PAAVAI ENGINEERING COLLEGE, NAMAKKAL - 637 018

(AUTONOMOUS)

B.Tech. – BIOTECHNOLOGY REGULATIONS 2019

(CHOICE BASED CREDIT SYSTEM)

(For the candidates admitted from the Academic Year 2022-2023)

SEMESTER VII

			SEMESTER VII				
S. No.	CATEGORY	COURSE CODE	COURSE TITLE	L	T	P	
THEOR	Y						
1.	PC	BT20701	Downstream Processing		T 0	T -	
2.	PC	BT20702	Immunology	3	0	0	-3
3.	PE	BT2035*	Professional Elective – III	3	0	0	3
4.	PE	BT2045*	Professional Elective – IV	3	0	0	3
5.	OE	BT2090*	Open Elective-II	3	0	0	3
RACTI	CALS		opon Execute-II	3	0	0	3
6.	PC	BT20703	Downstream Processing Laboratory				_
7.	PC	BT20704	Immunology Laboratory	0	0	4	2
8.	EE	BT20705	Project Work (Phase I)	0	0	4	2
			,	0	0	6	3
			TOTAL	15	0	14	22

SEMESTER VIII

			SEMESTER VIII				
S. No.	CATEGORY	COURSE CODE	COURSE TITLE	L	T	P	C
THEOR	Y						\perp
1.	HS	BA20151	Entrepreneurship Development	3	0		3
2.	PE	BT2055*	Professional Elective –V	3	0	0	+
3.	PE	BT2065*	Professional Elective – VI	3	0	0	3
PRACTI	CALS			3	U	,0	3
4.	EE	BT20801	Project Work (Phase II)	0	0	12	6
			TOTAL	9	0	12	15

TOTAL CREDITS: 166

PROFESSIONAL ELECTIVE III, SEMESTER VII

S. No.	S. No. COURSE CODE COURSE TITLE		L	T	P	C
1.	BT20351	Genomics and Proteomics	3	0	0	3
2.	BT20352	Bioconjugate Technology and Applications	3	0	0	3
3.	BT20353	Cancer Biology	3	0	0	3
4.	BT20354	Creativity, Innovation and New Product Development	3	0	0	3

PROFESSIONAL ELECTIVE IV, SEMESTER VII

S. No.	COURSE CODE	COURSE TITLE	L	Т	P	C
1.	BT20451	Nano Biotechnology	3	0	0	3
2.	BT20452	Process Equipments and Plant Design	3	0	0	3
3.	BT20453	Neurobiology	3	0	0	3
4.	BT20454	Foundation Skills in Integrated Product Development	3	0	0	3

PROFESSIONAL ELECTIVE V, SEMESTER VIII

S. No.	COURSE CODE	COURSE TITLE	L	Т	P	C
1.	BT20551	Stem Cell Technology	3	0	0	3
2.	BT20552	Metabolic Engineering	3	0	0	3
3.	BT20553	Systems Biology	3	0	0	3
4.	BA20252	Total Quality Management	3	0	0	3

PROFESSIONAL ELECTIVE VI, SEMESTER VIII

S. No.	No. COURSE COURSE TITLE		L	T	P	C
1.	BT20651	Molecular Therapeutics and Diagnostics	3	0	0	3
2.	BT20652	Mushroom cultivation and Biofertilizer production	3	0	0	3
3.	BT20653	Molecular Modeling	3	0	0	3
4.	BT20654	Energy Conservation and Management	3	0	0	3

OPEN ELECTIVE II (OE)

S. No.	COURSE CODE	COURSE TITLE	L	Т	P	C
1.	BT20903	Basics of Microbial Technology	3	0	0	3
2.	BT20904	Biotechnology for Waste Management	3	0	0	3

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BIOTECHNOLOGY

AUTONOMOUS

BT2070	DOWNSTREAM PROCESSING			3 0	0		3
COURSI	E OBJECTIVES						
To enable	e the students to						
1 ui	nderstand the different steps of downstream processing.						
2 00	onceptualize, prototype and develop each technique of bio separations	•					
	nderstand requirement engineering and know how to analyze the requi		ts fo	r bioı	nole	cula	ar
3	eparation strategy.						
	nderstand the purification strategies applied in biotechnology and phar	rma in	duetr	ies			
5 de	evelop the downstream processes required in multi-factorial manufact	uring	envir	onme	nt in	a	
st	tructured and logical fashion.	- paris	ń.				
UNIT I	INTRODUCTION	EMM					9
Introduct	tion to downstream processing, principles, characteristics of bio-mole	cules	and b	iopro	cess	es.	Cell
	n for product release - mechanical, enzymatic and chemical						
	ion of bio-products.						9
UNIT II							
Unit ope	erations for solid-liquid separation - Sedimentation, Flocculation,	Coag	ulatio	on, fi	Itrat	ion	anc
centrifug	gation.						
UNIT II	I ISOLATION OF PRODUCTS						9
Adsornti	ion, liquid-liquid extraction, aqueous two-phase extraction, membran	e sepa	ratio	n – ı	ıltraf	iltra	atior
	rse osmosis, dialysis, precipitation of proteins by different methods.						
UNIT IV							9
	tography – principles, instruments and practice, adsorption, reverse	nhas	e ic	n ex	chan	ge	size
						50,	J.L.
exclusio	n, hydrophobic interaction, bio-affinity and pseudo affinity chromatog				28.		•
UNIT V							9
Crystalli	ization- Theory, practice, equipment's, drying Theoretical c	onsid	eratio	ns,	equi	pme	ent's
lvophiliz	zation in final product formulation.						
J 1		OTAL	PE	RIOI	S:	45	;
COLID	OF OUTCOMES						
COURS	SE OUTCOMES			BT N	TAD	DEI	D.
At the e	nd of this course, the students will be able to			High			
	at the description of downstream processing for pro	duct	Unc	lersta	ndin	o (F	(2)
CO1	articulate the fundamentals of downstream processing for pro- recovery.		One	CISta	IIGIII	5 (*	
CO2	understand the requirements for successful operations of downst	ream	Uno	lersta	ndin	g (I	(2)
002	processing		1	olying	r (V)	3)	
CO3	demonstrate the components of downstream equipment and explain purpose of each equipment	n the	App	ny iii§	(17.	, ,	
CO4	apply principles of various unit operations used in downst	ream	App	olying	g (K.	3)	
1 1 14	processing and enhance problem solving techniques.						
COT	propose new strategies for biomolecular separations.		_	olying	/17/	•	

- 1. Sivasankar B, "Bioseparations: Principles and Techniques", PHI, 2006.
- 2. Belter PA, Cussler EL, Wei-Houhu, "Bioseparations Downstream Processing for Biotechnology", John Wiley, 2011.

REFERENCES

- Nooralabettu Krishna Prasad, "Downstream Process Technology" A New Horizon in Biotechnology, Prentice Hall India, 2010.
- 2. Michael R, Ladisch "Bioseparations Engineering: Principles, practice and Economics", Wiley-Interscience, 1st Edition, 2001.
- 3. Raja Ghosh "Principles of Bioseparations Engineering", World Scientific, 2006.
- 4. "Product Recovery in Bioprocess Technology", (BIOTOL Biotechnology by Open Learning Series). Butterworth Heinmann, Elsevier, 2004.

CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

		(2, -	/3 mai				'O's						PSO'	S
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	3	1	-	7=	-	-	-	-	-	1	3	3
CO2	3	2	3	1	-	-	-	-	-	-	-	1	-	3
CO3	3	2	3	1	1	-	-	1	1	-	-	1	2	3
CO4	3	2	3	1	1	-	-	1	1	-	-	1	1	1
CO5	3	2	3	1	1	-	-	1	1	-	-	1	3	2



