hou	rs				
Specimen colle	ection and pr	ocessing:- Collection of blood vein puncture, coll	ection	with	syrir	ige,				
collection with	n evacuated to	ube, skin puncture, arterial puncture and anticoagu	ulants.	Colle	ectior	of				
urine:- Timed	urine speci	mens, urine preservatives. Test for urinary co	ompou	nds.	Clin	ical				
significance of	f urinary con	ponents with reference to sugars, proteins, ketor	ne boo	dies,	biliru	bin				
and porphyrins	s. CSF:- Con	position and collection ,chemical examination an	nd infe	ction	s, spi	nal				
cord infections	. Amniotic fl	uid:- Origin, collection, composition and analysis c	of amni	otic f	luid.					
Artificial intell	ligence and M	lachine learning in maintaining electronic health re	cord d	ata.						
Unit:2		Serology and hematology		13	8 hou	rs				
Serology and	hematology	:- C- reactive protein test, immunological t	test fo	r pre	egnar	cy.				
Rheumatoid and	rthritis (RA)	test. ESR., Coagulation test, Prothrombin test. H	lemogl	obin:	Nor	nal				
and abnormal	Hb, Separa	tion of hemoglobin. Thalasemia, Hemoglobinop	pathies	. Ery	throc	yte				
metabolic path	ways, Disord	ers of erythrocyte metabolic pathways,. Porphyrins	and p	orphy	rias.					

Unit:3	Clinical Enzymology And Endocrinology	15 hours						
Clinical en	zymology and endocrinology:- Principles of diagnostic enzymology	y - Factors affecting						
enzyme le	vels in blood. Principle, assay, and clinical significance of tran	saminases, creatine						
kinase, lac	ate, Dehydrogenase, phosphatases, isocitrate dehydrogenase, 5'nuc	eleotidase, gamma –						
glutamyl	ransferase, amylase, lipase, trypsin, chymotrypsin, choline	esterase, glutamate						
diseases	diseases: Myocardial infarction hepatobiliary diseases. Overview of clinical significance of							
steroid pro	steroid protein and thyroid hormones (Experimental details not required)							
steroid, pre	tem und myrote normones. (Experimental details not required).							
Unit:4	Liver Function Test And Related Disorders	12 hours						
Liver funct	ion test and related disorders:-Jaundice ,cirrhosis, hepatitis, fatty li	iver and gall stones.						
Renal func	ion test and related disorder:- Acute renal failure.glomerular disea	ase,tubular diseases,						
analysis of	urinary calculi. Gastric and pancreatic function test. Hyper and hy	po lipoproteinemias						
and diagno	stic test for lipoprotein disorders.							
Unit:5	Oncology	17 hours						
Oncology:	Definition and types of Cancer (Carcinoma, sarcoma, melanor	na etc). Prevalent						
cancers: C	lorectal, Lung, Breast and Blood cancers, Properties of cancer ce	lls. Genetic basis of						
cancer: Or	cogenes, Antioncogens and Tumor suppressor genes, Viral onco	genes. Carcinogens						
and terator	ens. Molecular diagnosis of Cancer: PCR and RFLP based metho	ds. Tumor Markers						
such as CA	125 CEA AFP HCG Triple (FR/PR/HER2) negative breast can	cer markers BRAC						
genes Ster	Cell Banking	cor markers, Diarc						
Free radio	is in diseases. Introduction Types of free radicals Free r	adical induced linid						
nerovidatio	n and antioxidants (Enzymic - SOD Glutathione peroxidase G	lutathione reductase:						
Non Enzyr	in and antioxidants (Enzymic – SOD, Oldtathone peroxidase, O	initiatinone reductase,						
NOII EIIZ YI	ine-Ascolole acid, Tocopherol, Reduced Oldiatilione.	ŝ						
1	Sol HIAD UNIT IS							
	Contemporary Issues							
Expert lea	tures, online seminars – webin <mark>ars</mark>	2 hours						
	a gran in the second se							
	EDuo Total Lecture hours	75 hours						
	CATE TO ALEVON							
Text Boo	κ (s)							
1 Fund	amentals of Clinical Chemistry – Teitz, W.B.Saunders company, 20)14						
2 Clinic	l chemistry in diagnosis and treatment 6th edition – Mayne, ELBS	Publications, 1994						
3 Pract	cal clinical biochemistry, volume I and II, 5th edition - Varley et.a	ul., CBS Publishers,						
1980								
4 Teitz	text book of clinical biochemistry 3rd edition – Burtis et al., Willia	m Heinmann						
medi	al books, Ltd., 1999							

Re	eference Books
1	Clinical biochemistry – Metabolic and clinical aspects, Pearson Professional Ltd.1995
2	Clinical chemistry 5th edition – Mosby, Marshall, 2004
3	Harrison's Principles of internal medicine Vol. I and II. 14th edition, McGraw Hill 2012
4	Clinical Biochemistry-Allan GAW Michael J,an illustrated Colour Text,5 th Edition,2013
Re	elated Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1	https://onlinecourses.swayam2.ac.in/cec20_ago1/preview
2	https://onlinecourses.swayam2.ac.in/sc01_ago1/preview

Mappi	Mapping with Programme Outcomes									
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	-S	M	S	М	S	S	S
CO2	S	М	S	S	S	М	М	S	S	S
CO3	S	М	М	М	S	S	М	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S
			1 Nor	, Leas	2000	7		7.		

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*S-Strong; M-Medium; L-Low

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Course code	23D	SEMESTER – II PAPER-IX MOLECULAR BIOLOGY	L	Т	Р	С			
Core/Elective	e/Supportive	Core	3	1	-	4			
Pre-requisit	te	B <mark>asics of Molec</mark> ular Biology	Syllabus Molecular Biology Version						
Course Objectives:									
The main obj	ectives of this	course are to:							
1. Gain know	ledge on struc	tural organization of eukaryotic chromosomes.							
2. Understand	l the mol <mark>ecula</mark>	mechanism of replication of recombination.							
3. Have know	vledge about t	ne eukaryotic and prokaryotic transcription process	•						
4. Obtain kno	wledge re <mark>gard</mark>	ing RNA processing and regulation.							
5. Understand	l abo <mark>ut the trar</mark>	scriptional processing units							
	45								
Expected Co	urse <mark>Outcom</mark>								
On the succe	essfu <mark>l co</mark> mpleti	on of the course, student will be able to:							
1 Obtain 1	knowledge on	structural organization of eukaryotic chromosomes	÷.	K	(2,K)	l			
2 Underst	and the molec	ular mechanism of replication and recombination		K	2, K	4			
3 Gain ki	nowledge <mark>abou</mark>	i <mark>t the eukaryotic and prokaryo</mark> tic transcription proc	ess.	K	K2, K4				
4 Obtain	knowledge re	garding RNA processing and regulation.	5	K	K2, K	4			
5 Undersa	and about the t	ranscriptional processing units		K	K1, K	2			
K1 - Remen	ber; K2 - Unc	lerstand; K3 - Apply; K4 - Analyze; K5 - Evaluate	; K6 –	Creat	te				
	19	Colimbatore							
Unit:1	Molec	ular Structure Of Genes And Chromosomes		15	hou	Irs			
Molecular str	ucture of gene	s and chromosomes; molecular definition of gene	– pro a	ind eu	kary	otic			
transcription	units. Chromo	somal organization of genes and non-coding DN	IA – p	oroteir		ling			
genes. Tande	emly repeated	genes, single sequence DNA. Mobile DNA	– mot	oile e	leme	nts.			
Bacterial in	sertion sequ	ence, bacterial transposons, viral retrotran	sposon	is, r	non-v	riral			
retrotranspose	ons. Structura	l organization of eukaryotic chromosomes -	- hist	one	prote	ins,			
chromatin. Fu	inctional elem	ents of eukaryotic chromosomes. Mutations – types	5.						
Linit.?		DNA replication		1/	l hou	re			
DNA replicat	ion repair an	d recombination. General features of chromosom	al renli	cation		JA			
replication ma	achinery – euk	arvotes and prokarvotes. Role of topoisomerases	n DN/	A repl	icatio	on.			
DNA damage	and repair –	all types. Recombination – Holliday model. Rec B	CD en	zyme	, Rec	A			
protein, Mess	elson model, s	ite specific recombination		5	,				
		-							

U	nit:3 Prokaryotic transcription	18 hours							
Prokaryotic transcription - initiation, elongation and termination (rho dependent and rho									
independent). Lac operon and trp operon. Transcriptional control of gene expression. Overview									
ofe	of eukaryotic gene control and RNA polymerases. Regulatory sequences in protein coding genes								
-1	ATA box, initiators, proximal elements, distant enhancer sites. Transo	cription initiation by							
KIN Mit	a polymerase II, I and III. Regulation of transcription – factor contraction of the specific RN	A nolymerases							
IVIII	benonunar and emotoprast DIVA – transcription by organene speerre Kiv	A porymerases							
U	nit:4 Post RNA transcriptional gene control	13 hours							
Pos	t RNA transcriptional gene control. Processing of eukaryotic pre mRNA	, hnRNA proteins, Si							
RN	A, RNA binding motifs, splicing, snRNA, spliceosome. RNA edit	ing, macromolecular							
tran	sport across the nuclear envelope. Nuclear pore complex, cytoplasi	nic polyadenylation,							
deg	radation of mRNA, regulation of processing of rRNA and tRNA								
U	nit:5 Genetic code	13 hours							
Ge	netic code – wobble hypothesis. Protein sorting and targeting of mitocho	ndria and chloroplast							
pro	teins. Synthesis and targeting of peroxisomal proteins. Overview of	secretory pathway.							
Tra	nslocation of secretory products across ER membrane. Insertion of	of proteins into ER							
mei	nbrane. Posttr <mark>anslational modification – protein glycosylation in ER</mark>	and Golgi complex.							
Rec	eptor mediated endocytosis.								
E	Contemporary issues	21							
EX	pert lectures, online seminars – webinars	2 nours							
	a lotar Lecture nours	/5 nours							
9									
Text Book(s)									
l	Advanced molecular biology – Twyman, Viva publication, 1998								
2	2 Genes VIII – Lewin, Printice Hall, 2004								
3	Molecular biology of the cell 4th edition - Alberts et al., Garland Scier	ce Publications,							
	2002								
4	Molecular biology of the gene 5th edition – Watson, Pearson Education, 2004								
5	5 The Cell-A Molecular Approach Geoffrey Cooper Robert E Harsman 3 rd edition ASM								
	Press 2004								
Re	eference Books								
1	1 Molecular cell biology 5th edition – Freeman Publishers, 2003								
- -	Molecular Cell Biology Eighth Edition Harvey Lodich Baltimore et al. 2010								
	worecurat Cen blorogy Eighth Europhi natvey Louish ballillore et.al.,	2010							

1 <u>https://onlinecourse,swayam2.ac.in/cec20_ma13/preview</u>

2 https:onlinecourse.nptel.ac.in/noc20_bt32/preview

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO10
CO1	S	М	М	М	S	М	S	М	S	S
CO2	S	М	М	M	S	М	S	S	S	S
CO3	S	М	М	М	S	S	S	S	М	S
CO4	S	S	М	М	S	S	S	S	S	S
CO5	S	S	S	М	S	S	S	S	S	S
			\sim /	~ (11A					



