Curriculum & Syllabus

of

B.Tech. Biotechnology

(For the batch admitted in 2007-08)



K.S.RANGASAMY COLLEGE OF TECHNOLOGY TIRUCHENGODE – 637 215

(An Autonomous Institution affiliated to Anna University of Technology Coimbatore and approved by AICTE New Delhi)

K.S.Rangasamy College Autonomous Re	of Technology - gulation	R 2007
Department	Biotechnol	ogy
Programme Code & Name	23 : B.Tech. Biote	echnology

K.S. Rangasamy College of Technology, Tiruchengode - 637 215											
	Curriculum	for the Program	mes un	der A	utonom	ous Scheme	•				
Regulation		R 2007									
Department		Department of	Biotech	nolog	у						
Programme C	ode & Name	23 : B.Tech. Bio	otechno	ology							
		Se	mester								
Course	Course N	2m0	Ho	urs/W	eek	Credits	Ma	ximum N	larks		
Code	Course N	anie	L	Т	Р	С	CA	ES	Total		
	THEORY										
07230101G	Technical English		3	0	0	3	50	50	100		
07230102G	Engineering Mathem	atics I	3	1	0	4	50	50	100		
07230103G	Applied Physics	3	0	0	3	50	50	100			
07230104G	Applied Chemistry		3	0	0	3	50	50	100		
07230105G	Fundamentals of Pro	gramming	3	0	0	3	50	50	100		
07230106S	Basics of Electrical a Engineering	nd Electronics	3	1	0	4	50	50	100		
	PRACTICAL										
07230107P	Applied Physics Lab	oratory	0	0	3	2	50	50	100		
07230108P	Applied Chemistry La	0	0	3	2	50	50	100			
07230109P	Programming Labora	atory	0	0	3	2	50	50	100		
07230110P	Engineering Practice	s Laboratory	0	0	3	2	50	50	100		
	Total		18	2	12	28			1000		
		Se	mester	II							
Course	Course N	ame	Но	urs/W	eek	Credits	Ma	ximum N	larks		
Code		ame	L	Т	Р	С	CA	ES	Total		
	THEORY										
07230201G	Communication Skill	S	3	0	0	3	50	50	100		
07230202G	Engineering Mathem	atics II	3	1	0	4	50	50	100		
07230203G	Materials Science		3	0	0	3	50	50	100		
07230204G	Environmental Scien	се	3	0	0	3	50	50	100		
07230205C	Applied Biology		3	1	0	4	50	50	100		
07230206C	Object Oriented Prog	gramming	3	0	0	3	50	50	100		
	PRACTICAL										
07230207P	Engineering Graphic	s Laboratory	1	0	3	3	50	50	100		
07230208P	Applied Biology Labo	oratory	0	0	3	2	50	50	100		
07230209P	Object Oriented Prog Laboratory	gramming	0	0	3	2	50	50	100		
07230210P	Comprehension I		0	0	3	0	100	00	100		
	Total					27			1000		