	0702		IMM	UNOLOGY		3	0	0		
COUR	RSE OB	JECTIVES	Total days poss				, ii			
To ena	ble the s	tudents to								
1	discuss	the structure, f	unctions and integra	ation of immune sys	stem.					
2	explore	the molecular	and cellular basis of	f immunity and its i	role in health an	d disease.	M			
3	explain	the immune re	sponse and protective	ve mechanism agair	nst various path	ogens.				
4	understa	and autoimmun	e diseases, immuno	deficiencies, and v	accine developn	nent.				
5	apply in	nmune techniqu	ues for the diagnosis	s of various disease	s to develop dru	ıgs.				
UNIT	I IN	TRODUCTIO	N TO IMMUNE S	SYSTEM						
Organi	sation ar	nd classification	n of immune system	n – immune cells a	nd organs; inna	te and acq	uired	immı	ın	
Toll re	ceptors a	ature; hap	tens,	adjuv	/a					
	oll receptors and responses, classification of antigens – chemical and molecular nature; hapter ytokines; complement pathway, antigen presenting cells; major histocompatibility complex.									
UNIT						Γ				
Develo	pment,	maturation, ac	tivation, regulation	, differentiation as	nd classification	of T-cel	ls an	d R	CF	
			ntation, theory of			structure	and	funct	110	
			on of diversity; antig							
UNIT 1			AINST PATHOGI							
Inflamr	nation;	protective imm	une responses to	virus, bacteria, fur	ngi and parasite	s; tumor a	antige	ens, to	uı	
		1.								
immun	e respons	se, tumor diagn	osis, tumor immuno	otherapy.						
immune UNIT 1			RANCE AND HY		Ϋ́		-00		Γ	
UNIT 1	IV IM	MUNE TOLE		PERSENSITIVIT		n; laws of	transj	olanta	l	
UNIT I	IV IM e toleran	MUNE TOLE	RANCE AND HY ficiencies; Transpla	PERSENSITIVIT	of transplantatio					
UNIT I	IV IM e toleran and h	MUNE TOLE	RANCE AND HY	PERSENSITIVIT	of transplantatio					
UNIT I Immune Allergy diagnos	e toleran and hysis.	MUNE TOLE ce, Immuno de ypersensitivity	RANCE AND HY ficiencies; Transpla – Types of hype	PERSENSITIVIT	of transplantatio					
UNIT I Immune Allergy diagnos	toleran and hysis.	MUNE TOLE ce, Immuno de ypersensitivity PLIED IMMU	RANCE AND HY ficiencies; Transpla - Types of hype	PERSENSITIVIT Intation – genetics of ersensitivity, Autoi	of transplantatio	immune	diso	rders		
UNIT I Immune Allergy diagnos UNIT V	e toleran and hysis.	MUNE TOLE ce, Immuno de ypersensitivity PLIED IMMU tibodies, engine	RANCE AND HY ficiencies; Transpla – Types of hype NOLOGY eering of antibodie	PERSENSITIVIT untation – genetics of the persensitivity, Autoints; T- Cell cloning	of transplantation from the control of transplantation from the co	immune	diso	rders	ii	
UNIT I Immune Allergy diagnos UNIT V Monocl	e tolerand hysis. V AP lonal and so of vac	mune Tole ce, Immuno de ypersensitivity PLIED IMMU tibodies, engine cine developm	RANCE AND HY ficiencies; Transpla - Types of hype	PERSENSITIVIT untation – genetics of the persensitivity, Autoints; T- Cell cloning	of transplantation from the control of transplantation from the co	immune	diso	rders	ii	
UNIT I Immune Allergy diagnos UNIT V Monocl	e toleran and hysis.	mune Tole ce, Immuno de ypersensitivity PLIED IMMU tibodies, engine cine developm	RANCE AND HY ficiencies; Transpla – Types of hype NOLOGY eering of antibodie	PERSENSITIVIT untation – genetics of the persensitivity, Autoints; T- Cell cloning	of transplantation immunity, Auto g -Types and C muno diffusion	lassification	diso	Vacco, imm	ir	
UNIT I Immuno Allergy diagnos UNIT V Monocl method modula	e tolerand hydracis. V AP lonal ant s of vactory drug	MUNE TOLE ce, Immuno de ypersensitivity PLIED IMMU tibodies, engine ccine developm gs.	RANCE AND HY ficiencies; Transpla – Types of hype NOLOGY eering of antibodie	PERSENSITIVIT untation – genetics of the persensitivity, Autoints; T- Cell cloning	of transplantation immunity, Auto g -Types and C muno diffusion	immune	diso	Vacco, imm	ir	
UNIT I Immuno Allergy diagnos UNIT V Monocl method modula	e tolerand hydracis. V AP lonal ant s of vactory drug	mune Tole ce, Immuno de ypersensitivity PLIED IMMU tibodies, engine cine developm	RANCE AND HY ficiencies; Transpla – Types of hype NOLOGY eering of antibodie	PERSENSITIVIT untation – genetics of the persensitivity, Autoints; T- Cell cloning	of transplantation immunity, Auto g -Types and C muno diffusion	lassification	diso	Vacco, imm	ir	
UNIT I Immuno Allergy diagnos UNIT V Monocl method modula	e toleran and hysis. V AP lonal ant s of vac tory drug	MUNE TOLE ce, Immuno de ypersensitivity PLIED IMMU tibodies, engine ccine developm gs.	RANCE AND HY ficiencies; Transpla – Types of hype NOLOGY eering of antibodie	PERSENSITIVIT Intation – genetics of the persensitivity, Autoin the persensitivity the persensitivity that the persensitivity the persensit	of transplantation immunity, Auto g -Types and C muno diffusion	lassification ELISA, F	dison of ACS)	Vacco, imm	ii	
UNIT I Immuno Allergy diagnos UNIT V Monocl method modula	e toleran and hysis. V AP lonal and s of vac tory drug SE OUT	MUNE TOLE ce, Immuno de ypersensitivity PLIED IMMU tibodies, engine ccine developm gs. CCOMES is course, the st	RANCE AND HY ficiencies; Transpla – Types of hype INOLOGY eering of antibodie ent, immunodiagno	PERSENSITIVIT Intation – genetics of the persensitivity, Autoints Persensity Persensitivity, Autoints Persensitivity, Aut	of transplantation	lassification ELISA, F TOTAL P BT (Hig	dison of ACS) ERIC MAP hest I	Vacco, imm	in nu	
UNIT I Immuno Allergy diagnos UNIT I Monocl method modula COUR: At the e	e tolerand hydracis. V AP Honal and hydracis SE OUT End of this character Character A P A P A P A P A P A P A P A	MUNE TOLE ce, Immuno de ypersensitivity PLIED IMMU tibodies, engine ccine developm gs. CCOMES is course, the st terize the struct	RANCE AND HY ficiencies; Transpla – Types of hype INOLOGY eering of antibodie ent, immunodiagno udents will be able ure, functions and in	PERSENSITIVIT Intation – genetics of ersensitivity, Autoin ersensity, Autoin ersensitivi	of transplantation immunity, Automotive and Comuno diffusion in system.	lassification ELISA, F TOTAL P BT (High	on of ACS) ERIC MAP hest I	Vacco, imm	ir nı	
UNIT I Immuno Allergy diagnos UNIT V Monocl method modula COUR: At the e	e toleran and hysis. V AP lonal ant s of vac tory drug SE OUT end of this character elabora	MUNE TOLE ce, Immuno de ypersensitivity PLIED IMMU tibodies, engine ccine developm gs. CCOMES is course, the st terize the struct ate the antigen-	RANCE AND HY ficiencies; Transpla — Types of hype INOLOGY eering of antibodie ent, immunodiagno udents will be able ure, functions and in	PERSENSITIVIT Intation – genetics of ersensitivity, Autoin ersensity, Autoin ersensitiv	of transplantation immunity, Automotive Auto	lassification ELISA, F FOTAL P BT (High Understand Under Understand Understand Understand Understand Understand Underst	on of ACS) ERIC MAP hest I inding	Vacco, imm	ir nı	
UNIT I Immuno Allergy diagnos UNIT I Monocl method modula COUR: At the e	e toleran and hysis. V AP onal and s of vac tory drug SE OUT end of the charact elabora ascerta pathog	MUNE TOLE ce, Immuno de ypersensitivity PLIED IMMU tibodies, engine ccine developm gs. COMES is course, the st terize the struct ate the antigen- in the immu ens.	RANCE AND HY ficiencies; Transpla — Types of hype INOLOGY eering of antibodie ent, immunodiagno udents will be able ure, functions and in antibody interaction inoregulation in	PERSENSITIVIT Intation – genetics of ersensitivity, Autoin ersensity, Autoin ersensitivi	of transplantationimmunity, Automatical Au	lassification ELISA, F FOTAL P (High Understan Understan Applying	m of ACS) ERIC MAP hest I inding nding	Vacco, imm PPED Level g (K2)	in 2	
UNIT I Immune Allergy diagnos UNIT V Monocl method modula COUR: At the e	e toleran and hysis. V AP lonal antes of vactory drug SE OUT end of this character ascerta pathog Identify	MUNE TOLE ce, Immuno de ypersensitivity PLIED IMMU tibodies, engine ccine developm gs. CCOMES is course, the st terize the struct ate the antigen- in the immu ens. y, diagnose and	RANCE AND HY ficiencies; Transpla — Types of hype INOLOGY eering of antibodie ent, immunodiagno udents will be able ure, functions and in	PERSENSITIVIT Intation – genetics of ersensitivity, Autoin ersensity, Autoin ersensitivi	of transplantation immunity, Automotive Auto	lassification ELISA, F FOTAL P BT (High Understand Un	m of ACS) ERIC MAP hest I inding nding	Vacco, imm PPED Level g (K2)	in nu	

- Peter J Delves, Seamus J Martin, Dennis R Burtn, Ivan M Roitt., "Roitts Essential Immunology", 13th Edition, Wiley –Blackwell, 2016.
- 2. Judith a Owen, Jenni Punt, Sharon A Stranford, Kuby "Immunology", Macmillan International, 7th Edition, 2012.

REFERENCES

- 1. Ashim K, Chakravarthy, "Immunology", Tata McGraw-Hill, 2006.
- 2. Coico, Richard, "Immunology: A Short Course", VIth Edition. John Wiley, 2008.
- 3. Khan, Fahim Halim, "Elements of Immunology", Pearson Education, 2009.
- Robert R Rich, Thomas A Fleisher, William T Shearer, Harry Schroeder, Anthony J Frew, Cornelia Weyand M, "Clinical Immunology – Principles and Practive", Elsevier, 4th Edition, 2013.

CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

						P	'O's						PSO's		
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3	2	1	1	=	-	-	-	-	-	-	2	1	2	
CO2	3	2	2	2	-	-	-	×=	-	-	-	2	1	2	
CO3	3	1	2	2	-	-	-	v -	-		-	1	1	2	
CO4	3	2	2	1	2	-	-	-	-	-	-	1	2	3	
CO5	3	2	2	1	1	-	-	-	-	-	-	1	3	3	



BT	20703	DC	OWNSTREAM PROCESSING LABORATO	RY	0	0	4	2
COL	IRSE O	BJECTIVES						
To e	nable stu	dents to						
1	provide	hands on trai	ning in downstream processing through simple	experin	nentation	5.		
2	underst	and the nature	of the end product, its concentration, stability	and deg	ree of pu	rifica	tions	
3			the recovery and subsequent purification of targ	200	-			
4			biomolecular separation.					
LIST	OF EX	PERIMENT	S					
1	. Centr	ifugation stud	ies during settling of microbial cells.					
2	. Cell d	lisruption by	sonication.					
3			Enzymatic Reaction.					
4			ns by Dialysis.					
5			ation of Milk protein (Casein).					
6			oteins from Egg by Ammonium Sulphate Precip	oitation.				
7			extraction of biological samples.					
8			ins by Affinity Chromatography.					
9			ed biomolecules by Ion Exchange Chromatogra	aphy.				
1	0. Separ	ation of prote	ins by Size exclusion chromatography.			•		
				TOTA	L PERI	ODS	6	0
COU	RSE OU	ITCOMES						
At the	e end of	this course, th	e students will be able to		BT MAP Highest			
CO1	broth.		s and other insoluble ingredients from the cu	ılture	Applying		-	
CO2			ruption techniques to release intracellular produ		Applying	(K3))	
CO3	perform	m various sets.	eparation techniques for concentrating biolo	gical	Applying	(K3))	
CO4	performul formul	n the chroma ate the produ	tography to purify the biological products and ets for different end uses.	1	Applying	(K3)		
CO/P	O MAP	PING:						
		(3/2/1 india	CO/PO Mapping cates strength of correlation) 3-Strong, 2-Med	dium 1.	-Weak			

CO		(3/2	2/1 ind			th of c nes Oi				g, 2-Me	dium, 1	-Weak		
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	1	1		-	3	.=	1	2	2	1
CO2	3	2 -	1	2	1	1	-	-	3	-	1	1	2	1
CO3	3	3	2	2	2	1	-	1:-	3	1	1	2	3	2
CO4	3	3	3	3	2	1	-	-	3	-	1	2	53.0	-

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BT20	704			10	IMM	UNOL	OGY I	LABOI	RATO	RY			0	0	4	2
COU	RSE C	BJEC	CTIVE	S												
To er	able st	udents	to										-		-	
1	give p	ractica	l traini	ng in t	he fund	ctioning	g of im	mune s	ystem							
2	handle	biolo	gical sa	amples	, such	as bloo	d, for t	he isola	ation o	f serum,	plasma,	and in	mune	cell	s.	
3											nologica					
4						l assay:										
LIST	OF E	XPER	IMEN'	TS												
1.	Aniı	nal Ha	ndling	– Imm	unizat	ion – B	leeding	g techn	iques t	y Virtua	al method	ds				
2.	Iden	tificati	on of i	mmune	e cells	in a blo	od sm	ear								
3.	Iden	tificati	on of b	lood g	roup											_
4.	Isola	tion of	serum	and p	lasma											
5.	Test	ng for	typhoi	d antig	gens by	Widal	test									
6.	Imm	unodif	fusion	by Ou	chterlo	ny Dou	ıble Di	ffusion								
7.					45-101-00			ctropho				1				_
8.								ctropho								
9.	Enzy	me Li	nked In	nmuno	Sorber	nt Assa	y (ELI	SA) - T	ypes							_
10). Isola															
	. Isola															
											ТОТА	L PEI	RIODS	5 6	50	_
COUI	RSE O	UTCO	MES													_
At the	end of	this co	ourse, t	he stud	lents w	ill be a	ble to						BT M	IAP	PED)
CO1	perfor	m blo	od so	unla a		- !1	1'	•	- 11				(High			,
	group	detern	ninatio	n, and	antige	n testin	g using	g the W	IDAL	test.	cation, b		Apply	/ing	(K3))
02										lating in	imune ce	ells	Apply	ing	(K3))
CO3							=	ical ass	21				Apply	ing	(K3))
CO4				techni	ques ir	ı resear	ch or c	liagnos	tic con	texts.			Analy	zing	g (K4	1)
	O MAI															
Map	ping of	Cour	se Out	come ((CO's)	with I	Progra	mme (Outcon	nes (PO	's) and F	Progra	mme S	Spec	eific	
		(1/2	/3 indi	cates	strengt			s PSO ² ion) 3-		, 2-Med	lium, 1-	Weak				
201					O's									PSO)'s	Ī
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1		2	
CO1	2	2	2	2	2	1		-	2	-	-	3	3		1	
CO3	2	3	3	3	3	1	-	-	3	-	-	CINE E	RING.	CO	1	
CO4	3	3	3	3	2	2	-	_	3	-	1/2		Alone	ove	LES	160
							5.879	_	5	_	1/3/	BOAF BIO	ECHN	STI	IDIE	S

TONOMOUS

BT	20705		PROJECT WORK (PHASE I)	0			T,
COL	JRSE OI	BJECTIVES		U	U	6	3
To er	nable the	students to					_
1	develo	p knowledge fo	r solving technical problems through structured project	et research et	ıdı		
2	impro	ve the skills to f	ormulate a technical project.		iuy.		
3			ks of the project and standard procedures.				
4			ocedures for validation of the product and analyse the	cost effective	necc		
GUII	DELINE	S	, and so the	——————————————————————————————————————	11688	•	

The student in a group of 3 to 4 works on a topic approved by the Head of the Department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

2021		TOTAL PERIODS 90
COU	RSE OUTCOMES	
At the	e end of this project, the students will be able to	BT MAPPED
CO1	identify the technical ideas, strategies and methodologies.	(Highest Level) Applying (K3)
CO2	formulate the real-world problem, identify the requirements and develop the design solution.	e Applying (K3)
CO3	use the new tools, techniques that contribute to obtain the solution to the project.	e Applying (K3)
CO4	develop prototype and analysis the cost effectiveness.	Analysing (K4)

CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific
Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO							PO's					l-Weak	P	SO's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	2	2	1	1	2	2	1	3	2	2
CO2	3	3	3	3	2	2	1	2	2	2	1	3	2	3
CO3	3	3	3	3	3	2	1	2	1	2	2	3	3	3
CO4	3	3	3	3	3	3	1	3	2	2	3	SINZER		3

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VOMOUS

COURSE OBJECTIVES To enable the students to	3		
COU	RSE C	DBJECTIVES	
To en	nable th	e students to	
1	unde	erstand the management concepts	
2	build	the entrepreneurial competencies and analyse the support rendered by government and other	r
	agen	cies in entrepreneurship development.	
3	unde	rstand the business opportunities and to prepare a feasibility report	
4	prop	ose a business plan.	
5	appra	aise and comprehend the various factors to be considered for launching a small business.	
UNIT	ΓI	BASICS OF MANAGEMENT	9
Man	ageme	ent: Meaning- Definition, Nature and Importance; Roles of management- Function	ons of
UNIT	II	ENTREPRENEURIAL COMPETENCE AND ENVIRONMENT	9
Entre	eprene	urial Competence: Entrepreneurship- Definition, Role and expectations, Entrepreneurial	styles
Entre	prene	urial Environment: Role of Socio-Cultural, Economic and political environment - Institu	itional
11	oft for i	Entrepreneurs, Assistance Programme for small scale units, Institutional Framework- Centr	al and
			al and
State	Govern	ment Industrial Policies and Regulations.	
State UNIT	Govern	ment Industrial Policies and Regulations. ENTREPRENEURIAL DEVELOPMENT	9
State OWNE	Govern III rship	ment Industrial Policies and Regulations. ENTREPRENEURIAL DEVELOPMENT structures-Proprietorship, Partnership, Company, Co-operative, Franchise; Identification	9 on of
UNIT Owne Busin	Govern FIII rship ess Op	ment Industrial Policies and Regulations. ENTREPRENEURIAL DEVELOPMENT structures-Proprietorship, Partnership, Company, Co-operative, Franchise; Identification of Peasibility Report, Financial and Technical Evaluation, F	9 on of
UNIT Owne Busin Formu	Govern III ership ess Opulation-	ENTREPRENEURIAL DEVELOPMENT structures-Proprietorship, Partnership, Company, Co-operative, Franchise; Identification poportunity- Preparation of Feasibility Report, Financial and Technical Evaluation, Financial Evaluat	9 on of Project
UNIT Owne Busin Formu	Govern FIII ership ess Opulation- ammes	ENTREPRENEURIAL DEVELOPMENT structures-Proprietorship, Partnership, Company, Co-operative, Franchise; Identification opportunity- Preparation of Feasibility Report, Financial and Technical Evaluation, Formulation, Specimen Project Report Entrepreneurial Development of SSI Sector in the Economy; IAS units- Failure, Causes and Preventive Meaning Project Report Entrepreneurial Development of SSI Sector in the Economy; IAS units- Failure, Causes and Preventive Meaning Project Report Entrepreneurial Development of SSI Sector in the Economy; IAS units- Failure, Causes and Preventive Meaning Project Report Entrepreneurial Development Project Report Entrepreneurial Project Report Entrepreneurial Development Project Report Entrepreneurial	9 on of Project
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UNIT Owne Busin Formu Progra Turna UNIT Busin	Governormal Grands of Tive State of Tive Sta	ENTREPRENEURIAL DEVELOPMENT structures-Proprietorship, Partnership, Company, Co-operative, Franchise; Identification of Proportunity-Preparation of Feasibility Report, Financial and Technical Evaluation, For Common Errors in Project Formulation, Specimen Project Report Entrepreneurial Develogation of SSI Sector in the Economy; IAS units-Failure, Causes and Preventive Meastrategies. BUSINESS PLAN PREPARATION, FINANCING VENTURES	9 on of Project pment sures;
UNIT Owne Busin Formu Progra Turna UNIT Busin Marke	Governormal Grand Street Place	ENTREPRENEURIAL DEVELOPMENT structures-Proprietorship, Partnership, Company, Co-operative, Franchise; Identification opportunity- Preparation of Feasibility Report, Financial and Technical Evaluation, For Common Errors in Project Formulation, Specimen Project Report Entrepreneurial Develogable of SSI Sector in the Economy; IAS units- Failure, Causes and Preventive Meastrategies. BUSINESS PLAN PREPARATION, FINANCING VENTURES an: Business opportunities-SWOT, Business plan process, Feasibility Study, Functional	9 on of Project pment ssures; 9 plan-
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UNIT Owne Busin Formu Progra Turna UNIT Busin Marke	Governormal Graph Place of Pla	ENTREPRENEURIAL DEVELOPMENT structures-Proprietorship, Partnership, Company, Co-operative, Franchise; Identification opportunity- Preparation of Feasibility Report, Financial and Technical Evaluation, For Common Errors in Project Formulation, Specimen Project Report Entrepreneurial Develog Role of SSI Sector in the Economy; IAS units- Failure, Causes and Preventive Meastrategies. BUSINESS PLAN PREPARATION, FINANCING VENTURES an: Business opportunities-SWOT, Business plan process, Feasibility Study, Functional an-Operational plan, Organizational plan, financial plan, Evaluation criteria. entures: sources of raising capital- seed funding, venture capital funding; funding opportunities and Preventive Meastrategies.	9 on of Project pment ssures; 9 plan-
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Entrepreneurship in Informal Sector: Rural Entrepreneurship- Entrepreneurship in Sectors like Agriculture, Tourism, Health Care, Transport and allied services.