Course code	23P	SEMESTER I AND II CORE BIOCHEMISTRY PRACTICALS – I	L	Т	Р	С				
Core/Elective/S	upportive	Core	-	-	4	4				
Pre-requisite		Basic analytical skills	Sylla Versi	bus ion	2021- 2022					
Course Objectiv	ves:									
The main objecti	ives of this	course are to:								
1.Knowledge on	structural	organization of eukaryotic chromosomes.								
2. Understand the	e molecula	r mechanism of replication of recombination.								
3. Knowledge ab	out th <mark>e eul</mark>	karyotic and prokaryotic transcription process.								
4. Obtain knowle	edge r <mark>egarc</mark>	ling RNA processing and regulation.								
5. Understand about the transcriptional processing of its involving sub cellular organelle										
Expected Cours	se <mark>Outcom</mark>	es:								
On the successf	ul complet	tion of the course, student will be able to:		N.						
1Obtained knowledge on structural organization of eukaryotic chromosomes.K2										
2 Understood	2 Understood the molecular mechanism of replication of recombination K2									
3 Knowledge	3 Knowledge about the eukaryotic and prokaryotic transcription process. K2									
4 Obtained k	4 Obtained knowledge regarding RNA processing and regulation. K3									
5 Understood	5 Understood about the transcriptional processing of its involving sub cellular K1									
VI Pomombo	r: K2 Un	derstand: K3 Apply: K4 Applyzo: K5 Eveluate:	K6	Croo	to					
KI - Kemenide	29	derstand, KS - Appry, K4 - Anaryze, KS - Evaluate,	K0 - 0	Ciea	lite					
Unit:1		Clinical Biochemistry		30	Нош	rs				
1. Assay of the a	ctivity of t	he following serum enzymes: (any four)			1104					
a) LDH b) Acid phosphatase c) Alkaline phosphatase d) Aspartate amino transferase e) Alanine										
amino transferase f) Creatine kinase g) Superoxide dismutase h) glutathione peroxidase										
2. Determination of the following from Urine/Serum a) Chloride b) Calcium c) Magnesium										
3. Estimation of	albumin		0							
4. Estimation of	thiobarbitu	ric acid reactive substances (TBARS) in serum								
5. Estimation of	glucose, pr	rotein and chloride in serum								
Unit:2	Unit:2 Genetic Engineering And Molecular Biology (Demonstration)									
6. Agarose gel electrophoresis of DNA										
7. Preparation of competent E. coli – Transformation										
8. Plasmid DNA isolation from <i>E. coli</i> degradation of mRNA										
9. Immunodiffusion – single radial and double diffusion 10. Immunoelectrophoresis 11. Rocket immunoelectrophoresis 12. Agglutination antibodies 13. Identifying blood group and Rh typing Umit:4 Separation techniques Separation techniques 14. Separation of amino acids by paper chromatography – circular, ascending and descending 15. Separation of amino acids/lipids/sugars by TLC 16. Separation of plant pigments by column chromatography Unit:5 Bioinformatics Sequence and Structural Database 18. BLAST and Clustal W 19. Gene Prediction using GenMark and GenScan Votat Lecture hours Zhours Total Lecture hours Total	Unit:3	Immunology(Demonstration)	7 Hours							
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10. Immunoelectrophoresis 11. Rocket immunoelectrophoresis 12. Agglutination antibodies 13. Identifying blood group and Rh typing Umit:4 Separation techniques 15 hours 14. Separation of amino acids by paper chromatography – circular, ascending and descending 15. Separation of amino acids/lipids/sugars by TLC 16. Separation of plant pigments by column chromatography Unit:5 Bioinformatics 13 hours 17. Sequence and Structural Database 18. BLAST and Clustal W 19. Gene Prediction using GenMark and GenScan Total Lecture hours 75 Hours Total Lecture hours 75 Hours Expert lectures, online seminars – webinars Expert lectures, online seminars – webinars Total Lecture hours 75 Hours Total Lecture hours 75 Hours Laboratory manual in biochemistry by J.Jayaraman, Wiley Eastern Publishers I Laboratory manual in Biochemistry by Pattabiraman Acids colspan="2">Contemporary is bub christy CBS Publishers & Distributors Ltd. I Laboratory manual in Biochemistry by J.Jayaraman, Wiley Eastern Publishers I Laboratory manual in Biochemistry by Pattabiraman	9. Immunod	ffusion – single radial and double diffusion	·							
11. Rocket immunoelectrophoresis 12. Agglutination antibodies 13. Identifying blood group and Rh typing Umit:4 Separation techniques I5 hours 14. Separation of amino acids by paper chromatography – circular, ascending and descending 15. Separation of amino acids/lipids/sugars by TLC 16. Separation of plant pigments by column chromatography Unit:5 Bioinformatics 13. BLAST and Clustal W 19. Gene Prediction using GenMark and GenScan Total Lecture hours 75 Hours Total Lecture hours Publishers&Distributors Ltd. Laboratory manual in biochemistry by J	10. Immuno	lectrophoresis								
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19. Gene Prediction using GenMark and GenScan Contemporary Issues 2hours Expert lectures, online seminars – webinars 2hours Total Lecture hours 75 Hours Text Book(s) 1 Experimental Prosedures in Life Sciences S.Rajan R.Selvi Christy CBS Publishers&Distributors Ltd. 7 2 Laboratory manual in biochemistry by J.Jayaraman, Wiley Eastern Publishers 7 3 Laboratory manual in Biochemistry by Pattabiraman 7 Reference Books	18. BLAST	and Clustal W								
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David 1. Plummer, An introduction to practical biochemistry.3 Edition. McGraw Hill	1 David	Γ.Plummer,An introduction to practical biochemistry.3 rd Edition.	McGraw Hill							
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1 https://nptel.ac.in/courses/106/105/106105166/	1 https://	/nptel.ac.in/courses/106/105/106105166/								

Mappi	Mapping with Programme Outcomes									
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S



Course co	de 33A	SEMESTER - III PAPER –X BIOSTATISTICS AND RESEARCH	L	Т	Р	С			
		METHODOLOGY							
Core/Elect	ive/Supportive	ve Core 3 1 -							
Pre-requisiteFundamentals of Basic MathematicsSyllabus20Version20									
Course Ob	jectives:								
The main o	bjectives of this	course are to:							
1. To pro	vide knowledge	e and skills for understanding the role of							
statisti	cs in research.								
2. To dev	elop skills in th	e basic methods of data gathering and analysis.							
3. To pro	vide sufficient	background to interpret the statistical results in resea	arch						
4. To dev	elop a sound ki	nowledge of probability and probability distributions	to suj	pport					
Turthe	studies in stati	stics and operations research.							
Expected C	course Outcom	es:							
	ressiul completi	day on conducting surrous and data intermetation	and	toll	71 V	2			
	op skill in iden	if is the problem thesis writing and nu	l allu blicati		XI, N	5			
in iou	develop skill in identification of research problem, thesis writing and publication								
2 To be	In journal In journal 2 To have basis knowledge on measures of control tendency and variation								
$\frac{2}{3}$ To $\frac{10}{10}$	in sufficient kr	wedge on theoretical and normal distribution			\mathbf{X} 1, K	2			
$\frac{1}{4}$ To gr	asn knowledge	on tests of significance			$\frac{1}{7}$	5			
$\frac{10 \text{ gr}}{5}$	ve better under	standing on analysis of variance	3		$\frac{X}{X}$				
K1 - Reme	nber: K2 - Und	erstand: K3 - Apply: K4 - Analyze: K5 - Evaluate: 1	K6 – (Create	X 1, 1				
		<u> </u>							
Unit:1	292	Research Methodology		15 -	- ho	urs			
Organising	a statistical sur	vey - Planning and executing the survey. Source of	data -	Prim	ary a	nd			
secondary	lata, Collection	observation; interview; enquiry forms, question	naire	sched	ule a	nd			
check list. Classification and tabulation of data. Diagrammatic & graphic presentation of data.									
Thesis writing, Publication in a scientific journal, Preparation of Abstract and manuscript.						pt.			
Research problem, research design, preparation for a research and funding agencies. Bioethics&						s&			
Biosafety, IPR & Patenting.									
Funding agencies-National and International agencies.									
Unit:2		Measures Of Central Tendency		15 -	- ho	urs			
Measures of	f central tender	ncy; arithmetic mean, median, mode, quartiles, decil	les and	d perc	entil	es.			
Measures of	t variation: ran	ge, quartile and Quartile deviation, mean deviation,	standa	ard de	viatio	on.			
Correlation	Correlation analysis: Scatter diagram, Karl Peason's coefficient of correlation and Spearman's								
rank metho	u. Regression a	narysis- kegression line, kegression equation.							

Uni	it:3	Probability	15 hours						
Pro	bability	definition, concepts, Addition and Multiplication theorems (pr	oof of the theorems						
not	not necessary) and calculations of probability.								
The	Theoretical, distributions.								
Bin	omial ,Pois	son, Fit a Poisson distribution.							
Nor	mal distrib	ution -importance, properties, conditions and constants of the	e distribution (proof						
not	necessary).	Simple problems.							
Uni	it:4	Hypothesis Testing	15 hours						
San	npling distr	ibution and test of significance:							
Tes	ting of hyp	othesis errors in hypothesis testing, standard error and sampli	ng distribution.						
sam	pling of va	riables (large samples and small samples).							
Stu	dent's 't' dis	stribution and its applications. Chi - square test & goodness of fi	l t.						
Uni	it:5	Anova And Designing Of Experiment	13 hours						
Ana	alysis of va	uriance one way and two-way classification. SPSS Packages	and its correlations,						
Dur	ncans Multi	ple Range Test. Design of experiment - completely randomize	ed block design and						
rand	domized blo	oc <mark>k design. Clinical trials and machine learning alg</mark> orithms to fin	nd association across						
biol	logical data								
Uni	it•6	Contemporary Issues	2 hours						
Evn	ert lectures	online seminars – webinars	2 1100115						
Елр		, onnie seminars – weomars							
		Total Locture hours	75 hours						
Tor	t Dools(a)	Total Lecture nours	5 nours						
	Ctotiotical	methods & D. Cupto 42 rd edition							
1	Statistical	Combatore							
2	Biostatisti	cs – A foundation for analysis in health science Danien 11 th edi	tion						
3	Biostatisti	cal analysis - Jerrold H.Zar. Pearson Education, 5 th Edition							
4	IPR, Bios	afety and Bioethics – Deepa Goal and Shomini Parashar, Pearso	onPublications 1 st						
	edition								
5	Biostatis	tics and research Methodology by S.Karthikeyan, R.M.Chaturve	edi,R.M.Bhosale 1 st						
	edition								
6	P.Kaliraj 5.0,2020	,T.Devi,Higher Education for Industry 4.0 and Transforma	ation to Education						
Ref	erence Boo	oks							
1	Research	Methodology: Methods and techniques by C R Kothari New ag	e International						
	Publishers	4th edition	- momunitur						
2	Methods	in Biostatistics for Medical Students & Research Workers by Bi	ratati Baneriee 9 th						
-	Ed								

1 https://www.mooc-list.com/tags/biostatistics

2 https://www.mooc-list.com/tags/researchmethodology

Mappi	ng with	Progran	nme Out	comes						
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	М	S	S
CO2	S	Μ	М	M	S	S	М	Μ	S	S
CO3	S	М	М	M	S	S	M	М	S	S
CO 4	S	M	S	M	S	S	М	S	S	S
CO5	S	M	М	S	S	S	М	S	S	S
			5				N. 6			



Course code 350 METABOLISM AND METABOLIC L I <thi< th=""> I I</thi<>	Course code	22D	SEMESTER – III PAPER-XI META POLISM AND META POLIC	т	т	D	C	
Core/Elective/Supportive Core 3 1 - 4 Pre-requisite Basic knowledge on Metabolic pathways Syllabus Version 2021- 2022 Course Objectives: The main objectives of this course are 1.70 understand anabolic and catabolic pathways of carbohydrate, lipids, amino acids and porphyrin metabolism. 2.70 learn the role of plant hormones & biosynthesis of secondary metabolites & its application. 3.10 have an idea about the regulatory pathways in metabolism 4.To develop and analyse the clinical correlations with the disorders of metabolism 4.70 develop and analyse the clinical correlations with the disorders of metabolism 5 To understand carbohydrate metabolism and its regulation K1, K2 2 To have an overview on lipid metabolism and its regulation with energetics K1, K2 3 To analyse amino acid metabolism and its regulation K2, K3 4 To get detailed overview on porphyrin metabolism and its regulation K2, K3 5 To have knowledge on plant metabolism and its regulation. K2, K3 K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create Unit:1 Carbohydrate Metabolism 12 hours An overview & energetics of glycolysis and gluconeogensis - Regulation of glycolysis and gluconeogensis; Regulation by allosteric and subs	Course coue	330	REGULATION	L	I	r	C	
Pre-requisite Basic knowledge on Metabolic pathways Syllabus Version 2021- 2022 Course Objectives:	Core/Elective	/Supportive	Core	3 1 -				
Course Objectives: The main objectives of this course are 1.To understand anabolic and catabolic pathways of carbohydrate, lipids, amino acids and porphyrin metabolism. 2.To learn the role of plant hormones & biosynthesis of secondary metabolites & its application. 3.To have an idea about the regulatory pathways in metabolism 4.To develop and analyse the clinical correlations with the disorders of metabolism Kerect Course Outcomes: 0n the successful completion of the course, student will be able : 1 To understand carbohydrate metabolism and its regulation with energetics K1, K2 2 To have an overview on lipid metabolism and its regulation K2, K3 3 To analyse amino acid metabolism and its regulation K2, K3 4 To get detailed overview on porphyrin metabolism and its regulation. K2, K3 5 To have knowledge on plant metabolism and its regulation. K2, K3 K1 - Korrele K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create Voint: Carbohydrate Metabolism An overview & energetics of glycolysis and gluconeogensis - Regulation of glycolysis and gluconeogensis : Regulation of glycolysis and gluconeogensis : hoosphortuctokinase, hexokinase and pyruvate kinase as regulatory enzymes in glycolysis; hormone regulation. An	Pre-requisiteBasic knowledge on Metabolic pathwaysSyllabus Version20 20						1- 2	
The main objectives of this course are 1.To understand anabolic and catabolic pathways of carbohydrate, lipids, amino acids and porphyrin metabolism. 2.To learn the role of plant hormones & biosynthesis of secondary metabolites & its application. 3.To have an idea about the regulatory pathways in metabolism 4.To develop and analyse the clinical correlations with the disorders of metabolism 4.To develop and analyse the clinical correlations with the disorders of metabolism 6.To develop and analyse the clinical correlations with the disorders of metabolism 7.To develop and analyse the clinical correlations with the disorders of metabolism 7.To develop and analyse the clinical correlations with the disorders of metabolism 7.To understand carbohydrate metabolism and its regulation with energetics 7.To have an overview on lipid metabolism and its regulation 7.To analyse amino acid metabolism and its regulation 7.To analyse amino acid metabolism and its regulation 7.To approximate the course of the co	Course Objec	tives:						
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Expected Course Outcomes: On the successful completion of the course, student will be able : I To understand carbohydrate metabolism and its regulation with energetics K1, K2 2 To have an overview on lipid metabolism and its regulation K2, K3 3 To analyse amino acid metabolism and its regulation K4, K5 4 To get detailed overview on porphyrin metabolism and its regulation with its enzymes K2, K3 5 To have knowledge on plant metabolism and its regulation. K2, K3 K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create Value: Unit:1 Carbohydrate Metabolism An overview & energetics of glycolysis and gluconeogensis - Regulation of glycolysis and gluconeogensis - phosphofructokinase, hexokinase and pyruvate kinase as regulatory enzymes in glycolysis; hormone regulation. Anaphlerotic reactions 'filling up reactions Gluconeogensis: Regulation at branch points :-Pyruvate dehydrogenase. alpha - keto glutarate dehydrogenase, and citrate synthase. Glycogen metabolism - Regulation of glycogen phosphorylase; glycogen synthase by effectors, covalent modification and hormones. Unit:2 Lipid Metabolism An overview of fatty acid anabolism and catabolism - Regulation of fatty acid synthesis - Control of acetyl CoA carboxylase line on fatty acid synthesis of triacylglycerols, cholesterol, phosphotidyl choline, phosphotidyl ethanolamine and sphingomyelin. Biosynthesi	4.10 develop a		the children contributions with the disorders of includon	5111				
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TT			12					
Un	it:3	Aminoacid Metabolism	12 hours					
Am	inoacid me	etabolism - An overview on Gamma - glutamyl cycle. An ov	erview – Methionine					
as	as methyl donor (SAM pathway. An overview & regulation of urea cycle. Regulation of alpha-							
kete	o glutarate	family, pyruvate family. 3-Phosphoglycerate family, A	spartate family and					
Arc	omatic famil	y of amino acids. Allosteric regulation of glutamine synthase.						
Un	it:4	Porphyrin Metabolism	12 hours					
An	overview of	on porphyrin metabolism-Regulation of biosynthesis & degra	adation hemoglobin,					
chle	orophyll &	cytochrome. Nucleic acid metabolism. Pathways of pur	ine and pyrimidine					
bio	synthesis (both de novo and salvage pathways) & degradation. Re	egulation of purine					
b10	synthesis.	PRPP aminotransferases. Regulation of pyrimidine bios	ynthesis: Aspartate					
Cari	Danio yi tran	sterase. Regulation of deoxymbolideleotides by activators and r	minoitors.					
			Γ					
Uni	it:5	Plant Metabolism	<u>10 hours</u>					
Elu	cidation of	metabolic pathways-Analysis of single step pathway and	Multistep pathway,					
Mu	tant study-C	complementation for metabolic steps analysis.						
Pla	nt metaboli	sm - Hormones: Biosynthesis of – Indole acetic acid, Gibb	erellins, cytokinins,					
Eth	ylene, salic	ylic acid. Pathways of synthesis of secondary metabolites	and its application.					
Alk	aloids, Flav	anoids and Terpenoids.						
Uni	it:6	Contemporary Issues	2 hours					
Uni Exp	it:6	Contemporary Issues , online seminars – webinars	2 hours					
Uni Exp	it:6 pert lectures	Contemporary Issues , online seminars – webinars Total Lecture hours	2 hours 60 hours					
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Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