	TOTAL PERIODS 45
COURSE OUTCOMES	
At the end of this course, the students will be able to	BT MAPPED (Highest Level)
CO1 implement the necessary managerial skills to become an entrepreneur.	Understanding (K2)
CO2 take up self-employment having been exposed to entrepresent environment.	
CO3 select a best business idea by using appropriate methods to assignability.	sess its Applying (K3)
CO4 formulate a business plan and deploy the resources for sustainable grow	wth. Applying (K3)
CO5 analyse channels and means of launching a small business in any sector	

TEXT BOOKS

- 1. Khanka SS, "Entrepreneurial Development", S.Chand and Company Limited, New Delhi, 2016.
- 2. SaravanavelP, "Entrepreneurial Development", Ess Pee Kay Publishing House, Chennai, 2013.

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- Donald LSexton, Raymond WSmilor, "The Art and Science of Entrepreneurship", Ballinger Publishing Company, 2008.
- 2. Gifford Pinchot, Intrapreneuring" Harper and Row Publishers, New York, 2005.
- Mathew Manimala, "Entrepreneurship theory at the crossroads", Paradigms and Praxix, Biztrantra, 2nd Edition, 2015.
- 4. P.C.Jain, "Handbook for New Entrepreneurs", EDII, Oxford University Press, New Delhi, 2012.

CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

			1210 111]	PO's				curum, 1		PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	-	-	3	1	-	2	2	2		2	3	2	3
CO2	-	2	2	-	2	1		-	-	-	1	1	1	3
CO3		1	1	_	1	1	1	-	1	1	1	3	-	3
CO4	1	1	-	-	-	-	1	-	3	1	1	3	1	2
CO5	1	1	1	-	1	1	2	-	2	1	a INC	3	-	1

BOARD OF STUDIES

Master of Business Administration

23/12/24

BT20	0801	0	0	12	6	
COUF	RSE OBJECTIVES			1		
To ena	able the students to					
1	develop student knowle	lge for solving technical problems through structur	ed project res	earcl	1 stud	y.
2	improve the skills to for	mulate a technical project.				
3	explain the various task	of the project and standard procedures.				
4	analyse the various proc	edures for validation of the product and analyse the	cost effective	enes	S.	
GUID	ELINES					

The student in a group of 3 to 4 works on a topic approved by the Head of the Department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

		TOTAL PERIODS	180
COU	RSE OUTCOMES		l .
At the	end of this project, the students will be able to	BT MAPPED (Highest Level)	
CO1	identify the technical ideas, strategies and methodologies.	Applying (K3)	
CO2	formulate the real-world problem, identify the requirements and develop the design solution.	Applying (K3)	
CO3	use the new tools, techniques that contribute to obtain the solution to the project.	Applying (K3)	
CO4	develop prototype and analysis the cost effectiveness.	Analysing (K4)	

CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

]	PO's						P	SO's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	2	2	1	1	2	2	1	3	2	3
CO2	3	3	3	3	2	2	1	2	2	2	1	3	2	3
CO3	3	3	3	3	3	2	1	2	1	2	2	3	3	3
CO4	3	3	3	3	3	3	1	3	2	2	3	3	3	3

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BOARD OF STUDIES
BIOTECHNOLOGY

23/12/24

41: NOMOUS

	20351	GENOMICS AND PROTEOMICS	44(24)	3 0	0	3							
COU	RSE (OBJECTIVES											
To en	able th	ne students to	114-00			1000-110-1-1							
1	unde	erstand the fundamental principles and techniques of genomics and protect	mics.										
2	expl	ore genome sequence analysis and determination.			-								
3	appl	y bioinformatics tools for analysing genomic data to determine its function	n.										
4	disc	uss advancements in high-throughput protein sequencing technologies and	d their a	application	ons.								
5	anal	yze the structure, function, and interactions of proteins using proteomic a	pproach	ies.									
UNIT	r T	INTRODUCTION				9							
		to genome, transcriptome, and proteome; Overview of genomes	of boo	torio or	ohaa								
		Genomes of organelles.	or vac	iciia, ai	chae,	anu							
UNIT		GENOME MAPPING AND SEQUENCING				9							
	3/03/12/0	physical mapping, Linkage analysis, RFLP, SNP, SSLP, Restriction	manni	na CTC	mon								
		down and bottom-up sequencing strategies, Whole genome sequencing	57.175		2.5	3 334							
strategies.													
UNI	ГШ	FUNCTIONAL GENOMICS				9							
Genome annotation, ORF and functional prediction, Gene finding, Substractive DNA library scree													
Diffe	rential	display and Representational difference analysis, SAGE, TOGA, Introdu	ction to	DNA m	iicroa	rray							
UNI	ΓIV	TECHNIQUES IN PROTEOMICS		-230		9							
In-vi	ro and	in vivo-labeling of proteins, One and two-dimensional gel electrophore	esis, De	tection o	of Pro	teins							
		- Protein alassage Edman matrix migra coguancing Mass spectrome		-1-1	f MA	IDI							
on Si	DS gel	s, Protein cleavage, Edman protein micro sequencing, Mass spectrome	try-prin	cipies of		LDI-							
		le mass fingerprinting.	try-prin	cipies of									
TOF,	Peptio	le mass fingerprinting. PROTEIN PROFILING				9							
TOF, UNIT Large	Peption Period	le mass fingerprinting. PROTEIN PROFILING protein profiling using proteomics, Post-translational modification				9							
TOF, UNIT Large	Peption Period	PROTEIN PROFILING protein profiling using proteomics, Post-translational modification analyses; Analysis of protein-protein interactions, Protein microarrays.	ons, Ph	osphopr	otein	9 and							
TOF, UNIT Large	Peption Percentage Percentage Percentage Percentage Percentage Percentage Percentage Percentage Peption Percentage Percen	PROTEIN PROFILING protein profiling using proteomics, Post-translational modification analyses; Analysis of protein-protein interactions, Protein microarrays.	ons, Ph		otein	9							
TOF, UNIT Large	Peption Percentage Percentage Percentage Percentage Percentage Percentage Percentage Percentage Peption Percentage Percen	PROTEIN PROFILING protein profiling using proteomics, Post-translational modification analyses; Analysis of protein-protein interactions, Protein microarrays.	ons, Ph	osphopr L PERI O	otein	9 and							
TOF, UNIT Large glyco	Peption Percentage Per	PROTEIN PROFILING protein profiling using proteomics, Post-translational modification analyses; Analysis of protein-protein interactions, Protein microarrays.	ons, Ph	osphopr	otein ODS	9 and							
TOF, UNIT Large glyco COU	Peptid FV e-scale oprotein	PROTEIN PROFILING protein profiling using proteomics, Post-translational modification analyses; Analysis of protein-protein interactions, Protein microarrays. DUTCOMES	TOTAL BT (Hig	osphopr L PERIC	ODS ODS ODS ODS ODS	9 and 45							
TOF, UNIT Large glyco COU At th	Peptid F V e-scale pprotein RSE (e end (und app)	PROTEIN PROFILING protein profiling using proteomics, Post-translational modification analyses; Analysis of protein-protein interactions, Protein microarrays. OUTCOMES of this course, the students will be able to	BT (High	nosphopr L PERIC MAPPE ghest Lev	ODS ODS vel) ng (K	9 and 45							
TOF, UNIT	Peptid F V e-scale protein RSE C e end c und appl stru inve	PROTEIN PROFILING protein profiling using proteomics, Post-translational modification analyses; Analysis of protein-protein interactions, Protein microarrays. DUTCOMES of this course, the students will be able to erstand the existence of various levels of genome and proteome structures by the knowledge of mapping and sequencing to determine the genomination.	BT (Hig	MAPPE ghest Levelerstanding	ODS ODS vel) ng (K	9 and 45							
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- 1. Suhai, Sandor, "Genomics and Proteomics: Functional and Computational Aspects", Springer, 2000.
- 2. Primrose SB, Twyman, "Principles of Genome Analysis and Genomics", 7th Edition, Blakwell Publishing, 2006.

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- 2. O'Connor, Hames CD BD, "Proteomics", Scion Publishing, 2008.
- 3. Daniel C, Liebler, "Introduction to Proteomics", Humana press, 2002.
- 4. Conard, Edward, "Genomics", Apple Academics, 2010.

CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak PO's PSO's CO's CO₁ CO₂ CO₃ CO₄ CO₅



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com	SE OBJECTIV	VEC													
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1	provide theoret														
2	learn about the							biocoi	njugate	techno	ology.				
3	understand the	modific	cation o	of funct	tional	target	s.			-08			i la		
4	understand the	role of	reagent	ts in bio	oconju	ugatio	n.								7
5	gain knowledge	e on enz	zymes a	and nuc	eleic a	icids n	nodifi	cation							
UNIT	MODIFIC	CATIO	N OF I	FUNC'	TION	NAL T	CARG	ETS					-		9
Modifi	cation of amin	no acids	s, pepti	ides ar	nd pr	roteins	s – n	odific	ation	of sug	ars, po	lysac	cha	ride	s a
	njugates – mod						gonuc	leotide	es.						
UNIT	#55*														9
	reactive chemins - hydroxyl														
	active chemical														
UNIT	II BIOCON	JUGAT	TE REA	AGEN'	TS										9
Trifund	ength cross lin	kers – C	leavabl	le reage	ent sys	stems	– tags	and p	robes.					link	
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- 1. Hermanson GT, "Bioconjugate Techniques", Academic Press, 3rd edition, 2013.
- Sam Massa, Nick Devoogdt (eds.), "Bioconjugation: Methods and Protocols, Methods in Molecular Biology", vol. 2033, Springer Science and Business Media, LLC, part of Springer Nature, 2019.