https://www.mooc-list.com/course/biochemical-principle of energy metabolism

I	Mapping	g with Pro	ogramme	e Outcon	nes					
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	М	S	S	М	М	S
CO3	S	S	S	S	М	S	S	М	М	S
CO3	S	S	S	S	М	S	S	М	М	S
CO4	S	S	S	S	М	S	S	М	М	S
CO5	S	S	S	S	М	S	S	М	М	S

*S-Strong; M-Medium; L-Low

1



	220	SEMESTER – III PAPER-XII	T	T				
Course code	33C	GENETIC ENGINEERING	L	T	Р	C		
Core/Elective/	'Supportive	Core	3 1 -					
Pre-requisite		Basic principles of Genetics	Syllał Versi	ous on	2021 2022	l- 2		
Course Objectives:								
1.To le	earn the adve	ent of DNA research and the ability to change gene e	express	sions	,			
2. To l emotio	earn and ch	ange human <mark>capacities, wh</mark> ether they be physical, co	gnitiv	e, or				
3.To u	nderstand at	bout the potentially momentous biotechnological ap	plicati	ons				
4.To a	pply the rece	ent advances of Genetic engineering techniques in va	rious	field	s			
Expected Cou	rse Outcom	es:						
On the success	ful com <mark>pleti</mark>	on of the course, student will be able to:						
1 To have l	basi <mark>c unders</mark> t	tanding of Mendelian genetics			K1,	K2		
2 To equip	on the techn	iques of gene manipulation			K3,	K6		
3 Clear und	lers <mark>tanding o</mark>	of cloning vector, development and their application			K3,	K6		
4 Knowled	4 Knowledge of cloning strategies and expression vectors K2, K3							
5 Adequate knowledge on gene transfer methods and selectable markers and their K4, K3 applications						K3		
K1 - Remembe	K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create							
	5							
Unit:1	40	Genetics		13	ho	urs		
Introduction to Mendelian ge homozygous, h Mendel's laws. Salient featur codominance a	genetics. Tr netics. M leterozygous Linkage – c res of auto nd dominan	ansmission genetics. endelian analysis of inheritance. Genes, chro and mechanism of Mendelian inheritance. definition, simple measurement and salient features. osomal dominant, recessive, codominance; X ce; Y-linked characters. Extra nuclear inheritance.	mosor -linkec	nes, l re	allel ecessi	es, ve,		
Unit:2		Genetic Techniques		15	ho	ours		
Restriction End	donucleases	- types and functions; restriction mapping						
Nucleic acid probes and their applications – cloned probes, oligonucleotide probes; labeling of nucleic acid probes. Nucleic acid hybridization techniques – liquid and dot blot technique; Southern and Northern hybridization; in situ hybridization; whole mount in situ hybridization EISH								
 nybridization; in situ hybridization; whole mount in situ hybridization. FISH. Polymerase chain reaction – types and applications. Chemical synthesis of genes, DNA fingerprinting, DNA sequencing. DNA Foot printing and Sequence generation, Next generation sequencing. DNase Foot Printing 								
Artificial Intell	igence in Ph	ylogeny and AI in next sequence generation sequence	cing					

Un	it:3	Vectors	15 hours						
Clo	ning vector	s – salient features. Plasmids as vectors – properties, natural	plasmids, pBR 322,						
pS(pSC 101, pUC, bluescript. Mechanism of cloning in plasmid vectors. Bacteriophage vectors $-\lambda$ phage X-vector $-\lambda$ packing of X-vector in vitro. Cosmid vectors								
Bac	Bacteriophage vectors $-\lambda$ phage, λ -vector $-$ packing of λ -vector in vitro. Cosmid vectors, cosmid cloning.								
DN	DNA (single stranded) vectors – development of M13 vector PEMBL vector λ 2AP viral								
vec	vectors. SV 40, retrovirus, adenovirus, recombinant vaccinia virus vectors. Baculo virus vector								
for	for insects. Transposons as vectors.								
High capacity cloning vectors - bacterial artificial chromosomes, phage P1, yeast aritificial									
chr	omosomes a	and PACs.							
			I						
Un	it:4	Cloning Strategies And Expression Vectors	15 hours						
	ning strateg	ties – genomic and cDNA cloning. cDNA library.							
Exp	pression vec	tors – vectors for maximizing protein synthesis, fusion proteins							
Exp	pression ve	ctors – expression of cloned genes in E. coli. Cloning and ex	xpression of cloned						
gen	les in Bacil	lus subtilis. Cloning in yeasts; yeast expression vectors, over	expression in yeast.						
	pression in t	baculovirus system.							
Rec	combination	i, selection and screening methods and processes.							
T Im	:+.5	Cone Transfor Matheda In Animal Calla	15 hours						
	II:5	Gene i ransier Methods in Annnai Cens	15 Hours						
Gei	ne transfer	methods in animal cells – calcium phosphate copreceipitati	on, electroporation,						
	nsfor cotro	sushing virial vectors.	anas Gana targating						
$\frac{11a}{in}$	nimal cells	transfer and expression of cloned genes in Drosonhila. Gene	knockout Methods						
for	production	of transgenic animals (mice sheep goat fish nig cow	etc.) – retroviral						
DN	Amicroinie	ctionandengineeredstemcellmethods. Applications of transgenic	animals: transgenic						
ani	mals as mo	dels/in the prevention of human diseases like cystic fibrosis,	muscular dystrophy						
and	anticancer	herapy.	9						
		So, SALAP IN S							
Un	it:6	Contemporary Issues	2 hours						
Exp	pert lectures	, online seminars – webinars							
		Total Lecture hours	75 hours						
Tex	xt Book(s)	EDUCATE TO FLENATE							
1	Genomes	– Brown, John Wiley, 1999							
2									
	Principles	of gene manipulation 6th edition – Primrose et al., Blackwell S	cientific						
2	Publishers	, 2001							
3	Genetics 4th edition – Elrod, Stansfield, 2002								
4	Molecular	cell biology 5th edition – Lodish et al. Freeman Publishers 20	04						
5	Willieului								
6	Molecular Genetic er	biotechnology 3rd edition – Glick, Paternak, Panima Publisher	s, 2003						
0		Encoming Theorems, Cambridge Oniversity (1055, 2002							
7	Molcular I	biology of the gene 5th edition – Watson, Pearson Education							

Ref	ference Books
1	.S. B. Primrose and R. M. Twyman, Principles of Gene Manipulation, Blackwell Science,
	2006.
2	.B. Lewin, Genes IX, International Edition, Pearson education, 2008
Rel	ated Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1	https://www.mooc-list.com/tags/genetics
2	https://www.mooc-list.com/tags/genetically-modified-organisms

]	Mapping	g with Pro	ogramm	e Outcon	nes	æ40,	0			
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	М	M	S	M	S	M	М	М	S
CO3	S	S	S	S	S	S	М	S	М	S
CO3	S	S	S	S	S	S	М	S	М	S
CO4	S	S	Μ	S	S	S	S	S	S	S
CO5	S	S	Μ	S	S	S	М	S	М	S

*S-Strong; M-Medium; L-Low

Generations 2 ministral Construction

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Course code	33D	SEMESTER III PAPER-XIII ENDOCRINOLOGY	L	Т	Р	С
Core/Elective/	/Supportive	Core	3	1	-	4
Pre-requisite		Basics of Physiology and Endocrine system	Syllah Versi	ous Dus	202 202	21- 22
Course Objec	tives:					
1. To have a	clear knowle	edge on the chemistry, synthesis, biological functi	ons, n	necha	nism	of
action and path	ophysiology	v of all the hormones				
2.To learn about	ut the variou	as receptors of the hormones with their mechanism	of acti	on		
3. To learn the	biochemica	I changes occurring in pregnancy, parturition and la	.ctatior	1.		
4.10 nave an 10	lea over Hui	nan miertinty-reason and therapy				
Expected Cou	rse Outcom	05.				
On the success	ful completi	on of the course student will be able to:				
1 To gain h	asic knowle	dre of hormones and their recentors			K 1	к2
2 To provid	de informatio	on on nituitary thyroid parathyroid hormone			K1.	$\frac{K2}{KA}$
$\frac{2}{3}$ To provide	de informati	on on melanocyte hormones and nineal gland			K2,	<u>K4</u>
$\frac{1}{4}$ To gain h		n pancreatic hormones and their pathonhysiology			K2,	K4 K5
4 To gain F	information	on reproductive hormones and their pathophysiology	N		K3,	KJ K6
J TO gall		arstand: K3 Apply: K4 Apply: K5 Evolute:	y V6 (Trooto	КЗ,	,KU
KI - Kemembe	er, K 2 - Ollu	erstand, K5 - Appry, K4 - Anaryze, K5 - Evaluate,	<u> </u>	Jeale		
Unit.1		Hormonog		12	ho	
Unit.1	troduction	abamical atructure Hormonas and homosta	sis No	14 -	- no	ino
integration in	homeostasis	Classes of chemical messengers Hormone secret	tion T	ransr	ort a	and
clearance. Hor	mones and	behavior. Feed back control of secretion .Mecha	anisim	of h	ormo	one
action -recepted	ors .second	messengers. Cytosolic hormone receptors: Eicoso	noids a	and h	ormo	one
action. calmod	ulin. 🕥	e ବା				
				10		
Unit:2		Pituitary Gland		12 -	- ho	urs
Pituitary horm	ones- Anato	omy of pituitary gland, hormones of the pituitary	, path	ophys	\$1010 bolor	gy.
hormone secre	tion Feed by	ack mechanisms. Mechanism of action	01 1	туроц	laiai	me
Neurohypophy	sis: Synthe	sis, secretion chemistry and control of neurohyp	ophys	eal h	ormo	one
secretion. Role	and mechar	ism of action of oxytocin and vasopressin. Pathoph	ysiolo	gy.		
Growth hormo	nes: somatot	ropins and somatomedins, pathophysiology.				
Growth factor	s: neurotrop	ic growth factors, hematopoietic growth factors,	epide	ermal	grov	vth
lactors.						
IInit.3	Т	hyroid Parathyroid And Pincal Cland		12	ho	lire
Thyroid gland		and chemistry of hormones, control of thuroid	hormo	14 • ne so	- IIU	013
circulation an	d metaboli	sm. physiological roles, mechanism of action	. Path	lophv	siolo	gv.
Parathyroid gla	and: synthes	is, chemistry and metabolism of parathyroid gland	horm	ones,	cont	rol
of secretion. F	hysiological	role and vitamin D. Mechanism of action of ca	lcium	home	ostas	sis,

pathophysiology.

Melanotropic hormones- chemistry, role of MSH and mechanism of action.Pathophysiology. Pineal gland - melatonin hypothesis, melatonin secretion and circulation, proposed role of pineal, mechanism of action.