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- 3. Chrostof M Niemeyer (Eds), "Methods in Molecular Biology", 283, Bioconjugation Protocols Strategies and Methods. Humana Press, 2004
- 4. Richard B Silverman, "Organic Chemistry of Enzyme-Catalyzed Reactions", Academic Press, 2002.

CO/PO MAPPING:

CO/PO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

			I	Progra	mmes	Outco	mes (I	POs)						
COs							PO's						PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	-	1	_	-	-	-	-	-	-	2	3	3
CO2	3	3	-	3	-	-	-	-		-	-	3	-	3
CO3	3	3	3	2	-	· -	-0	= 3	-	-	-	2	2	3
CO4	3	3	3	1	1	-	-	-		-	-	-	1	1
CO5	2	3	3	2	1	-	-	1	-	-	-	3	3	2

Approved
BOARD OF STUDIES
BIOTECHNOLOGY

AUTONOMOUS

AUTONOMOUS

	CANCER BIOLOGY	3	0	0	3
COURSE C	OBJECTIVES			124	
To enable th	ne students to			4 -	
1 unders	stand the basics of cancer and cancerous cells.				
2 discus	ss the significance of carcinogenesis in the development of cancer.				
3 interp	ret the role of oncogenes and their growth factors.		П		
4 make	understanding on process of cancer metastasis and their dysregulation factors	s.			
5 gain k	nowledge on the advancement in cancer treatment.				
UNIT I	FUNDAMENTALS OF CANCER BIOLOGY			T	9
Introduction	n, historical perspective, classification carcinogenesis, cancer initiation	i, p	rom	otion	and
progression,	, pathways of spread- Epidemology Regulation of cell cycle, mutations that	t car	use	chang	es in
signal mole	cules, effects on receptor, signal switches, tumour suppressor genes, module	atio	n of	cell	cycle
X-22	lifferent forms of cancers, diet and cancer. Cancer screening and early de				
using bioche	emical assays, tumor markers, molecular tools for early diagnosis of cancer.				
UNIT II	PRINCIPLES OF CARCINOGENESIS				9
	PRINCIPLES OF CARCINOGENESIS arcinogenesis, Chemical carcinogenesis, metabolism of carcinogenesis, prin	ncip	les o	of Phy	
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COUR	SE OUTCOMES	
At the e	nd of this course, the students will be able to	BT MAPPED (Highest Level)
CO1	explain the development and proliferation of cancer with specific causes.	Understanding (K2)
CO2	describe the influence of carcinogenesis in the cancer development.	Understanding (K2)
CO3	identify the pathways and therapeutic targets of cancer.	Applying (K3)
CO4	investigate the steps involved in metastasis and tumour cell invasion.	Applying (K3)
CO5	explore novel drugs and technologies for the treatment of cancer.	Applying (K3)

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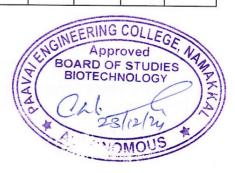
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- 2. McDonald F etal., "Molecular Biology of Cancer" II Edition. Taylor and Francis, 2004.
- 3. Hejmadi M, "Introduction to cancer biology", Bookboon, 2014.
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CO/PO MAPPING:

CO/PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

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COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	1	-	-	-	-	-	-	-	3	3	3
CO2	3	2	-	1	-	-	-	-	-	-	-	3	2	3
CO3	3	3	3	2	_	-	: <u>=</u>	-	-	-	-	2	2	3
CO4	3	3	3	1	-	-	-	-	-	-	-	2	1	1
CO5	3	3	3	2	1	-	-	2	-	-	-	2	3	2



BT	20354	CREATIVITY, INNOVATION AND NEW PRODUCT DEVELOP	MENT	3 0	0	3
CO	URSE	OBJECTIVES	May			
То	enable	the students to	M emil			
1	deve	lop the creativity skills among the learners.				
2		art the knowledge of creative intelligence essential for entrepreneurs.				
3		v the applications of innovation in entrepreneurship.				
4		lop innovative business models for business.	Bus tara			
5		knowledge on creative intelligence.	- 18			
0.532	IT I	CREATIVITY	and the		1	9
Cre	ativity	: Definition- Forms of Creativity-Essence, Elaborative and Expressive C-Existential, Entrepreneurial and Empowerment Creativities – Creative Egy- Creative Personality and Motivation.	Creativities Environme	s- Qu ent- (Cre	ty o ativ
	IT II	CREATIVE INTELLIGENCE				9
	IT III		Product In	novat	tion	9
Inn Pro	ovation cess-	n: Definition- Levels of Innovation- Incremental Vs Radical Innovation-Technological, Organizational Innovation – Indicators- Characteristics of Theories in Innovation and Creativity- Design Thinking and Innovation- In	Innovation	in I	Diff	n and
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- 4. Peter F Drucker, "Innovation and Entrepreneurship", Harper Business, 2006.

CO/PO MAPPING:

CO/PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak Programmes Outcomes (POs) PO2 PO3 PO4 PO₅ PO6 **PO7** PO8 PO9 PO10 PO11 PO12 PSO1 3 3 1 3 3 3 3 3

COs PO1 PSO₂ CO₁ 3 CO₂ 3 3 3 3 3 3 CO₃ 3 3 3 2 3 3 3 3 2 3 CO₄ 3 3 3 1 3 1 1 1 1 CO5 2 3 3 2 3 1 3 3 3 2



	151	NANO BIOTECHNOLOGY	3	0	0	3
COURS	SE O	DBJECTIVES	37 467 5			
To enab	le th	e students to				
1 1	unde	rstand the principles and methods in Nano biotechnology.	<u> </u>			
2 6	explo	ore the structure and stability of biomaterials for nanotechnology applications	tions.			
3 1	learn	techniques of protein nanoparticle synthesis and functionalization.				
4 1	learn	techniques of DNA nanoparticle synthesis and functionalization.				
5	evalu	nate the applications of nano biotechnology in biomedical sectors.				
UNIT I		NANOSCALE PROCESSES AND NANOMATERIALS	Test	na -		9
Overvie	w of	nanoscale processes and characterization of nanomaterials – Physicocl	hemica	l pro	pertie	s o
nanoma	teria	ls – Concepts in nanotechnology – Natural nanomaterials –Type	s of	Nano	mate	rial
(Quantu	ım c	lots, Nanoparticles, Nanocrystals, Dendrimers, Polymeric nanopart	ticles,	Bucl	cy b	alls
		Synthesis and assembly of nanoparticles and nanostructures using bioder				
UNIT I		STRUCTURAL AND FUNCTIONAL PRINCIPLES OF NANOMA				9
Biomole	ะดบบล	r structure and stability - Protein folding - Self-assembly - Self-organiz	zation	– Info	rmat	ion
		r structure and stability – Protein folding – Self-assembly – Self-organiz				
Driven 1	nano	assembly – Biomaterials – Biomolecular motors – Traffic across membra				
Driven i	nano – Se	assembly – Biomaterials – Biomolecular motors – Traffic across membral f-replication – Machine-phase bionanotechnology.				ula
Driven is sensing	nano – Se II	assembly – Biomaterials – Biomolecular motors – Traffic across member of the second of	ranes -	- Bior	nolec	ula
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COUI	RSE OUTCOMES	
At the	end of this course, the students will be able to	BT MAPPED (Highest Level)
CO1	comprehend the fundamental processes and concepts of nano biotechnology.	Understanding (K2)
CO2	demonstrate the skills in nanoparticle synthesis and characterization.	Understanding (K2)
CO3	understand the synthesis of protein-based nanoparticles in biology.	Understanding (K2)
CO4	apply the various approaches for DNA based nanoparticles synthesis	Applying (K3)
CO5	correlate the potential applications in drug delivery, diagnostics, and environmental management.	Applying (K3)

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CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

						PO	's						PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1	1	2	1	-	-	-	-	-	-	-	3	2	2
CO2	2	2	2	1	-	-	-	-	-	-	-	3	2	2
CO3	2	2	1	1	-	-	-	-	-	-	-	3	1	3
CO4	3	2	3	3	1	-	-	-	-	-	-	2	2	3
CO5	3	2	3	3	1	-	1	1	-	-	-	2	3	3



00	0452	PRO	CES	S EQUIP	MENT	S AN	D PLA	NT DE	SIGN	Ī	3	0	0	3
COU	RSE O	BJECTIVES												
To ena	able the	e students to												
1	under	rstand the design	ning a	spects of	various	equip	ment's	used in	biote	ch ind	ustry.			
2	explo	re the design an	nd con	struction	of press	sure ve	essel sti	ructures						
3	under	rstand the constr	ruction	n details o	of extrac	ctors a	and abso	orption	tower	s.		H.		
4	learn	the types of pur	mps, s	eals, valv	es and s	switch	ies.	1			24	H		
5	desig	n various types	of pip	ing and p	lant lay	out de	esign.							
UNIT	I	HEAT EXCHA	ANGE	RS, CO	NDENS	SERS,	EVAP	ORAT	ORS					9
structu		nulti-process exc ngle and vertica												
UNIT	'II S	STORAGE VE	ESSEI	FOR V	OLATI	ILE A	ND NO	N-VO	LATI	LE FI	LUIDS			9
multip	olayer v	e following equivessels, combust	tion d	etails and	suppor	ting st	tructure	7 2000			, 1			
UNIT		EXTRACTOR							22.22					9
		details and as owers; Plate and						d Extra	action	Towe	ers; Pla	te a	nd P	'acked
UNIT	IV					owers.	•							
		PUMPS, MEC	HAN	ICAL SE				D SWI	ТСН	ES				9
Vario		es of pumps, P			CALS, V	VALV	ES AN				es and	disa	dvan	
	us type		Princip	ole of wo	CALS, Vorking,	constr	TES AN	usage	s, adv	antage				tages;
Vario	us type	es of pumps, P	Princip ectiven	ole of we	orking, ges; Pne	constr	ruction,	usage	s, adv	antage				tages;
Vario	us type us type ial of c	es of pumps, P	Princip ectiven eumat	ess, usag	orking, es; Pne	construention of Valve	ruction, c Seals es.	usage	s, adv	antage				tages;
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CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

			marca			PO	's						PS	o's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	2	-	-	1	1	1	-	1	-	2	3	3
CO2	3	3	2	-	-	1	1	1	-	1	-	2	3	3
CO3	3	3	3	-	-	1	1	1	-	1	-	2	3	3
CO4	3	1	1	-	-	2	1	1	-	1	-	2	1	1
CO5	3	3	2	-	-	2	1	1	-	1		2	2	3