Uni	it:4	Pancreas And Adrenal Gland	12 hours
Pan	creas:- Endocrine p	ancreas, insulin, glucagons, somatostatin. Pancreatic pe	eptide – chemistry,
phy	siological roles and	mechanim of action.	
Ca	techolamines :- synt	hesis, chemistry andmetabolism.	
Nei	urohormones:- ende	orphins-source, chemistry, control of secretion; ph	iysiological roles.
Me	chanism of action ar	d patnophysiology.	
TT	• / =		10 1
Un		Reproductive Endocrinology	<u>10 nours</u>
Ma	le reproductive sy	stem:- source, synthesis, chemistry and metabolism	of androgens,
Phy Eor	siological roles and	mechanism of action. Pathophysiology.	al rola Machaniam
of	nale reproductive sy	ine control of overian function. Pathophysiology	a role, mechanism
Enc	locrinology of pres	mancy parturition and lactation Sex differentiation	and development
Pub	perty and hormone co	ontrol. Human infertility – reasons, therapy and treatment	nt.
	Ĵ		
Uni	it:6	Contemporary Issues	2 hours
Exp	pert lectures, online	seminars – webinars	
		Total Lecture hours	60 hours
Тех	xt Book(s)		9
1	Endocrinology 6 th	edition – Hadley & Levine, PrenticeHall	
-	Lindooriniorogy o		
2	Text book of medie	cal physiology 10 th edition – Guyton, Hall, Saunders Pul	olishingCo.,
3	Principles of bioch	emistry 7 th edition – Smith et al., McGraw Hill,1983	
4	W/:11: ?- T 41		
4	william s Textboo	k of endocrinology 8 edition – wilson, Poster.	
Ref	ference Books	UNIC TO EEL	
1	Lary Jameson J, 20	017 Harrisons Endocrinology, McGraw Hill Publishers	20th Edition 2017.
2	Norman Levin, 20	19 Manual of Endocrinology and Metabolism 5th Edition	on, Wolters Kluwer
	Publishers 2019.		
3	Hormones and th	e Endocrine System: A text Book of Endocrinolog	y by Bernhard K,
	Winfried B, Sprin	ger Nature Publishers 2016	
Rel	ated Online Conter	nts [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://www.mo	oc-list.com/tags/anatomy-xseries	
2	https://swayam.g	gov.in/endocrinology	

Mappi	ng with	Progran	nme Out	comes						
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	М	Μ	Μ	Μ	Μ	М	Μ	S
CO3	S	S	М	Μ	S	S	S	М	Μ	S
CO3	S	S	М	Μ	S	S	S	М	Μ	S
CO4	S	S	М	Μ	S	S	S	М	Μ	S
CO5	S	S	S	S	S	S	S	S	S	S



			SEMESTED III DADED VIV	1			
Com	waa aada	22E	DIADMA CELITICAL CHEMISTRY AND	т	т	р	C
Cou	rse code	33E	PHARMACEUTICAL CHEMISTRY AND	L		P	C
			NEUROCHEMISTRY				
Core	e/Elective	/Supportive	Core	3	1	-	4
				Sylla	b		
				ns na	~	2021	_
Pre-	requisite		Fundamentals of Drug Biochemistry	Vorsi	in	2021	_
				n	U	2022	
Соц	rse Ohiec	tives:	A A A A A A A A A A A A A A A A A A A	<u></u>			
000	The m	ain objective	es of the course are				
	1.To u	inderstand th	e various aspects of Pharmacology				
	2.To h	nave an idea	about the various assays used in Pharmacology				
	3.To k	now about th	he genetically modified drugs with their clinical corre	lations			
	4.To g	ain knowled	ge about the therapeutic measures of various drugs				
	C						
Exp	ected Cou	rse Outcom	es:				
Ont	he success	ful completi	on of the course, student will be able to:				
1	To have	de <mark>eper unc</mark>	lerstanding on various routes of drug administration	on, it	s	K1, I	K2
	distributi	ion, and exc	retion.			,	
2	To enabl	e student <mark>s to</mark>	learn about principles of basic pharmacokinetics			K2,K	3
3	To gain l	knowledge of	n drug delivery system		A	K3,K	4
4	To have	understandin	g on genetically engineered products	2		K5,K	6
5	To gain l	knowledge of	n neurotransmitters and neuro degenerative disorders		/	K3,K	4
K1 -	Remembe	er; K2 - Und	ers <mark>tand; K3 - Apply; K4 - Analyze; K5</mark> - Evaluate; K	6 – Cr	eat	e	
			Coimbatore Cos				
Unit	:1		Chemistry Of Drugs		13	ho	urs
Drug featu abso cyto Drug recej antag	gs – sourc pres and p rption. dis chrome P4 g receptor ptor and ic gonists.	ees, classifica pharmacolog stribution, m 450. rs – localiza on-channel li	ation, dosage forms and routes of administration. D ical activity, prodrug concept. Absorption, factors etabolism and elimination of drugs – phase I, II rea- tion, types and subtypes, models and theories. G inked receptors. Examples of drug-receptor interaction	rugs - modi actions -prote ons. A	- s fyi s, a ein gor	tructu: ng dr action coupl nists a	ral ug of ed nd
Unit	::2		Pharmocokinetics		15	ho	urs
Drug drug tach Assa	g tolerance s. Adver yphylaxis, yy of drug	e and drug de se response drug abuse, potency: che	ependence. Principles of basic pharmacokinetics, AD e to drugs, drug intolerance, pharmacogenetics vaccination against infection, factors modifying drug mical, bioassay and immunoassay.	ME pro- , dru action	rop Ig I an	erties allerg d effe	of gy, ct.

Uni	it:3 Genetically Engineered Drugs	15 hours
Ger	netically engineered protein and peptide agents. Drug delivery systems	: Non-conventional
rou	tes of administration, anti-AIDS drug development, oncogenes as targets f	or drugs, multidrug
resi	stance, production of secondary metabolites by plant culture.	
Pate	enting of Drug, Marketing, Computer aided drug design.	
B10	technology and Pharmacy-Manufacturing practices, Quality control,	Drug management,
uise		
Un	it:4 Therapeutical Applications	15 hours
Me	chanism of action of drugs used in therapy of	
A).	Respiratory system – cough, bronchial, asthma, pulmonary tuberculosis.	
B).	Antimicrobial drugs – sulfonamides, trimethoprim, penicillins, aminoglyc	osides and bacterial
resi	stance.	
C).	Cancer chemotherapy	
D).	Invitid and anti-thyroid drugs, insulin and oral anti-diabetic drugs	s, anti-fertility and
ovu	nation inducing drugs.	
Un	it:5 Neurodrugs	15 hours
Nei	rotransmitters :- Cholinergic transmission and receptors: adrenergic	transmission and
rece	eptors; muscarinic receptors.	
No	n-steroidal and anti-inflammatory drugs; adrenergic blocking drugs; cl	olinergic blocking
dru	gs; muscarinic blocking drugs; Parkinson's diseas	e; Alzhemier's
dise	ease.Neurodegenerativedisorders-amylotropic,lateralsclerosis,seniledement	ia, Schizophrenia,
Hu	ntington's disease, meningitis.	
TT		21
Un	ert lectures online seminars webinars	2 nours
L'	sert rectures, online seminars – weomars	9
	Total Lecture hours	75 hours
Теу	t Book(s)	iouis
1	The pharmacology, Volumes I and II – Goodman, Gilman 13 th edition	
2	Basic and Clinical Pharmacology– Katzung, Printice Hall, NewDelhi 7 th e	dition
3	Pharmacology– Rang, Tale 3 rd edition	
Δ	Pharmacology and Pharmacotherapeutics – Satoskar <i>et al</i> 25 edition Popu	ılar
-	Prakashar Mumbai	<i>i</i> 101
		the second
5	Principles of Medicinal Chemistry – Foye, Waverks Pvt. Ltd. NewDelhi 8	^{un} edition
6	Burger's medicinal chemistry and drug discovery: principles and practice	– Wolf, JohnWiley
_	5 edition	
7	Molecular basis of inherited diseases – Davies, Read, IRLPress 4 th edition	Ĺ
8	Molecular biotechnology– Glick, Pasternak, Panima Publishers, 2002 2 nd	edition

Ref	ference Books
1	The Organic Chemistry of Drug Design and Drug Action, Richard B. Silverman, Second
	Edition
2	An Introduction to Medicinal Chemistry, Graham L. Patrick; Second Edition
Rel	ated Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1	https://www.mooc-list.com/tags/pharmaceutical
2	https://www.mooc-list.com/tags/medicinal-chemistry

_{കെ}ന്ദര്സ

I	Mapping	; with Pro	ogramme	e Outcon	nes		66			
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	S	M	S	М	S	S	S
CO2	S	M	S	M	S	S	S	S	S	S
CO3	S	S	М	М	S	S	S	S	М	S
CO4	S	M	S	М	М	S	М	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

Colmbatore Const LITTEOUT 2 LITES ATE TO ELEVATE

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Cou	rse code	43P	CORE BIOCHEMISTRY PRACTICALS – II	L	Т	Р	С
Core	e/Elective/	Supportive	Core	-	-	4	4
Pre	-requisite		Basic knowledge on Biochemical isolations	Sylla Versi	bus on	2021 2022	- 2
Cou	rse Objec	tives:		•		•	
The 1.Le 2.Kr 3.Co 4.Ez 5.Be	main object arn the iso now about prrelate the spertise in equipped ected Cou	ctives of this lation of bio the enzyme a clinical inte staining tech with all the rse Outcom	course are to: chemicals from different samples assays rpretations of the analysis aniques biochemical isolations				
On	the succes	sful complet	ion of the course, student will be able to:				
1	Carryout	the isolation	of biochemicals from different samples			K4, K	3
2	Perform	th <mark>e enzyme</mark> a	issays			K4, K	5
3	Correlate	e th <mark>e cl</mark> inical	interpretations for diagnosis			K5, K	6
4	Perform	the staining a	and microbiological tests			K2, K	3
5	Expertise	e and be equi	pped with all the biochemical test			K5, K	6
K1	- Rememb	per; K2 - Un	d <mark>erstand; K3 - Apply; K4 - Analyze; K5 - Ev</mark> aluate;	K6 - (Crea	te	
				5			
Uni	it:1	2	Colorimetric Experiments		15	5 hou	rs
1.Isc 2.Isc 3.Isc 4.Es 5.Es	lation and lation and lation and timation o timation o	estimation of estimation of estimation of f β -carotene f lactose from	of starch from potato of glycogen from liver of ascorbic acid from fruit from carrot n milk				
TT			LOUCATE TO ELEVAIE	1			
Un	It:2		Colorimetric Experiments		1	5 hou	rs
6.Es	timation of	f RNA – UV	and visible methods				
7.1SC 8 Ee	timation of	f fructose in	fruits				
$9 \Delta r$	unation of	assav- DPPH	$[FRAP and H_{2}O_{2}]$ scavenging assay				
7.7 M		ussay DITT	, TIME and H ₂ O ₂ seavenging assay				
Un	it:3		Enzyme Studies		1	0 hou	rs
10	Isolation	, purificatio	on (precipitation methods, dialysis and chromatogr	aphy)	, pr	opertie	es,
kine	tics and in	hibitor studio a) peroxida	es of any one of the following enzymes: se b) amylase c) cellulase d) protease	- • /	•	-	

Ur	nit:4	Clinical Microbiology(Demonstration experiments)	18 hours
11.I	solation of	pure culture - serial dilution, pour plate, spread plate, streak	plate methods, and
slab	culture tec	hniques for long term storage	
12.0	Colony mor	phology – colony counting	
13.5	Staining teo	chniques - simple, differential, negative, acid fast, spore, o	capsule and fungal
stai	ning		
Ur	nit:5	Clinical Microbiology(Demonstration experiments)	15 hours
14.4	Antibiotic s	ensitivity disc – phenol coefficient method	
15.I	Estimation of	of bacteria – growth curve of bacteria and generation time	
16.I	Biochemica	l test – IMVIC, Starch test and Catalase test	
		and a state	
Ur	nit:6	Contemporary Issues	2 hours
Ex	pert lecture	s, onli <mark>ne seminars –</mark> webinars	
		Total Lecture hours	75 hours
Te	ext Book(s)		
1	Practical C	linical Biochemistry Methods and Interpretations 5 th Edition 20)20 by Ranjna
1	Chawla		
2	Manual of	Practical and Clinical Biochemistry 1 st Edition 2020 By Ashish	Sharma&Anita
	Sharma	here have been and	
3	Experimer	tal Procedures in Life Sciences S.Rajan,R.Selvi Christy	
		in the second is	
Re	eference Bo	oks	
1	Varley's P	ractical Clinical Biochemistry Sixth edition Alan H Gowenlock	
2	David T.	Plummer, An introduction to practical Biochemistry	
		Combature	
Re	elated Onlin	ne Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://or	linecourses.swayam2.ac.in/nce20_ag01/preview	
		SUCCATE TO ELEVAL	

Mappir	ng with P	rogrami	ne Outco	omes						
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO 4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S