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CO4	analyse various facts about brain function and experimental approaches, theories, and models to integrate neuroscience information cross their	Analysing (K4)
CO5	apply the basic mechanisms associated with neural system with behavioural studies principles and implications of neuroscience	Applying (K3)

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- 3. Norman Doidge, "The Brain That Changes Itself: Stories of Personal Triumph from the Frontiers of Brain Science", Penguin USA, 2007.
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CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific **Outcomes PSO's**

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak PO's													PSO's	
gg.		2	2	4	5	6	7	8	9	10	11	12	1	2
CO's	1		3	2		2	1	2	-	-	-	1	1	3
CO1	3	1	1	2	-	2	1	2		_	_	1	1	3
CO2	3	3	3	3	-	3	1	2				1	2	3
CO3	3	2	1	2	-	3	-	-	-	-	-	1		2
CO4	3	1	2	2	-	3	1	2	-	-	-	2	2	3
	3	1	2	2		3	1	2	-	-	-	2	3	3
CO ₅	3	2	2	2	_	3	1							



Toe	enable the students to										
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1	understand the global trends and development methodologies of various types of products a services.	nd									
2	conceptualize, prototype and develop product management plan for a new product.										
3	understand how to collect, analyze and arrive at requirements for new product development										
4	understand system modeling and arrive at the optimum system specification and characteris	tics.									
5	develop documentation, test specifications, validate and sustain up to the End of Life suppo activities.	develop documentation, test specifications, validate and sustain up to the End of Life support activities.									
UNI	T I BASICS OF PRODUCT DEVELOPMENT	9									
Glob	bal Trends Analysis and Product decision - Social Trends - Technical Trends- Economic	Trend									
Dev	nagement - Overview of Products and Services - Types of Product Development - Overview of elopment methodologies - Product Life Cycle - Product Development Planning and Management	nent.									
UNI	IT II REQUIREMENTS AND SYSTEM DESIGN	9									
Syst UNI	lysis - Requirement Management - System Design and Modeling - Introduction to System Mem Optimization - System Specification - Sub-System Design - Interface Design. T III DESIGN AND TESTING	9									
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Syst	tem Optimization - System Specification - Sub-System Design - Interface Design. IT III DESIGN AND TESTING	9									
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COUI	RSE OUTCOMES	
At the	end of this course, the students will be able to	BT MAPPED (Highest Level)
CO1	define, formulate, and analyze a problem in product development.	Understanding (K2)
CO2	understand the requirement engineering and system modeling.	Understanding (K2)
CO3	utilize concept generation techniques and testing products.	Applying (K3)
CO4	work independently as well as in teams.	Applying (K3)
CO5	organise a project from start to finish as per industry need.	Applying (K3)

- Karl T Ulrich, Stephen D Eppinger, "Product Design and Development", Tata McGraw Hill, 5th Edition, 2011.
- 2. John W Newstorm, Keith Davis, "Organizational Behavior", Tata McGraw Hill, 11th Edition, 2005.

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- 1. Hiriyappa B, "Corporate Strategy Managing the Business", Author House, 2013.
- 2. Peter F Drucker, "People and Performance", Butterworth Heinemann [Elsevier], Oxford, 2004.
- 3. Vinod Kumar Garg, Venkita Krishnan NK, "Enterprise Resource Planning Concepts", 2nd Edition, Prentice Hall, 2003.
- 4. Mark S Sanders, Ernest J McCormick, "Human Factors in Engineering and Design", McGraw Hill Education, 7th Edition, 2013.

CO/PO MAPPING:

CO/PO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

		Programmes Outcomes (POs)														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2		
CO1	3	2	3	1	-	-	-	-	-	1	-	1	3	3		
CO2	3	2	3	1	-	-	-	-	-	1	-	1	-	3		
CO3	3	2	3	1	1	-	-	1	1	1	-	1	2	3		
CO4	3	2	3	1	1	-	-	1	1	1	-	1	1	1		
CO5	3	2	3	1	1	-	-	1	1	1	-	1	3	2		

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BOARD OF STUDIES
BIOTECHNOLOGY

UTONOMOUS

	20551 STEM CELL TECHNOLOGY 3												
COURSE	OBJECTIVES	as all to real three to											
To enable	the students to												
1 in	ntroduce the fundamental principles of stem cell biology.												
2 id	entify and character	ize human embryonic and adult ste	m cell.										
3 fa	miliarize with differ	rentiation of stem cells into differen	t cell types.	Into 18									
4 di	scuss ethical, legal,	and societal considerations in stem	cell research	and therapy									
	ldress challenges i chnologies.	n clinical translation and ethica	l considerat	ions in adva	anced s	tem	cell						
UNIT I	INTRODUCTION	ON TO STEM CELLS					9						
Stem cell	Classification, Sour	ces and Properties -Types of stem	cells: metho	ds of isolation	on, stud	y of	stem						
cells and	their viability IPSO	C, embryonic stem cells, cancer s	tem cells	- Preservation	ns of S	tem	cell.						
Embryonic	stem cell: Isolat	ion, Culturing, Differentiation, I	roperties -	Adult stem	cell:	Isola	tion,						
Culturing,	Differentiation, Tra	ns-differentiation, Plasticity, and Pr	roperties.										
UNIT II	HUMAN EMBI	RYONIC AND ADULT STEM C	ELL				9						
Stem cells	and their developn	nental potential. In vitro fertilization	n-culturing	of embryos -	- blastoc	yst i	nner						
cell mass-	isolation and grow	ing ES cells in lab; Identification	and charact	erization of	human	ES c	ells.						
Somatic s	tem cells-test for	identification of adult stem cel	ls- adult ste	em cell diff	erentiati	ion 1	trans						
differentia	tion-plasticity-differ	rent types of adult stem cells-liver	stem cells-sk	eletal muscle	e stem c	ells-l	bone						
	erived stem cells.	and, remarking our and the											
UNIT III	DIFFERENTIA	TION OF STEM CELLS INTO	CELL TYP	ES			9						
Factors in		ecialization – internal factors –			, cell	signa	aling						
mechanisn	ns – diffusion, direc	et contact and gap junctions; environ	onmental fac	tors – tempe	rature. c	lrugs	and						
				Particular Control of the Control of									
		cell differentiation – errors in cell	differentiation	on – anaplasi		lasia	and						
		cell differentiation – errors in cell	differentiati	on – anaplas		lasia	and						
metaplasia			differentiati	on – anaplas		lasia							
metaplasia UNIT IV	STEM CELLS	IN TISSUE ENGINEERING			ia, dysp		9						
metaplasia UNIT IV Haematop	STEM CELLS		n of haema	topoietic ster	ia, dysp	, clii	9 nical						
metaplasia UNIT IV Haematope application	STEM CELLS : oietic Stem Cells-ons of haematopoieti	IN TISSUE ENGINEERING Growth factors and the regulation	n of haema	topoietic ster	m cells,	, clin	9 nical bone						
UNIT IV Haematope application marrow tre	oietic Stem Cells-ons of haematopoietic ansplantation; Meser based gene therapy	IN TISSUE ENGINEERING Growth factors and the regulation c stem cells; HLA matching, patienchymal stem cells and their role and benefits to human. Technique	n of haema ent selection e in bone tis es in stem c	topoietic stern, peripheral ssue engineer	m cells, blood a	, clinand to	9 nical bone pair;						
metaplasia UNIT IV Haematope application marrow tra Stem cell activated c	STEM CELLS in order of the control o	IN TISSUE ENGINEERING Growth factors and the regulation c stem cells; HLA matching, patienchymal stem cells and their role and benefits to human. Technique time lapse video, green fluorescent	n of haema ent selection e in bone tis es in stem c	topoietic stern, peripheral ssue engineer	m cells, blood a	, clinand to	9 nical bone pair; ence						
metaplasia UNIT IV Haematope application marrow tra Stem cell activated co UNIT V	stem cells-one of haematopoietic ansplantation; Meson based gene therapy well sorting (FACS), APPLICATION	IN TISSUE ENGINEERING Growth factors and the regulation of stem cells; HLA matching, patient enchymal stem cells and their role and benefits to human. Technique time lapse video, green fluorescent AND ETHICAL ISSUES	n of haema ent selection e in bone tis es in stem c protein tagg	topoietic stern, peripheral ssue engineer technologing.	m cells, blood a ring bon gy - fluc	, clinand to the report of the resources contract the resource contract the resources contract the resource contract the re	9 nical bone pair; ence						
metaplasia UNIT IV Haematope application marrow tra Stem cell activated co	stem cells-one of haematopoietic ansplantation; Meson based gene therapy well sorting (FACS), APPLICATION	IN TISSUE ENGINEERING Growth factors and the regulation c stem cells; HLA matching, patienchymal stem cells and their role and benefits to human. Technique time lapse video, green fluorescent	n of haema ent selection e in bone tis es in stem c protein tagg	topoietic stern, peripheral ssue engineer technologing.	m cells, blood a ring bon gy - fluc	, clinand to the report of the resources contract the resource contract the resources contract the resource contract the re	9 nical bone pair; ence						
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COU	RSE OUTCOMES	
At the	e end of this course, the students will be able to	BT MAPPED
		(Highest Level)
CO1	differentiate different types of stem cells and to characterize them	Analyzing (K4)
CO2	gain knowledge on development potential of human embryonic and adult stem cell	Applying (K3)
CO3	develop techniques to program stem cells into specific cell types	Understanding (K2)
CO4	understand the role of stem cells in tissue engineering and regenerative medicine	Understanding (K2)
CO5	familiarize with stem cell technology and its applications for the betterment of society	Applying (K3)
TEVT	POOKS	

- 1. Robert Paul Lanza, Essentials of stem cell biology, Academic Press, 2006
- 2. Ariff Bongso, Eng Hin Lee, "Stem cells", World Scientific Publication Co. Pvt. Ltd., 2005.

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- 1. Alberts et al, "Molecular Biology of the Cell", 2014.
- 2. Stephen Sullivan, Chad Cowan, "Human Embryonic Stem Cells", 2007.
- 3. Scott F. Gilbert, "Developmental Biology", 2020.
- 4. Ali Gholamrezanezhad, "Stem cells in clinic and Research", Intech, 2013.

CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	103												P	PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3	3	3	2	2	2	-	_	_	1	-	1	3	2	
CO2	2	2	1	3	2	-	-	-	-	1		1	3	1	
CO3	2	3	3	2	1	-	-	-	_	1	_	1	1	2	
CO4	3	3	3	2	1	2	_	_	_	1	_	1	3	2	
CO5	2	2	2	2	3	1	-	-	-	1		1	3	2	

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BOARD OF STUDIES
BIOTECHNOLOGY

TONOMOU

		METABOLIC ENGINEERING		3 (0 0	3								
COURSE C	DBJECTIVES													
To enable th	e students to				MYT	50								
1 descr	ribe the metaboli	c design and pathway analysis.												
2 outli	ne the models of	cellular reactions and measurements errors, ra	ate.											
3 point	t out the determin	ned system and their metabolic fluxes by isoto	pe labelling.											
4 calcu	ulate the analysis	of metabolic control and flux control coeffici	ents.											
5 exam	nine the stoichior	netric network and their consistency tests and	experimenta	l valid	ation									
UNIT I	BASICS OF M	ETABOLIC DESIGN AND PATHWAY A	NALYSIS			9								
Basic princ	iples of metabo	olic design, thermodynamics of pathway,	redox balanc	eing,	trans	port c								
substrates, o	enzyme candida	tes, substrate and product transport and	choice of ap	propr	iate	geneti								
UNIT II	MATERIAL B.	ALANCES AND DATA CONSISTENCY				9								
Comprehens	sive models of o	cellular reactions; stoichiometry of cellular	reactions, lui	mping	of 1	reactio								
		mined systems using black box model- ident												
errors. Intro	duction to MATI	LAB®.												
UNIT III														
Theory of	determined, over-determined systems, underdetermined systems- linear progra													
sensitivity a	nalysis, methods	for the experimental determination of metabo	olic fluxes by	isotop	e lab	eling.								
UNIT IV	METABOLIC	CONTROL ANALYSIS				9								
Fundamenta	als of Metabolic	c Control Analysis, control coefficients a	and the sum	matio	n th	eorem								
				flore	e dev	iations								
	al determination	of flux control coefficients and other coefficients	ents. Theory o	or large	rimental determination of flux control coefficients and other coefficients. Theory of large dev									
			ents. Theory o	or rarge		9								
Experimenta UNIT V	ANALYSIS OF					9								
Experimenta UNIT V Stoichiomet	ANALYSIS OF	METABOLIC NETWORKS	ne pathways.	Con	trol	9 of flu								
Experimenta UNIT V Stoichiomet distribution	ANALYSIS OF tric Network Anat a single br	METABOLIC NETWORKS nalysis. Elementary mode analysis, extren anch point, Grouping of reactions, optimi	ne pathways.	Con	trol	9 of flu								
Experimenta UNIT V Stoichiomet distribution	ANALYSIS OF tric Network Anat a single br	METABOLIC NETWORKS nalysis. Elementary mode analysis, extren	ne pathways.	. Con	trol nplifi	of flu								
Experimenta UNIT V Stoichiomet distribution consistency	ANALYSIS OF tric Network Anat a single br	METABOLIC NETWORKS nalysis. Elementary mode analysis, extren anch point, Grouping of reactions, optimi	ne pathways.	. Con	trol nplifi	of flucation								
Experimenta UNIT V Stoichiomet distribution consistency COURSE C	ANALYSIS OF tric Network Are at a single brotests and experimental outcomes	F METABOLIC NETWORKS nalysis. Elementary mode analysis, extren anch point, Grouping of reactions, optimi mental validation.	ne pathways.	. Con	trol nplifi DDS	of fluctations								
Experimenta UNIT V Stoichiomet distribution consistency COURSE O At the end of	ANALYSIS OF this course, the	malysis. Elementary mode analysis, extrenanch point, Grouping of reactions, optiminental validation.	TOTAL I	Con ux an PERIC F MA lighes	trol nplifi DDS PPE	of fluctation 45 Delivery								
Experimenta UNIT V Stoichiomet distribution consistency COURSE (At the end of	ANALYSIS OF this course, the	malysis. Elementary mode analysis, extrenanch point, Grouping of reactions, optiminental validation. estudents will be able to mics of pathway and redox balancing	TOTAL F	Con ux an PERIC F MA lighest ndersta	trol nplifi DDS PPE t Lev andin	of fluction 45 Deling (K2								
Experimenta UNIT V Stoichiomet distribution consistency COURSE (At the end c CO1 expl CO2 iden	ANALYSIS OF this course, the	malysis. Elementary mode analysis, extrenanch point, Grouping of reactions, optiminental validation.	TOTAL F	Con ux an PERIC F MA lighest ndersta	trol nplifi DDS PPE t Lev andin	of fluction 45 Deling (K2								
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CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

	PO's												PSO's	
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	3	2	2	1	-	-	3	2	2	1
CO2	2	3	3	-	2	3	-	-	-	-	3	3	2	1
CO3	3	3	2	-	-	-	-	-	-	=	3	2	2	-
CO4	1	2	2	2	-	2	1	1	-	=1	-	3	3	3
CO5	1	3	3	2	-	2	1	1	-	=	-	2	3	2



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3	expla	in the flux bala	ance	e ar	nalysi	is and	signal	1 trans	sductio	n netw	orks.								
4	Interp	oret the Netwo	rk n	mot	ifs an	d their	ir integ	gration	n.				AF.	4					
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CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific **Outcomes PSO's**

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CO2	3	3	2	2	2	-	-	-				1	1	2
CO3	3	3	2	2	1	-	-	-	-	-	-	1	1	3
CO4		3	2	2	1	-	-	-	-	-	-	1	3	2
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3	unders	stand the signific	ance of statistical process cont	rol for quality	monogom.				
4	ascerta	nin quality mana	gement tools and techniques.		manageme	ent.			
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CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

					PO'	3						P	SO's
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BOARD OF STUDIES
Moster of Business Administration

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To en	able th	ne students to)																	
1	expl	ain the mole	cular d	dia	gno	stic	es for	r infe	ction	ns.										
2	deta	il the traditio	nal dis	sea	ise a	and	vari	ious n	neth	nods	and	tools.								
3	disc	uss the various	us dise	eas	e an	nd c	liagr	nostic	s an	nd tre	atmo	ents.								
4	class	sify therapies	again	ist :	for	can	icer.												_	
5	exar	nine the tech	niques	s in	mo	olec	cular	and	clini	ical	liagr	ostic	tech	nol	ogies					
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UNIT	II	TRADITIO	NAL	DI	SE	AS	E D	IAGN	NOS	SIS I	ИЕТ	HOI	OS Al	ND	TOO	OLS			T	9
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		um., Diagr	nosis	of	f 1	maj	or						Derm	ieto	phyto	oses,	Cano	didic	sis	a
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COIII	RSE OUTCOMES	
	end of this course, the students will be able to	BT MAPPED (Highest Level)
CO1	articulate sample collections and diagnostics.	Understanding (K2)
CO2	estimate the diagnostics for traditional diseases.	Understanding (K2)
CO3	list treatment of common diseases and diagnostics.	Understanding (K2)
CO4	interpret various targeted therapy and types.	Applying (K3)
CO ₅	identify the types of mutation and clinical diagnostics.	Applying (K3)
2000 PM 110	T DOOKS	

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CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

Т		(1/2/0	1111111		-0	PO'							PS	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		2	1	-	-	1	1	-	-	-	-	2	1	2
CO2	2	2	1	2	2	1	-	-	-	-	-	2	1	2
CO3	1	2	1	1	-	-	-	-	_	-	-	2	3	3
CO4	1	1	3	2	-	2	1	1	-	-	-	3	3	3
CO5	1	2	3	2	1	2	1	-	-	-		2	3	2