PLANT HISSOE COLTORECore/Elective/SupportiveElective31-4Pre-requisiteFundamentals of tissue cultureSyllabus Version2021- 2022Course Objectives:The main objectives of this course are to:1. To understand the knowledge about genome organization in plants2. To have an idea on embryo culture and artificial seed production3. To understand the basic concepts of cryopreservation and germplasm4. To knew about the basic concepts of plant transformationExpected Course Outcomes:On the successful completion of the course, student will be able to:1Remember the genome organization of plantsK1, K22Application of Artificial seed production.K3, K6
Core/Elective/Supportive Fundamentals of tissue culture 3 1 - 4 Pre-requisite Fundamentals of tissue culture Syllabus 2021- 2022 Course Objectives: Version 2022 The main objectives of this course are to: 1 To understand the knowledge about genome organization in plants 2. To have an idea on embryo culture and artificial seed production 3 1 - 4 3. To understand the basic concepts of cryopreservation and germplasm 4 To knew about the basic concepts of plant transformation 5 To have a brief idea on secondary metabolitess Expected Course Outcomes: On the successful completion of the course, student will be able to: K1, K2 1 Remember the genome organization of plants K1, K2 2 Application of Artificial seed production K3, K6
Course Objectives: The main objectives of this course are to: 1. To understand the knowledge about genome organization in plants 2. To have an idea on embryo culture and artificial seed production 3. To understand the basic concepts of cryopreservation and germplasm 4. To knew about the basic concepts of plant transformation 5. To have a brief idea on secondary metabolitess Expected Course Outcomes: On the successful completion of the course, student will be able to: 1 Remember the genome organization of plants K1, K2 2 Application of Artificial seed production
The main objectives The main objectives of this course are to: 1. To understand the knowledge about genome organization in plants 2. To have an idea on embryo culture and artificial seed production 3. To understand the basic concepts of cryopreservation and germplasm 4. To knew about the basic concepts of plant transformation 5. To have a brief idea on secondary metabolitess Expected Course Outcomes: On the successful completion of the course, student will be able to: 1 Remember the genome organization of plants K1, K2 2 Application of Artificial seed production
1. To understand the knowledge about genome organization in plants 2. To have an idea on embryo culture and artificial seed production 3. To understand the basic concepts of cryopreservation and germplasm 4. To knew about the basic concepts of plant transformation 5. To have a brief idea on secondary metabolitess Expected Course Outcomes: 0n the successful completion of the course, student will be able to: 1 Remember the genome organization of plants K1, K2 2 Application of Artificial seed production
 2. To have an idea on embryo culture and artificial seed production 3. To understand the basic concepts of cryopreservation and germplasm 4. To knew about the basic concepts of plant transformation 5. To have a brief idea on secondary metabolitess Expected Course Outcomes: On the successful completion of the course, student will be able to: 1 Remember the genome organization of plants K1, K2 2 Application of Artificial seed production K3, K6
3. To understand the basic concepts of cryopreservation and germplasm 4. To knew about the basic concepts of plant transformation 5. To have a brief idea on secondary metabolitess Expected Course Outcomes: 0n the successful completion of the course, student will be able to: 1 Remember the genome organization of plants K1, K2 2 Application of Artificial seed production
4. To knew about the basic concepts of plant transformation 5. To have a brief idea on secondary metabolitess Expected Course Outcomes: 0n the successful completion of the course, student will be able to: 1 Remember the genome organization of plants 2 Application of Artificial seed production
5. To have a brief idea on secondary metabolitess Expected Course Outcomes: On the successful completion of the course, student will be able to: 1 Remember the genome organization of plants 2 Application of Artificial seed production
Expected Course Outcomes: On the successful completion of the course, student will be able to: 1 Remember the genome organization of plants 2 Application of Artificial seed production K3, K6
Expected Course Outcomes: On the successful completion of the course, student will be able to: 1 Remember the genome organization of plants 2 Application of Artificial seed production K3, K6
On the successful completion of the course, student will be able to: 1 Remember the genome organization of plants 2 Application of Artificial seed production
1Remember the genome organization of plantsK1, K22Application of Artificial seed productionK3, K6
1 Remember we genome organization of plants 2 Application of Artificial seed production K3, K6
3 Analysis of cryopreservation and germplasm K3 K4
A Analysis of basic concepts of plant transformation
Fugluation and production of secondary metabolitat
K1 Remember: K2 Undestand: K3 Apply: K4 Applyze: K5 Evaluate: K6 Create
KI - Kemember, K2 - Oldestald, K5 - Appry, K4 - Anaryze, K5 - Evaluate, K0 - Create
Unit 1 Tissue Culture In Plants 10 hours
Genome organization in plants Cell and Tissue culture in plants: Tissue culture media
(composition and preparation)
Primary culture: cell line, cell clone, callus and suspension, culture, Somoclonal variation
Micropropagation Organogenesis
Unit-2 Embryo Rescue
Embryo culture and Embryo rescue somatic embryogenesis Haploidy Protoplast fusion and
somatic hybridization Cybrids Allopheny Artificial seeds
Unit:3 Haploid Plants 8 hours
Anther Pollen and overy culture for production of haploid plants and homozygous
lines Cryopreservation slow growth and DNA banking for germ plasm conservation
Unit:4 Application Of Plant Transformation 8 hours
Application of Plant Transformation for productivity and performance: Herbicide resistance
Insect resistance, virus resistance, Nematode resistance, and Bt genes.

Uı	nit:5	Secondary Metabolites	9 hours						
Pla	nt secondar	y metabolites, Edible vaccines, and Biodegradable plastics	. Phytochemistry –						
Ext	raction me	thods and purification of alkaloids, flavonoids and terpe	enoids. Therapeutic						
imp	ortance of 1	nedicinal plants.							
Uı	nit:6	Contemporary Issues	2 hours						
Ex	pert lecture	s, online seminars – webinars							
		Total Lecture hours	45 hours						
Те	ext Book(s)								
1	1 Molecular activities of plant cell-An introduction to Plant Biochemistry. John.W.								
2	Anderson	and John Brardall, Black well Scientific Publications, 1994							
3	Concepts i	n Biotechnology D.Balasubramanian University Press							
Re	eference Bo	oks							
1	Plant Phy	siology – Devlin N.Robert and Francis H.Witham,CBS Publica	ations.						
Re	lated Onlin	ne Contents [MOOC, SWAYAM, NPTEL, Websites etc.]							
1	https://w/	www.toppr.com/guides/biology/plant-growth-and-development/r	lant-growth-						
1	regulator	s/	nunt growth-						

Mapping with Programme Outcomes													
COs	PO1	PO2	PO3	PO4	PO5	PO6	P07 (PO8	РО 9	PO10			
CO1	S	Μ	SV (S	М	S	М	S	Μ	S			
CO3	S	S	S	SSL	பாதூர	2_S	S	S	Μ	S			
CO3	S	S	S	ELSICA	'E SO EL	EVS	S	S	Μ	М			
CO 4	S	Μ	S	М	S	S	Μ	Μ	L	М			
CO5	S	S	S	S	S	S	S	S	М	M			

Course code	2E A	ELECTIVE-A PAPER-II	T.	т	Р	C					
	21313	ANIMAL TISSUE CULTURE		-	•	C					
Core/Elective/	/Supportive	Elective	3	1	-	4					
Pre-requisite	2	Fundamentals of tissue culture	Syllab Versio	ous	202 202	1- 2					
Course Objec	tives:		versit	, 11	202						
The main obje	ctives of this	course are to:									
4. To unders	stand the prep	paration of different cultures with its composition									
5. To know	about the typ	bes of cell culture									
6. To have a	n in depth k	nowledge of characterization of cultured cells									
7. To analys	e and apply	the stem culturing methods									
8. To understand the production of Transgenic animals and its applications											
Expected Course Outcomes:											
On the successful completion of the course, student will be able to:											
1 Have a	complete un	derstanding of different types of preparation of cul	ltures		K2,K	.3					
2 Analyse and apply the apt type of cell cutures for experiments											
3 Characterization of the cultured cells											
4 Applica	tion of stem	culturing methods			K6,K	K6,K4					
5 Product	ion of tra <mark>ns</mark> g	enic animals			K4,K	.6					
K1 - Rememb	per; K2 - Un	destand; K3 - Apply; K4 - Analyze; K5 - Evaluate;	K6 –	Crea	te						
	2		5								
Unit:1	9	Animal Tissue Culture		1	8 hou	irs					
Animal cells;	Culture me	edia: Balanced salt solution and simple growth	mediu	ım,	Physic	al,					
Chemical and	metabolic fu	nctions of different constituents of culture medium.									
		a anis in the second second									
Unit:2		Types Of Culture		1	5 hou	irs					
Types of cell	culture: pr	imary and established culture, organ culture, ti	ssue c	cultu	re, th	ree					
dimensional cu	alture and tis	sue engineering.									
	D 1				- 1						
Unit:3	Biolog	y And Characterization Of Cultured Cells		1	5 hou	irs					
Biology and		ion of cultured cells : tissue typing, cell-cell int	eractio	n, n	leasur	ing					
parameters of	growin, mea	isurement of cen death, apoptosis and its determine	nation,	Cyt	UUX1C	ny					
assay											
Unit:4		Embryology		1	5 hou	irs					
Embryology: o	collection an	d preservation of embryo, culturing of embryos,	gamet	ogei	nesis a	ind					
fertilization in	animals. Ste	m cell – isolation, identification, expantion, differen	ntiatior	n and	l uses.						

U	nit:5	Transgenic Animals	10 hours						
Tra	nsgenic ani	mal production and application, transgenic animals as models	for human diseases,						
tran	nsgenic anin	hals in live stock improvement, transgenesis in industry.							
U	nit:6	Contemporary Issues	2 hours						
Ex	kpert lecture	s, online seminars – webinars							
		Total Lecture hours	75 hours						
Te	ext Book(s)								
1	1 Principles of Animal Cell Culture Students Compendium by Basant Kumar Sinha and Rinesh								
	Kumar								
2	Cell cultur	e technology: Recent advances and future prospects (Euroscico	on Meeting Reports						
	Book by B	ruserud, Øystein and Astrid Englezou							
Re	eference Bo	oks							
1	Culture o	f Animal Cells by R.Freshney							
Re	elated Onli	ne <mark>Contents</mark> [MOOC, SWAYAM, NPTEL, Websites etc.]							
1	https://or	llinecoursesnptel,ac,in/noc20_bt32/preview							
		2 Realized and the State							

Mappi	Mapping with Programme Outcomes												
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10			
CO1	S	S	М	S	S	S	S	S	M	S			
CO3	S	S	M	S	S	S	S	S	M	S			
CO3	S	S	Μ	S	S	S	S	S	M	S			
CO 4	S	S	М	S	S	S	S	S	M	S			
CO5	S	S	M	S	S	S	S	S	M	S			
			ć	ந்தப்		2 11	i pr						

*S-Strong; M-Medium; L-Low EDUCATE TO ELEVATE

Cou	rse code	3EA	ELECTIVE PAPER-A PAPER III METHODS IN MOLECULAR BIOLOG	Y	L	Т	Р	С			
Cor	e/Elective/	Supportive	Elective		3	1	-	4			
Pro	e-requisite		Basic knowledge on Molecular principles		Syllab Versio	us on	20-2	21			
Cou	rse Object	tives:		ı							
The	main objec	ctives of this	course are to:								
1.	To know a	about the str	ctural organization of eukaryotic chromosome	S							
2.	Understan	d the nuclei	acids with their properties								
3.	Know abo	out the functi	ons and techniques of chromosomes								
4.	Understan	d about pha	es and vectors								
5.	Practice th	ne cloning st	ategies								
			· Store Co								
Expected Course Outcomes:											
On	the succes	sful complet	on of the course, student will be able to:								
1 Know about the structural organization of eukaryotic chromosomes											
2 Understand the nucleic acids with their properties											
3 Know about the functions and techniques of chromosomes											
4	Understa	nd a <mark>bout pha</mark>	ges and vectors				K2, K5				
5	Practice t	the cloning s	rategies				K3,	K6			
K1	- Rememb	oer; K2 - U n	lestand; K3 - Apply; K4 - Analyze; K5 - Evalu	late;	K6 – (Crea	ite				
Un	it:1		DNA Sequencing Techniques			1	10 h	ours			
Rap	id DNA se	quencing tec	hniques and strategies details of a range of me	thode	ologie	s, e.	g. plus	s and			
min	us, di- dec	oxynucleotid	e, partial ribose substitution, Maxims and C	Gilber	rt. Us	e of	thin	gels,			
reso	lution etc.	interpretatio	n of DNA sequences Role of counter ions, I	Deep	and n	arro	w gro	oves,			
sing	le stranded	DNA,A,B a	nd Z DNA etc. Chirality of the helix, syn / ar	ntipar	rallel c	com	pleme	ntary			
strar	nds.		5.5								
			BUT BUT BUT BUT BY								
Un	it:2		RNA Sequencing Techniques				10 h	ours			
Phys	sical prope	rties of RN	A: Classes of RNA, rRNA, tRNA, mRNA, H	nRN	A etc.	Sti	ructure	and			
metl	hods of iso	lation and fr	ctionation, gel electrophoresis and Dnases, Rr	iases,	, Phos	pho	diester	ases.			
Rap	id RNA se	equencing te	hniques: plus and minus interpretation of RN	JA se	equenc	e. I	Metho	ds of			
disti	nguishing	double and s	ngle stranded DNA								
Un	it:3						8 h	ours			
Re-	association	kinetics: co	t values, experimental procedure, qualitative	signi	ficanc	e, u	se of A	Ag +			
cesi	um sulfate.	Satellite D	NA : C-value paradox, possible functions of s	atelli	te DN	Ά,	mecha	nical			
strer	ngth, gene	library, supp	ressor mutation, centromeric DNA, spilt gener	s. Ch	romati	n: I	Histone	e and			
non-	-histone pr	oteins, gene	al properties of histones, packing density. Nu	cleos	somes	, si	ze var	iable			
link	er, role of I	H1.Solenoid	structure. Transcriptionally active chromatin.								

Unit:4		8 hours							
Movabl	genes: Transposons and associated inverted repeats. The cassett	e model, transforming							
DNA a	d plant genes. Retrovirus life cycle. Strategies for cloning in plasn	nid vectors, features of							
commo	ly used vectors, their purification and characterization. Identification	on of bacterial colonies							
that co	tain recombinant plasmids . Bacteriophage vectors, growth, p	urification. Cloning in							
Bacteri	phage vectors.								
Unit:5		7 hours							
Agaros	gel and Polyacrylamide gel electrophoresis, detection and extracti	on of DNA from gels.							
Constru	ction and analysis of c-DNA: Protocols and strategies for c-DNA	A cloning. Analysis of							
genomi	DNA by southern hybridization. Amplification of DNA by t	he Polymerase Chain							
Reactio	n. Preparation of radiolabelled DNA and RNA probes. Synthetic of	oligonucleotide probes.							
Express	on of cloned genes in cultured cells. Screening expression	with antibodies and							
oligonu	leotides								
Unit:6	Contemporary Issues	2 hours							
Expert	lectures, online seminars – webinars								
	56 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5								
	Total Lecture hours	45 hours							
Text I	ook(s)								
1 BR	S Biochemistry, Molecular Biology and Genetics 7 th Edition 2019 by	Liberman							
2 Te	hniques in Molecular Biology by Agrawal, Suraksha Ibdc Publishers								
3 Mo	ecular Biology and Genetic Engineering Saras Publications								
	5. 70	The second second							
Refer	nce Books	5							
1 M	olecular Biology Techniques A classroom laboratory manual Susan C	Carson							
	Colmbatore								
Relate	Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]								
1 <u>h</u>	ps://onlinecourses.swayam2.ac.in/cec20_bt17/preview_								
LI	SDUCATE TO ELEVALS								

Mappi	Mapping with Programme Outcomes												
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10			
CO1	S	М	S	S	S	S	S	S	S	S			
CO3	S	М	S	М	S	S	S	S	S	S			
CO3	S	М	S	М	S	М	S	S	S	S			
CO4	S	М	S	М	S	S	М	S	S	S			
CO5	S	М	S	М	S	S	S	S	S	S			

		FLECTIVE-A PRACTICALS				Т
Course code	1 FD	CELL CHI THE AND MOLECHIAD	т	т	D	C
Course coue	41/1	CELL CULTURE AND MOLECULAR TECHNIQUES	L	1	I	C
		TECHNIQUES				
Core/Elective/	Supportive	Elective	-	-	4	4
Pre-requisite	2	Basic analytical skills	Sylla Versi	bus .on	2021 2022	1- 2
Course Objec	tives:		L			
The main object	ctives of this	course are to:				
1.Learn about	the technique	s of Plant Tissue Culture				
2.Learn about	the technique	s of Plant Tissue Culture				
3.Expertise in	molecular tec	hniques				
Expected Cou	rse Outcome	s:				
On the succes	sful completi	on of the course, student will be able to:				
1 Understa	nd the technic	ues of plant tissue culture			K1.K	2
2 Apply the			K3.K	4		
3 Understa			K2.K	4		
4 Apply the	K4 K5					
5 Expertise	techniques			K5 K	<u>6</u>	
K1 - Rememb	per: <mark>K2 -</mark> Und	erstand: K3 - Apply: K4 - Apalyze: K5 - Evaluate:	K6 - (~re	ate.	0
					are	
Unit:1	PI	ANT TISSUE CULTURE		A1	5 hou	rs
1.PTC laborate	orv organizati	on	8			
2.Sterilization	procedures	TAN NEW A	5	/		
3.Preparation of	of PTC mediu	m JAP IN 6				
4.Callus induct	tion 🧐	Combatara				
		5A. AV				
Unit:2	PL	ANT TISSUE CULTURE		1	15 hou	rs
5.Micro propag	gation	EDUCATION				
6.Artificial see	d production	OCATE TO ELEVAN				
7.Mitotic Prepa	aration –Onio	n root tip				
		*				
Unit:3		1	l5 hou	rs		
1.Preparation of	of ATC mediu	Im and membrane filtration				
2.Preparation of	of primary cul	ture from chick embryo				
Unit:4	AN	IMAL TISSUE CULTURE		1	5 hou	rs
3.Isolation of I	ONA from an	mal cell				
Quantification	of DNA- Spe	ctrophotometric method				

U	nit:5	METHODS IN MOLECULAR BIOLOGY	13 hours							
1.Is	solation of g	enomic DNA and RNA								
2.Is	solation of p	lasmid DNA and estimations by DNP method								
3.P	olymerase c	hain reaction								
U	nit:6	Contemporary Issues	2 hours							
Ех	xpert lecture	s, online seminars – webinars								
		Total Lecture hours	75 hours							
Te	ext Book(s)									
1	1 Molecular Cloning : a laboratory Manual, J. Sambrook, Fritschand Maniatis, Cold Spring									
	Harbor Laboratory Press, New York, 2000.									
2	2 Applied Molecular Genetics, Roger, L.Miesfield, John Wiley and Sons Inc Publications,									
	1999.									
3	Recombin	ant DNA Principles and Methodologies, James J. greene, Venga	lla B.Rao, Marcel							
	Dekker Pu	blications, 1998								
		96 7								
Re	eference Bo	oks E A A A A A A A A A A A A A A A A A A								
1	DNA Clor	ing, a pratical approach, D.M. Glover and B.D. Hames, IPL								
	press, Oxf	ord, 1995								
2	Molecular	and Cellular methods in Biology and Medicine, P.B. Kaufman,								
	W.Wu, D.	Kim and L.J.Cseke, CEC press, Florida, 1995.								
		Salar Internet								
Re	elated Onli	ne Contents [MOOC, SWAYAM, NPTEL, Websites etc.]								
1	https:onl	inecourses.swayam2.ac.in/cec20_bt17/preview								
		a gistimon e minister								

Mappi	Mapping with Programme Outcomes and ELEVALE												
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10			
CO1	S	S	S	S	S	S	S	S	S	S			
CO3	S	S	S	S	S	S	S	S	S	S			
CO3	S	S	S	S	S	S	S	S	S	S			
CO 4	S	S	S	S	S	S	S	S	S	S			
CO5	S	S	S	S	S	S	S	S	S	S			

		ELECTIVE GROUP- B PAPER-I										
Course code	IEB	COMPUTATIONAL MOLECULAR	L	Т	Р	С						
		BIOLOGY										
Core/Elective/	/Supportive		3	1	-	4						
	Supportion	Elective	- -	_								
Pre-requisite	•		Syllab	us	202	l-						
		Basics of Computer in Biology	Versio	n	202	2						
Course Objec												
The main object	enth knowled	course are										
2 To obtain an	overview of	he sequence alignment										
3.To gain knowledge about the evolutionary bioinformatics												
4. To get Knowledge about the functional transcriptional regulatory signals												
5.To get knowledge about the profile pattern												
Expected Cou	rse Outcome	s:										
On the succes	sfu <mark>l complet</mark> i	on of the course, student will be able to:	-									
1 Gain kno	wledge about	all genome databases			K1, F	K2						
2 Understa	nd the overvi	ew of the sequence alignment	-		K2, ŀ	Κ4						
3 Gain kno	wledge about	the evolutionary bioinformatics			K1, F	Κ5						
4 Gain kno	owledge abo	ut the functional transcriptional regulatory signals			K1, F	Κ3						
5 Gain kno	wledge about	the profile pattern	9	A	K1,K	6						
K1 - Rememt	per; K2 - Und	erstand; K3 - Apply; K4 - Analyze; K5 - Evaluate	; K6 –	Cre	eate							
	505	CAR UN										
Unit:1	292	Computational Molecular Biology	<u></u>		7 hou	rs						
Computational	Molecular B	iology: Bioinformatics - Literature database: Publ	MED. I	Bibl	iograp	hic						
and Full Text	Journal Acce	ss- Genome Databases - Molecular Biology Data	bases o	on t	he We	b -						
DNA and pro-	tein forensics	analysis - Probability and statistics - Prior pr	obabili	ty -	Linka	ıge						
analysis.		COATE TO ELETT										
Unit:2	Pat	tern Matching with Consensus Sequences	_		8 hou	rs						
Pattern Matchi	ing with Con	sensus Sequences - Quantitative & Probabilistic	Pattern	n M	latchin	g -						
Sequence Alig	nment - Rapi	d Sequence Similarity Search - Near-Optimal Seq	uence	Ali	gnment	S -						
Multiple Seque	Multiple Sequence Alignment.											
Unit:3	Unit:3 Distance Based Phylogenies 7 hours											
Distance Base	d Phylogenie	s - Sequence Blocks & Profiles - Protein Secure	ence M	loti	fs Prot	ein						
Structural moti	if.	1			•	-						

Unit:4	Clustering and Functional Analysis	13 hours
Clustering an	d Functional Analysis of Coordinately Regulated Gen	es - Discovering
Transcriptional	Regulatory Signals - Ultra conservation in the Human C	Genome - Pathway
Bioinformatics		

Un	nit:5	Machine Learning Algortihms And Artificial	8 hours							
		Intelligence								
Intr	Introduction to GCG SeqWeb and EMBOSS Web interface software suites and their tools: Best									
Fit,	Fit, GAP, WATER, NEEDLE, TRANSEQ, BACKTRANSEQ, PEPINFO, CpG PLOT,									
DO	TMATCHE	ER. PRETTYPLOT. Machine learning algorithms and Artific	cial Intelligence for							
bior	nedical big	data. Data analytics.								
		Contemporary Issues	2 hours							
Ex	pert lecture	s, online seminars – webinars								
		Total Lecture hours	45 Hours							
Te	xt Book(s)									
1	Bioinforr	nat <mark>ics-A beg</mark> inner's guide by Jean – Michel Claverie and Cedric	v Notredame,							
	Wiley- D	ream Tech India Pvt.Ltd.								
2	Bioinform	natics by David.W.Mount, CBS publishers and distributers.								
3	Instant no	otes in bioinformatics by D.R. Westhead, J.H.Parish and R.M.Tv	vyman.							
4	Introduct	ion to bio <mark>informatics by T.K. Attwood and D.J. Parry –sm</mark> ith, P	earson							
	Education	nAsia.	5							
		S ALAR UN S								
Re	ference Bo	ooks Colmbatore								
1	Biostatist	ical analysis.Zar.J.H								
2	Peuzner,	P.A., Computational molecular Biology, An algorithmic approa	ch.							
3	Developi	ng bioinformatics computer skills by Cynthia Gibas and	Per Jambeck, O'							
	Reillypul	blications								
Re	lated Onli	ne Contents [MOOC, SWAYAM, NPTEL, Websites etc.]								
1	http://ww	w.dypatil.edu/schools/biotech-and-bioinformatics/swayam-npte	el-local-chapter/							
2	http://ww	/w.ncbi.nlm.nih.gov/genbank								

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	М	S	M	S	S	M	S	S
CO3	S	S	S	М	М	S	S	S	Μ	S
CO3	S	Μ	S	S	S	S	S	S	S	S
CO4	S	M	S	S	S	S	S	M	S	S
CO5	S	Μ	S	М	S	M	S	Μ	S	S
							-			



		ELECTIVE GROUP- B PAPER-II	_		-	~
Course code 2EB		GENOMICS		Ί	Р	С
Core/Elective/	Supportive	Elective	3	1	-	4
Pre-requisite	•	Basics in Genetics	Syllab Versic	us n	202 202	1- 2
Course Objec	tives:		<u>I</u>			
The main object	ctives of this	course are to have				
1. Basic uses o	f structures of	of genomes				
2. Thorough kr	nowledge of	mapping and sequencing of genome				
4 Gain the knowled	uge about the	ut the DNA sequencing and modelling				
	wiedze ubo	at the DTAT sequencing and moderning				
Expected Cou	rse Outcom	es:				
On the succes	sful complet	tion of the course, student will be able to				
1 Gain ba	sic uses of st	tructures of genomes			K1, F	ζ2
2 Gain the	oro <mark>ugh know</mark>	vledge of mapping and sequencing of genome			K3, I	ζ4
3 Gain kn	ow <mark>ledge</mark> abo	out the gene evolution and human genome project			K2, I	ζ6
4 Gain kno	wl <mark>edge</mark> abou	It the DNA sequencing and modelling			K2, H	ζ3
5 Understa	nd <mark>concepts</mark>	of comparative genomics of prokaryotes and eukary	yotes		K2, H	ζ5
K1 - Rememb	per; <mark>K2 - Un</mark>	<mark>derstand; K3 -</mark> Apply; <mark>K4 - Analyze; K5 -</mark> Evaluate	; K6 –	Cre	eate	
Unit:1		Genome Structure			10 hou	irs
Genome struct	ture: Genom	e sizes and the C-value paradox, introns and ex	ons, m	icr	obial a	nd
organelle geno gene density, in	mes - Centro ntergenic DN	omeres and telomeres, tandem repeats- dispersed reported and telomeres.	peats (t	ran	sposon	.s),
	29	Calindadana				
Unit:2		Genome Sequencing			15 hou	irs
Genome physic	cal mapping	and sequencing: Fragmenting the genome, the nee	d for r	nar	kers -	
marker sequen	ces (RFLPs	, AFLPs, SNPs, etc) - hybridization mapping -m	apping	W	ithout	
cloning - Basi	c Sanger se	quencing - automated sequencing- sequencing sin	nple ge	eno	mes -	
Sequencing lar	ge genomes	- finalizing sequences – resequencing.				
Unit·3		Genome Project And Bioinformatics			13 hor	irs
Genome proje	ect and bio	informatics - www databases for genomes -	DNA	dy	namics	-
Recombination	n – Evolutio	n - Gene diversity - Consensus and pattern reco	gnition	-	Sequen	ice
diversity – Pol	ymorphism.					
TIm: 4 - A		Dhalogonotia Community			101	
Unit:4	Jenome man	rnylogenetic Genome mapping	shearin	10	10 hou	n rs
Web-based OR	F finding set	ping - Diva sequence uniquese analysis - Kandolli- equence alignment and 3-D matrix tools - Constato	-5110a111	ıg ' Δ r	nodelir	.ικ - ισ
	a munic, s	equence angliment and 5 D matrix tools Genotate		1		·5·

U	nit:5		Ortho	logues and pa	ralogues		1	0 hours
Ort	hologues a	and paralogues,	RNA	transactions,	comparative	genomics	of viruses,	bacteria,
org	anelles and	eukaryotes, late	ral gen	e transfer.	-	-		
		·						
			Co	ntemporary I	ssues			
Ex	pert lectur	es, online semina	ars – we	ebinars				2 hours
	1	· ·						
					Total Lect	ure hours	6	0 hours
Te	ext Book(s))						
1	The Hum	an Genome Proj	ect; De	ciphering the b	olueprint of he	redity ; Edit	ed by Necia	Grant
	Cooper; U	Jniversity Science	e book	s <mark>, CA, USA,</mark> 1	1994. <mark>2. Bioin</mark>	formatics		
2	Bioinforn	natics-A beginne	r's guio	l <mark>e by Jean – N</mark>	lichel Claveri	e and Cedric	Notredame	, Wiley-
	Dream Te	ch India <mark>Pvt. Lt</mark> e	i.		6			
						2		
		18	11.			6		
Re	eference B	ooks 👘 🖊						
1	Develop	ing <mark>bioinform</mark> ati	cs com	puter skills by	y Cynthia Gil	oas and Per	<mark>J</mark> ambeck, C)' Reilly
	publicati	ons.		20			1	
Re	elated Onli	ine <mark>Contents</mark> [M	100C,	SWAYAM, N	NPTEL, Web	sites etc.]		
1	https://o	nline <mark>courses,n</mark> pt	el,ac,in	/noc20_bt19/p	oreview	1 3.0		
2	2 https://onlinecourses.swayam2.ac.in/cec20_bt20/preview							
			6	- it		R		
		E		NT.	2		9	
Co	ourse Desig	ned By:	24.		181		9 /	
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		200						0.616		
Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	М	SSL	புகரை	S-L-	S	М	S	S
CO3	S	S	М	ELSUCA	TE SO E	ESTE	S	М	S	S
CO3	S	S	Μ	S	S	S	S	М	S	S
CO4	S	S	М	S	S	S	S	М	S	S
CO5	S	S	Μ	S	S	S	S	М	S	S