COU	RSE	OBJECTIVES											
To en	able t	he students to											
1	und	erstand the basic c	concep	ots of mush	hroom cul	ltivation a	nd its ir	mporta	nce.			en i	
2	inte	rpret the mushroor	m Cul	tivation ar	nd harvest	ting techn	iques.						
3	1	il the ability and sl							m cult	ivation.			
4	exp	lain various metho	ods of	compostin	ng techniq	ques and the	heir step	ps.					
5	illus	strate various types	es of b	iofertilizer	r and their	applicati	ons.						
UNIT	'I	MUSHROOM B	BIOL	OGY MO	RPHOL	OGY			S. Williams			-	9
Classi	ficati	on: edible and po	oisono	us mushro	ooms. Life	e cycle o	f Basidi	iomyce	etes fur	ngi Bree	eding a	nd G	enetic
impro	veme	nt of mushroom st	trains.	Medicinal	l and Nuti	ritional va	alue of n	mushro	oms.				
UNIT	П	MUSHROOM C	CULT	IVATION	N TECH	NIQUES					411		9
Cultis	- 1												9
runnii	ng an	conditions for trop d harvesting of m op). Diseases and	nushro	ooms (Vol	erate coun	pp., <i>Pleu</i>	rotus sp	pp., <i>Ag</i>	garicus	spp., C	'alocyb	e spp	spawn o., and
runnii <i>Lentir</i> cannii	ng and	d harvesting of m	nushro	ooms (Volvenmination;	erate coun	pp., Pleus	rotus sp	pp., <i>Ag</i>	garicus	spp., C	'alocyb	e spp	spawn o., and ng and
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runnin Lentin cannin UNIT Econo Infras expen	ng and nus sping. Till omics tructuditure	ECONOMICS Cof the production re facilities, expert, interest and dep	OF M	ooms (Volumination; USHROO yster mush are on fixe	Post Hand	pp., Pleur rvest Tec TIVATIO ilky mush	hnology N nroom a nd mac	pp., Ag	exaricus ezing, c ddy stra	spp., Collrying, I	ralocyb Freeze- hroom project	e spr dryin cultiv	spawn o., and ng and g and vation:
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COURSE OUTCOMES	
,	BT MAPPED (Highest Level)
CO1 articulate the morphology, lifecycle of mushroom and its functional values.	Understanding (K2)
CO2 apply the cultivation techniques for mushroom production	Understanding (K2)
CO3 illustrate the marketing potential of the produced mushroom and composts.	Applying (K3)
CO4 classify various composting process and identify its multifunctioning.	Applying (K3)
CO5 interpret the importance of biofertilizer and their mass production.	Applying (K3)

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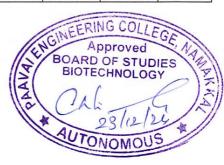
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- 2. Tiwari SC, Pankaj Kapoor, Mushroom Cultivation, Mittal Publications, 2018.
- 3. Krishnamoorthy, Hand Book of Mushroom Cultivation. TNAU Publications, Coimbatore, TN, India, 2019.
- 4. Subba Rao NS, Biofertilizers in agriculture and forestry. India Book House Ltd. New Delhi, 2024.

CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

PO's PSO's CO's CO1 CO₂ CO₃ CO₄ CO₅



	T20653	MOLECULAR MODELING	3	0	0	3
CO	URSE C	DBJECTIVES				
То	nable th	e students to				
1	unders	tand the molecular behaviour of proteins, nucleic acids and small molecu	les in bio	logica	al sys	tem.
2	explai	n the principles involved in molecular modelling.				
3	apply	modelling tools and docking programme.				
4	analys	e how drugs interact with macromolecules.				
5	strateg	ies used in designing novel drugs and prodrugs.				
UNI	TI	INTRODUCTION TO CLASSICAL MECHANICS				9
New	tons law	vs of motion – time intervals- algorithms			-	
UNI	ТП	INTRODUCTION TO STATISTICAL MECHANICS				9
Bolt		Equation – Ensembles – Distribution law for non-interacting molecules –	– Statistic	al me	chan	ics of
UNI	TIII	QUANTUM MECHANICS				9
		e effect – De Broglies hypothesis – Uncertainity principle – Schrod	ingers tir	ne in	depe	ndent
	reion p	article in a one -dimensional box.				
UNI		GROMOS, GROMACS, AMBER and DOCK				9
2287 334	TIV		lar dynam	nics-	Mole	-
Vari	T IV ous force	GROMOS, GROMACS, AMBER and DOCK	lar dynan	nics–	Mole	-
Vari	ous force	GROMOS, GROMACS, AMBER and DOCK efields for proteins and nucleic acids – Molecular mechanics – Molecular	lar dynan	nics-	Mole	-
Vari dyna UNI Prep	ous force amics sin	GROMOS, GROMACS, AMBER and DOCK efields for proteins and nucleic acids – Molecular mechanics – Molecular nulations in water and organic solvents.				cular 9
Vari dyna UNI Prep	ous force amics sin TV aring injusting	GROMOS, GROMACS, AMBER and DOCK efields for proteins and nucleic acids – Molecular mechanics – Molecular mulations in water and organic solvents. GAUSSIAN out files – job types – model chemistries – basis sets – molecule specifica		ning (Gauss	cular 9
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Vari dyna UNI Prep exan	ous force amics similar IV aring inples. URSE One end of biol	GROMOS, GROMACS, AMBER and DOCK efields for proteins and nucleic acids – Molecular mechanics – Molecular mulations in water and organic solvents. GAUSSIAN out files – job types – model chemistries – basis sets – molecule specifical mulations of this course, the students will be able to lerstand the classical mechanics to study the behavior of molecules in	TOTAL P BT MA (Highest	ERIC PPEI Leve	ODS Obs Okalisation	9 sian – 45
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Varidyna UNI Prepexan COU At th	ous force amics sire. TV aring injunctes. URSE One end of biods simulation asset	GROMOS, GROMACS, AMBER and DOCK efields for proteins and nucleic acids – Molecular mechanics – Molecular nulations in water and organic solvents. GAUSSIAN out files – job types – model chemistries – basis sets – molecule specifical actual sets of this course, the students will be able to least and the classical mechanics to study the behavior of molecules in logical system. ulate the biomolecules using statistical mechanics.	BT MA (Highest Understa	PPEI Leve	Gauss ODS O el) g (K2	9 sian – 45

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CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

											,	1- Weak	T	
						,	PO's						PSC	O's
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1	-	-	-	-	2	1	1	1	1	1	2	1	1
CO2	1	3	1	-	-	2	1	-	-	-		2	2	3
CO3	1	-	3	2	-	1	-	1	-		-	1	1	1
CO4	1	-	1	-	-	2	1	1	2=	-	-	1	2	2
CO5	3	1	2	2	-	2	1	1	-	-	-	1	3	2



BT2	0654	LITER	or come	DERVAI	TION A	ND MA	NAGE	MENT		3	0	0	
COUR	SE OBJECTI	IVES		v Tana is									
To ena	ble the students	s to											_
1	analyze globa	I and nation	onal energy	y consump	ption an	d impac	ts.						
2	apply knowled	dge of pov	wer system	s, motors,	s, and lig	ghting							_
3	valuate efficie	ency of bo	oilers, furna	aces, and s	steam sy	ystems.							-
4	identify energ	y-saving	opportuniti	ies in pum	nps, fans	s, and co	mpress	ors.					-
5	apply energy of	economics	s concepts l	like payba	ack peri	od and i	rr.		2 T-V II				-
UNIT	INTROD	OUCTION	N							186			
Energy	- Power - Pa	st and Pro	esent scena	ario of W	orld; Na	ational I	Energy	consumpt	ion Da	ıta –	Envi	ironm	2
aspects	associated wit	th energy	utilization -	- Energy	Auditin	ig: Need	, Types	s, Methodo	ology a	nd B	arrie	rs. Ro	1
Energy	Managers. Ins	struments	for energy	auditing.									
UNIT	II ELECTI	RICAL S	YSTEMS										
Compo	nents of EB b	illing – H	T and LT	supply, T	Transfor	rmers, C	able S	izing, Con	cept of	f Cap	pacito	ors, P	_ O
	Improvement,							0.	•	•			
Illumin	ation – Lux, L	umens, Tv	wnes of ligh	Dec	• т	ED Ligh	nting ar	d scope of	f Encon	n in I	llum	inatio	
			ypes of figh	ning, em	icacy, L	LU LISI		d scope of					1
UNIT	III THERM			nung, Em	icacy, L	DD DIGI	- Ing un	au scope of					1
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Stoichi	ometry, Boiler	AL SYST	FEMS es and The	ermic Flui	id Heate	ers – Eff	ficiency	computat	tion and	d En			u
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CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

		PO's												
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1	3	2	1	1	3	2	-	-	-	2	1	1
CO2	1	2	3	2	2	2	2	1	-	-	-	3	2	3
CO3	2	1	3	2	1	2	2	1	-	-	_	2	1	2
CO4	2	1	3	2	1	3	2	1	-	-	1	3	2	
CO5	3	1	3	2	1	3	2	1	-	_	1	3	3	2



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1	gain kn	owledge on	basic	cs (of n	micro	obes a	and its	stypes						L I			
2	underst	and various	sterili	iliza	atio	on te	chniqu	ues an	nd diag	gnostic	method	ls.					Har-	
3		out microbe							_		A. Viso	7 01	1B/A7					
4	explain	the benefic	ial app	ppli	icat	tions	s of mi	icrobes	es in va	arious	industri	es.		23.31				-
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		s – Bacteria,						robes,	, mve	entions	or gre	eat sc	ientist	and r	1151	ory,	typ	es (
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								N-5 /50										9
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CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

 (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

 PO's

 1
 2
 3
 4
 5
 6
 7
 8
 9
 10
 11
 12

CO's CO₁ CO₂ CO₃ CO₄ **CO5**

Approved
Approved
BOARD OF STUDIES
BIOTECHNOLOGY
AUTONOMOUS

PSO's

		BIOTECHNOLOGY FOR WASTE MANAGEMENT							0		
COL	RSE OB.	JECTIVES							_		
To er	nable the s	tudents to							-		
1	impart 1	the fundamentals	of biological trea	atment processes.							
2											
3			tive of biofuels fr								
4	illustrat	e various chemic	als and enzyme p	roduction from v	wastes						
5	acquire	knowledge on b	io composting pro	ocesses.							
UNIT	I BIO	DLOGICAL TI	REATMENT PR	OCESS							
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			Solid waste mar								
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CO/PO MAPPING:

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's

PO's											PSO's		
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1	1	1	1	-		-	-	-	-	-	2	1	1
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2	2	3	3	-	2	_	1	-	-	-	1	2	2
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