Course code	3EB	ELECTIVE GROUP- B PAPER-III PROTEOMICS	L	T	Р	С				
Core/Elective/	Supportive	Elective	3	1	-	4				
Pre-requisite	;	Knowledge on Protein Chemistry	Syllabus 2 Vorsion 2			1-				
Course Object	tives•	Knowledge on Frotein Chemistry	versio		202					
The main object	ctives of this	course are to								
1. To know abo	out electroph	presis, chromatography techniques.								
2. Clearly understand analysis of proteins.										
3. Have thorough knowledge on structural proteomics.										
4. Gain knowl	edge on deve	loping new drugs.								
5. Have clear i	idea on comp	utational protein – protein interactions.								
Expected Cou	rse Outcome	es:								
On the succes	sful com <mark>pleti</mark>	on of the course, student will be able to:								
1 Know ab	out electroph	oresis, chromatography techniques.			K1,K	52				
2 Clearly u	nde <mark>rstand an</mark>	alysis of proteins.			K2,K	3				
3 Gain tho	rou <mark>gh knowl</mark>	edge on structural proteonomics			K2,K	34				
4 Gained k	nowledge on	developing new drugs.		K2,K6						
5 Get clear	r id <mark>ea got</mark> on	computational protein – protein interactions			K2,K	35				
K1 - Rememb	per; K2 - Und	erstand; K3 - Apply; K4 - Analyze; K5 - Evalua	te; K6 –	Cre	ate					
				Δ						
Unit:1	E	Chromatography Techniques	13		8 hou	ırs				
Introduction to and analytical quantitative 2D	2D gel elec protein chi DGE, quantita	ctrophoresis, multidimensional chromatography, ps. Identifying proteins in complex mixtures tive mass spectrometry.	mass s s. Prote	spec in	tromet profili	ry, ng,				
	ζġ	Coimbatore								
Unit:2		Protein interaction			7 hou	ırs				
The analysis of phosphoproteins and glycoproteins. Protein interaction analysis, Y2H, mass spec complex analysis, functional protein chips, protein localization, high throughput functional annotation.										
Unit:3			8 hou	ırs						
Protein domai	ns and folds	s, using sequences and structures to predict	gene fu	incti	on, hi	gh				
throughout stru	ctural analys	is of protein, structural proteomics and what it ca	n achiev	ve.						
Unit:4		Phamacogenomics			7 hou	ars				
Phamacogenon	rocedur	e fol	lowed	in						
drug design; Molecular modification of lead compounds; Prodrug and soft drugs; Physico- chemical parameters in drug design; QSAR; Active site determination of enzymes; Design of enzyme inhibitors.										

Ur	nit:5	Bioinformatics	13 hours							
Sig	nificance	ata handling, data								
Inte	Interpretation. Computational protein-protein interactions RasMol – Swiss PDB viewer									
	1									
Contemporary Issues										
Ex	Expert lectures, online seminars – webinars									
		45 hours								
Те	ext Book(s)									
1	Branden,	C and J.Troze, 1999. Intr <mark>oduction to pro</mark> tein structure. Second e	dition.							
2	Baxevanis	, A.D and Ouellette, B.F.F (Eds), 2001. Bioinformatics: A prac	tical guide to the							
	analysis o	f genes and proteins. Wiley interscience. New York.								
Re	eference Bo	oks								
1	Higgins,	D and Taylor, W (Eds), 2000. Bioinformatics: Sequer	nce, structure and							
	databnks.	Oxf <mark>ord Unive</mark> rsity Press, Oxford.								
2	Misener,	S a <mark>nd Krawe</mark> tz, S.A (Eds), 2001.Bioinformatics <mark>: m</mark> ethods and	protocols. Replica							
	press priva	ate limited, New Delhi.								
Re	Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]									
1	https://or	llinecourses,nptel.ac.in/noc20_bt19/preview								
2	https://or	llinecourses.nptel.ac.in/noc20_bt20/preview								
		the second of the								
		5 70 000	20							

Mappi	Mapping with Programme Outcomes											
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10		
CO1	S	М	S E	S	S	S	S	S	S	S		
CO3	S	М	S	S	JISON	S	S	S	М	S		
CO3	S	М	S	SCAL	E SI EL	S	S	S	S	S		
CO 4	S	М	S	S	S	S	S	S	М	S		
CO5	S	М	S	S	S	S	S	S	S	S		
Course code	4EP	4EP ELECTIVE -COMPUTATIONAL BIOLOGY PRACTICALS										
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Core/Elective	e/Supportive	Elective	-	-	4	4						
Pre-requisit	e	Basic Computer skills	Sylla Versi	bus ion	3 2021 2022	 						
Course Obje	ctives:											
The main obje	ectives of this	course are to										
1.Gain hands	on experience	alessification of acqueres and structure										
2.Galli Knowie	euge about the	classification of sequence and structure										
		100 00 00 00 00 00 00 00 00 00 00 00 00										
Expected Course Outcomes:												
On the succe	essful co <mark>mpleti</mark>	on of the course, student will be able to:										
1 Gain basic uses of molecular databases K1,K3												
2 Gain thorough knowledge on Bioinformatic tools K2,K3												
3 Gain knowledge about the retrieval, integration and interpretation K3,K6												
V1 December V2 Hedersteed V2 Angle V4 As Levy V5 Feelence V6												
KI - Kemen	ider, K 2 - Olio	erstand, KS - Appry, K4 - Anaryze, KS - Evaluate,	K0 – 1		ale							
Unit:1	5	Expasy – Proteomic Tools.		6	40 hou	rs						
A. Peptid	e cutter		9									
B. Peptid	e Mass			1								
C. Revers	se Translate	SHAR UN										
D. Interpr	roscan	Colimbatore Co										
E. 2Zip	~	5.4										
F. Coils		a Bissi war a Wite										
G. EPestf	ïnd	EDUCATE TO SU EVINTE										
H. Protpa	ram	SATE TO EEET										
I. Radar												
J. Comp	ute pl/Mw		1									
Unit:2		Small Molecules, Fatty Acids		20	hours							
Other data bas	ses Small mole	ecules, Fatty acids etc.,										
A. Drawing small molecules using chemsketch.												
B. Retrieving fatty acids and drawing using chemsketch.												
Unit:3	Unit:3Multiple Sequence Alignment13 hours											
Multiple sequence alignment (Clustal).												

	Contemporary Issues									
Expe	ert lectures, online seminars – webinars	2 hours								
	Total Lecture hours	75 hours								
Text	Text Book(s)									
1 K	1 K. Mani, N. Vijayaraj, Bioinformatics for beginners. 1 st edition, Kalaikathir Achagam, Coimbatore, 2002.									
Refe	erence Books									
1 N	Mani. K and Vijayraja, Bioinformatics – A practical approach, Aparna pub	lications,								
(Coimbatore 2005.									
Relat	ted Online Cont <mark>ents [MOOC</mark> , SWAYAM, NPTEL, Websites etc.]									
1 1	https://onlinecourses.nptel.ac.in/noc20_bt23/preview									

Mappi	ng with	Program	<mark>ı</mark> me Out	comes		-	2	ાશ				
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10		
CO1	S	S	S	S	S	S	S	S	S	S		
CO3	S	Μ	S	S	S	S	S	S	M	S		
CO3	S	M	S	S	S	S	S	S	М	S		
CO4	S	M	S	S	S	S	S	S	М	S		
CO5	S	М	S	S	S	S	S	S	M	S		
		5		Cho.		2	27	1 AS		<i>k</i>		
*S-Stron	*S-Strong; M-Medium; L-Low Colmbatore SISSLILIITGOT 2-UITSSIL FOUCATE TO ELEVATE											

		ELECTIVE GROUP- C									
Course code	1EC	PAPER- I: FUNDAMENTALS OF NANOSCIENCE	L	Т	Р	C					
Core/Elective/	/Supportive	Elective	3	1	-	4					
Pre-requisite	•	Basics of Nanoparticles	Syllabi Versio	ıs n	2021- 2022						
Course Objec	tives:										
The main ob	jectives of thi	is course are to									
1.Understand	d the history o	of Nanotechnology, Nanomaterials and interactio	n of								
Nanoparticle	es,										
2.Have a kee	en knowledge	on forces between atoms and molecules									
3.Get knowl	edge on Nanc	carbon tubes and their applications									
4.Understand	d about High	vaccum technology									
Expected Cou	rse Outcome	s:	<u> </u>								
	On the successful completion of the course, student will be able to:										
1 To under	stand the hist	ory of nano techniques at their atomic level			K_{1} K	3					
2 Gain kno	wledge about	the interactions of nanoparticles				5					
3 Have kn	owledge abou	it nanostructures and their properties			K4, K	5 5					
4 Get Idea	about variou	s forms of carbon			KI, K	5					
5 Have In	depth knowle	edge on high vacuum technology		A	K3, ł	\$5					
K1 - Rememb	per; K2 - Und	estand; K3 - Apply; K4 - Analyze; K5 - Evaluate	e; K6 –	Crea	ate						
	C.	4 The second second		1							
Unit:1	25	Basics of Nanotechnology	09 h	our	5						
Background to	o Nanotechn	ology – Scientific revolutions – types of I	Nanotec	hnol	ogy ai	nd					
Nanomachines	– Atomic st	ructure molecules & phases – molecular and at	omic si	ze –	surfac	es					
	al space – Nal	iomaterials- top down and bottom up approach									
Linit.?	Fo	arces Between Atoms And Molecules		0	0 hom	re					
Strong intermo	lecular force	s = covalent and coulomb interactions – interactions	tions in	volv	ing not	ar					
molecules and	polarization -	- weak intermolecular forces and total intermolec	ular pai	r no	tentials						
Van der Waal	ls forces – r	epulsive forces: special interactions such as h	vdrogei	1 - 1 -	bondin	g.					
hydrophobic a	nd hydrophili	c interactions.	.,8			0,					
	~ 1										
Unit:3	Ň	anostructures and their properties		0	8 hou	rs					
Definition of I	Nano systems	- Dimensionality and size dependent phenome	na in Q	uant	um do	ts,					
and Quantum v	wires – size de	ependent variation in magnetic, electronic transpo	ort prop	ertie	S						

U	nit:4	Nanocarbon Tubes and their properties	09 hours							
Typ	bes of nanot	ubes - formation of nanotubes - methods and reactants - arcin	g in the presence of							
cob	alt – laser i	nethods - ball milling - chemical vapour deposition methods -	- properties of nano							
tube	es – plasma	arcing - electro deposition - pyrolytic synthesis - Zeolites and	templated powders							
laye	ered silicate	S.								
U	nit:5	High Vacuum Technology	08 hours							
Eva	poration th	neory – different sources for evaporation – working princi	ples of rotary and							
diff	diffusion pumps – Cryogenic pumps – Cryo sorption and Getter pumps – Vacuum materials.									
U	nit:6	Contemporary Issues	2 hours							
Ex	pert lecture	es, online seminars – webinars								
	1	Total Lecture hours	45 hours							
Te	ext Book(s)									
1	Nanotechi	ology: Basic Science and Emerging Technologies – Mick Wils	on, Kamali							
	Kannanga	ra, Geoff Smith, Michelle Simmons, Burkhard Raguse, Oversea	is Press(2005)							
2	2 Amorphous and Nanocrystalline Materials: Preparation, Properties, and Applications,									
	A.Inoue, I	K.Hashimoto (Eds.,)(2000)								
3	Introduction (2003)	on to Nanotechnology, Charles P. Poole, Frank J. Owens, Wiley	r-Interscience							
4	Nanotechi	nology: A Gentle Introduction to the Next Big Idea, Mark A. Ra	tner, Daniel							
	Ratner, M	ark Ratne, Prentice Hall PTR; 1 st edition(2002)								
5	Fundamer	tals of Surface and Thin Film Analysis, Leonard C.Feldmanan	dJames W.							
	Mayer	NB-S-S-S-								
6	Hand boo	c of thin film technology L I Maissel and R. Glang (McGraw -	Hill Book							
0	Company		THII DOOK							
	Company	SOATE TO ELEVIT								
Re	eference Bo	ooks								
1	Nanotech	nology: Basic Science and Emerging Technologies – Mick Wils	son, Kamali							
	Kannanga	ra, Geoff Smith, Michelle Simmons, Burkhard Raguse, Oversea	us Press(2005).							
2	Understan Warner Be	ding Nanotechnology, Scientific American, editors at Scientific poks(2002).	American,							
3	Introduction	on to Nanotechnology Charles P. Poole, Frank I. Owens, Wiley	-Interscience							
5	(2003)	sh to realisteemology, charles r. roole, rrank J. Owens, whey	merseicher							
	(2003).									

Re	elated Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1	https://www.my-mooc.com/tags/nanotechnology
2	https://www.coursera.org/courses/nanotechnology
3	https://www.classcentral.com/tag/nanotechnology
4	https://swayam.gov.in/endocrinology

]	Mapping	g with Pro	ogramme	e Outcon						
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	М	S	М	S	S	S	М	S
CO2	S	S	М	M	S	S	S	S	М	S
CO3	S	M	S	S	M	S	S	S	S	S
CO 4	S	M	M	M	S	М	S	M	S	М
CO5	S	M	M	S	M	S	S	M	S	М

*S-Strong; M-Medium; L-Low

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Cou	rse code	2EC	ELECTIVE GROUP- C PAPER-II: NANOMATERIALS	L	Т	Р	С				
Core	e/Elective/	/Supportive	Elective	3	1	_	4				
Pre	-requisite		Basics of Nanoparticles	Sylla Versi	bus ion	2021- 2022	<u> </u>				
Cou	rse Objec	tives:									
	The m	ain objective	s of this course are to								
	1.Know about the gel processing techniques										
	2.Synt	hesise t <mark>he na</mark>	nocomposites								
	3.Und	erstand the fi	Im deposition methods								
	4.App	ly different s	ynthetic methods								
	5.Synthesise the nanostructures										
Expe	ected Cou	rse <mark>Outcome</mark>	es:								
On the successful completion of the course, student will be able to:											
1	Gain kno nanoparti	owl <mark>edge abou</mark> icles	t fundamentals of sol gel processing techniques of			K1, K	2				
2	Understa	nd the in-dep	th detail of synthesis of Nanocomposites			K2 K3					
3	Know at	oout synthesis	by Film deposition techniques		1	K1,K3					
4	Know an	d apply vario	us methods for the synthesis of Nanomaterials	-0	A	K3,K6	5				
5	To know	and apply ad	vanced methods used in the synthesis of Nanostru	ctures		K3 K5	5				
		50	SAR UN								
K1	- Rememb	per; K2 - Unc	lerstand; K3 - Apply; K4 - Analyze; K5 - Evaluate	e; K6 -	– Cre	eate					
Uni	it:1	s).	Sol-Gel Processing Method			20 hou	rs				
Fund Silic	lamentals a gel – Zir	of sol-gel pro conia and Yt	ocess – sol-gel synthetic methods for oxides – Th trium gel – Aluminosilicate gel methods.	e Pec	heni	method	. —				
Uni	it:2		Synthesis of Nanocomposites	10	hour	'S					
Synt	hesis of o	ther Inorgan	ic materials- Synthesis of Nanocomposites – Synthesis	/nthes	is of	Polvm	er				
Nano	composit	es.			10 01	1 01911					
Uni	Unit:3Film deposition methods15 hours										
Intro	duction –	Fundamenta	als of film deposition - Thermal Evaporation	– Mc	lecu	lar Bea	m				
Epitaxy - Pulsed laser deposition - Sputter deposition - Chemical Vapour Deposition (CVD) -											
layer	by layer	growth and	ultra thin films – chemical solution deposition –	Lang	muir	Blodge	elt				
films	5.										

Ur	nit:4			Ot	her Synt	hesis Me	thods			0	8 hours
Mo	lecul	ar Bea	m Epitax	y – Pulse	d laser d	leposition	n – Sput	ter depos	ition –	Chemical	Vapour
Dep	ositi	ion (CV	D). Sur	face Chen	nistry an	d its rol	e to prep	pare Qua	ntum de	ots – Pol	ymer as
Qua	ntur	n dot si	ze stabili	zer.							
		<u> </u>									
Ur	nit:5			Syr	thesis of	Nanostr	ructures			20 hours	
One	One-dimensional (1D) structure synthesis by Spontaneous Growth – One-dimensional (1D)										
stru	structure synthesis by VLS and SLS Growth - Template Assisted Growth method -										
Elee	Electrochemical growth of one-dimensional (1D) structures.										
	nit:6						2 hours				
Ex	pert	lecture	s, online s	seminars –	webinars	5		0			
	<u> </u>			<u> </u>			Total L	ecture ho	urs	45 -	- hours
Te	$\frac{\mathbf{xt} \mathbf{B}}{\mathbf{xt}}$	ook(s)					-				1
1	Nat	10 electr	onics and d	Rainer W	on techno	blogy: Ac	Ivanced e	lectronic	material	s and nove (005)	el
2	V Nanocomposite science and technology Pulickel M. Aigyan Linda S. Schedler, Paul V.										
2	Braun, Wiley – VCH Verag, Weiheim(2003)										
3	3 Amorphous and Nanocrystalline Materials: Preparation, Properties, and Applications,										
4	A.I	noue, K	.Hashimo	oto (Eds.,)	(2000)	1	0 1		71 1' '		
4	Qua	antum F	leterostru	ictures: Mi	croelectro	onics and	Optoeled	ctronics,	ladimir	Mitin	
5	Th	eory of	Modern	electronic	semicon	ductor d	evices, K	K.F.Brenn	anand A	.S. Brown	1
6	Sei	micond	uctor Nar	ostructure	s for Opt	oelectron	ic applica	ations, To	dd D.Ste	einer	
1	Sm	art Elec	tronic Ma	aterials (Fi	indament	als and a	pplication	ns), Jaspri	tSingh		
8	The	e Physic	s of Low	dimension	nal semico	onductors	s, John H.	.Davies.	100		
	efere	nce Bo	oks	N		the star D				Caralta	
1	Na Na	nostruc	tures and	Nanomate	erials (Syl	itnesis, P	roperties	and Appl	ications	, Guozno	ngCao.
2 D	Nar	1000000000000000000000000000000000000	onics and	Informati	on techno	blogy Edi		ainer wase	er.		
			le Contei		C, SWA	Y AIVI, NI	PIEL, W	ebsites e	tc.]		
1	<u>nt</u>	tps://ww	vw.my-m	ooc.com/t	ags/nanot	ecnnolog	YVALL				
2	<u>nt</u>	tpo://ww	ww.classe	entral.com		visof pope	<u>gy</u> motorial	-			
5	<u>III</u>	Monnir	ayann.go	rogromm		<u>1501 IIalic</u>		S			
	1	viappii				105	1	1			1
CC	S	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO	1	S	M	M	M	M	S	S	S	M	S
CO	2	<u>S</u>	S	M	M	M	S	S	S	M	S
CO	3	<u>S</u>	M	M	M	M	S	M	S	M	S
CO	4	S	M	S	S	M	M	S	S	M	S
CO5 S			M	M	M	S	M	S	M	S	M

*S-Strong; M-Medium; L-Low

Course code	purse code3ECELECTIVE GROUP- C PAPER-III: CHARACTERIZATION OF NANOMATERIALSLTP											
Core/Elective/	/Supportive	Elective	3	1		4						
Pre-requisite	2	Basics of Nanoparticles	Syllal Versi	bus on	2021- 2022							
Course Objec	tives:											
The m	ain objective	es of this course are to										
1.Und	erstand the a	nalytical tools and applications of different techniq	ues									
2.Gair	2.Gain knowledge on quantum dot materials											
3. App	ply the nanor	naterials in different fields.										
Expected Cou	rse Ou <mark>tcom</mark>	es:										
On the succes	ssful complet	tion of the course, student will be able to:										
1 Gain knowledge about fundamentals of XRD and NMR techniques F												
2 In-depth detail of AFM and EDX techniques												
3 Have knowledge about characterization of Nanoparticels by SEM and TEM												
4 To know and apply the synthetic techniques of Quantum dots												
5 To know	5 To know the advanced applications of Nanomaterials K3,K6											
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze: K5 - Evaluate; K6 – Create												
Unit:1		XRD and NMR		0	8 hou	rs						
X-Ray diffract	tion techniqu	e- Basics and its application to size analysis of N	anoma	terial	ls. NN	ИR						
Technique- Ba	sics and app	lication tosize analysis of Nanomaterials.										
	65		2	/								
Unit:2	2	AFM and EDX		0	9 hou	rs						
Working of A	tomic Forc	e Microscopy (AFM) – Mode of operations (qu	alitativ	ve)	and	its						
application.		3.5 Stores in All										
EDX spectra-1	Basics and it	s application to size analysis of Nanomaterials.										
		EDUCATE TO ELEVATE										
Unit:3		SEM and TEM		0	9 hou	rs						
Scanning Elec	tron Microso	cope (SEM)-Theory, Instrumental setup and its app	licatio	ns –	Low]	KV						
SEM and its ap	pplication – l	Low temperature SEM and its application.										
Transmission I	Transmission Electron Microscope (TEM)-Theory, Instrumental setup and its applications											
TT		Our and the second seco			0 1.							
Unit:4		Quantum dot Materials			5 nou	rs						
Quantum dot IR photo detectors- Quantum dot lasers –working of electron probe micro analysis												
and its applies	ation in eler	mental analysis – SK growth of germanium dots	s on si	11100	n and	1ts						
application.												

Uı	nit:5	Applications of Nanomaterials	09 hours
Syn	thesis of Zi	nc oxide nanomaterials and its application – Synthesis of Silve	er Nanomaterials and
its	application	Synthesis of Copper Nanomaterials and its application-Syn	nthesis of Group-III
Niti	ride Nanost	ructures and their applications.	
U	nit:6	Contemporary Issues	2 hours
Ex	pert lecture	s, online seminars – webinars	
		Total Lecture hours	45 hours
Te	ext Book(s)	A REAL	
1	Theory of	Modern electronic semiconductor devices, K.F.Brennanand	A.S. Brown
2	Semicond	actor Nanostructures for Optoelectronic applications, Todd D.S	teiner
3	Smart Ele	ctronic Materials (Fundamentals and applications), JaspritSingl	h
4	The Physic	cs of Low dimensional semiconductors, John H.Davies	
5	Nanoscale	e calibra <mark>tion an</mark> d Standards and Methods Edited by C.Wilkening	g andKoenders
6	Nanostruc	ture <mark>s and Nan</mark> omaterials (Synthesis, Properties and Application	s), GuozhongCao
7	Nanoelect	onics and Information technology Edited by RainerWaser	
Re	eference Bo	oks – Alexandra and a second an	
1	Scanning l	Electron Microscopy for Nanotechnology Edited by W.Zhou an	d Z. LinWang
	Nanosyste	m characterizationtools in the life sciences Edited by ChallaKu	mar
		e han / A	
Re	elated Onlin	ne Conte <mark>nts</mark> [MOOC, SWAYAM, NPTEL, Websites etc.]	-9
1	https://w	ww.my-mooc.com/tags/nanotechnology	20
2	https://w	ww.classcentral.com/tag/nanotechnology	
3	https://sv	vayam.gov.in/structuralanalysis of nanomaterials	
		Coimbatore	
		ST Q	

	555LILITION 2 WITT											
Mapping with Programme Outcomes TO ELEVATE												
COs	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO10		
CO1	S	М	М	М	М	S	S	S	М	S		
CO2	S	S	S	М	М	S	S	S	S	S		
CO3	S	М	Μ	М	М	S	S	S	М	S		
CO4	S	М	M	S	М	S	S	S	S	S		
CO5	S	М	S	М	S	М	S	S	М	S		

*S-Strong; M-Medium; L-Low

Course code 4EP		ELECTIVE – NANOTECHNOLOGY PRACTICALS	L	Т	Р	С			
Core/Flective	/Sunnortive	Flective			<u> </u>	4			
Pre-requisite		Basic analytical skills	Syllabus Version		2021 2022	<u> </u>			
Course Objec	tives:		.I						
The main object	ctives of this	course are to:							
1. Update the students with latest nano techniques									
2. Train the students with all synthetic process									
3. Enrich the students skill in nanosci <mark>ence so as to un</mark> dertake their project works									
ைக்கம்கு									
Expected Cou	rse Outcome	2S:							
On the succes	ssful com <mark>pleti</mark>	on of the course, student will be able to:							
1 Underst	and the diffe	rent synthesis methods of nanoparticles			K2				
2 Apply the synthesis with different samples									
3 Charact	3 Characterize the structural components of a sample								
4 Elucidate different activities of the organisms									
5 Apply the knowledge in synthesizing naomaterials									
K1 - Rememb	per; K2 - Und	lestand; <mark>K3 - Apply; K4 - Analyze; K5</mark> - Evaluate; K	<u> (6 – (</u>	Crea	lte				
	13	Real and a state of the second							
Unit:1 NANOPARTICLES SYNTHESIS 15 hours									
1.Green synthe	esis of silver N	Nanoparticles	N	_					
			9						
Unit:2		NOPARTICLES SYNTHESIS	1 /	2	5 hou	rs			
2.Zinc oxide N		Synthesis							
3.Zinc oxide T	itanium Nanc	particles synthesis by chemical method							
Unit:3	NA	ANOPARTICLES SYNTHESIS		14	5 hours	5			
4. Mic Assay c	of Nanopartic	les 2		1	mour	<u>,</u>			
5.Green synthe	esis of copper	Nanoparticles // IT 500 2-04-							
	1	EDUCATE TO ELEVATE							
Unit:4	nit:4 NANOPARTICLES CHARACTERIZATION 13 hours (Demonstration only) 13 hours								
1). Characteriz	ation of Nan	oparticles by - UV, Visible and FTIR							
2). Demonstrat	tion of XRD,	SEM and TEM							
3). Application	is of Nanopar	ticles							
Unit:5	NAN	PARTICLES CHARACTERIZATION		1	5 hour	rs			
(Demonstration only)									
a). Determination of Antibacterial activity									
b). Determination of Anti-fungal activity									
c). Determination of Anti-cancer activity									

Unit:6		Contemporary Issues	2 hours					
Ex	Expert lectures, online seminars – webinars							
		Total Lecture hours	75 hours					
Text Book(s)								
1	Nanotechnology:Fundamentals and applications Manasi Karkare							
2	Nanostructures and Nanomaterials (Synthesis, Properties and Applications), GuozhongCao							
D								
Reference Books								
1	1 Nanoelectronics and Information technology: Advanced electronic materials and novel							
	devices (2 nd edition), Rainer Waser (Ed.), Wiley – VCH Verlag, Weiheim(2005)							
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]								
1	https://www.my-mooc.com/tags/nanotechnology							
2	https://www.classcentral.com/tag/nanotechnology							

Mapping with Programme Outcomes										
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO 4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S
		9		1 km			0 1	12		





M. Sc., **BIOCHEMISTRY**

BHARATHIAR UNIVERSITY :: COIMBATORE 641046

DEPARTMENT OF BIOCHEMISTRY

MISSION

1.To bring out proficient graduates with a broad based knowledge in the concepts, principles and applications of Biochemistry

2. To identify the local and global issues that need intervention for the development of intelligent strategies and biochemical approaches in problem solving methods

3.To spread an atmosphere to acquire skills in identifying the link between the biological and human resources

4.To provide research based projects activities in the emerging areas of Biochemical sciences with critical thinking

5.To have the ability of being employed with self dedication and professional ethics