K.S. Rangasamy College of Technology, Tiruchengode - 637 215											
	Curriculum for the Proc	gramme	s uno	der Auton	omous Sc	heme					
Regulation	R2007										
Department	Department	of Biote	chnc	ology							
Program Code &	& Name 23 : B.Tech.	Biotech	nnolo	gу							
	1	Seme	ster I		1						
Course	Course Name	Ho	ours/\	Neek	Credit	M	aximum l	Marks			
Code		L	Т	Р	C	CA	ES	Total			
	THEORY										
07230301G	Engineering Mathematics III	3	1	0	4	50	50	100			
07230302C	Bioorganic Chemistry	3	0	0	3	50	50	100			
07230303C	Microbiology	3	0	0	3	50	50	100			
07230304C	Principles of Chemical Engineering	3	1	0	4	50	50	100			
07230305C	Biochemistry	3	0	0	3	50	50	100			
07230306C	Instrumentation Techniques	3	0	0	3	50	50	100			
	PRACTICAL										
07230307P	Bioorganic chemistry Laboratory	0	0	3	2	50	50	100			
07230308P	Microbiology Laboratory	0	0	3	2	50	50	100			
07230309P	Instrumentation Techniques Laboratory	0	0	3	2	50	50	100			
07230310P	Comprehension II	0	0	3	0	100	00	100			
07230311P	Career competency Development I	0	0	2	0	100	00	100			
	Total	19	3	14	26			1100			
		Seme	ster I	V							
Course		He	ours/\	Neek	Credit	Μ	aximum l	Marks			
Code	Course Maine	L	Т	Р	С	CA	ES	Total			
	THEORY										
07230401C	Probability and Statistics	3	1	0	4	50	50	100			
07230402C	Genetics	3	0	0	3	50	50	100			
07230403C	Molecular Biology	3	0	0	3	50	50	100			
07230404C	Basic Industrial Biotechnology	3	0	0	3	50	50	100			
07230405C	Chemical Reaction Engineering	3	1	0	4	50	50	100			
07230406C	Chemical Thermodynamics and Biothermodynamics	3	1	0	4	50	50	100			
070004075			0	2		50	50	400			
07230407P	Chemical Reaction	U	U	3	2	50	50	100			
07230408P	Engineering Laboratory	0	0	3	2	50	50	100			
07230409P	Laboratory	0	0	3	2	50	50	100			
07230410P	Comprehension III	0	0	3	0	100	00	100			
07230411P	Career competency Development II	0	0	2	0	100	00	100			
	Total	18	3	14	27			1100			

K.S. Rangasamy College of Technology, Tiruchengode - 637 215													
	Currie	culum for the Programme	es und	er Au	tonomo	ous Schem	ne						
Regulation		R2007											
Department		Department of Biotech	tment of Biotechnology										
Program Code	& Name	23 : B.Tech. Biotechno	chnology										
		Seme	ester V										
Course	6	uroo Nomo	Ho	urs/W	'eek	Credit	Max	imum M	arks				
Code		urse name	L	Т	Р	С	CA	ES	Total				
	THEORY												
07230501S	Principles of N	lanagement	3	0	0	3	50	50	100				
07230502C	Genetic Engin	eering	3	0	0	3	50	50	100				
07230503C	Bioinformatics		3	1	0	4	50	50	100				
07230504C	Bioprocess En	3	1	0	4	50	50	100					
07230505C	Enzyme Engi Technology	neering and	3	0	0	3	50	50	100				
072305**E	Elective I		3	0	0	3	50	50	100				
	PRACTICAL												
07230507P	Genetic Engin	eering Laboratory	0	0	3	2	50	50	100				
07230508P	Bioprocess En	0	0	3	2	50	50	100					
07230509P	Enzyme Engi	0	0	3	2	50	50	100					
07230510P	Comprehensio	n IV	0	0	3	0	100	00	100				
07230511P	Career compe	tency Development III	0	0	2	0	100	00	100				
		Total	18	2	14	26			1100				
		Seme	ster V										
Course	6	uroo Nomo	Ho	urs/W	'eek	Credit	Max	imum M	arks				
Code			L	Т	Р	С	CA	ES	Total				
	THEORY												
07230601S	Professional E	thics	3	0	0	3	50	50	100				
07230602C	Immunology		3	1	0	4	50	50	100				
07230603C	Molecular Moc Designing	leling and Drug	3	0	0	3	50	50	100				
07230604C	Protein Engine	ering	3	1	0	4	50	50	100				
072306**E	Elective II		3	0	0	3	50	50	100				
072306**E	Elective III		3	0	0	3	50	50	100				
	PRACTICAL												
07230607P	Immunology L	aboratory	0	0	3	2	50	50	100				
07230608P	Bioinformatics	Laboratory	0	0	3	2	50	50	100				
07230609P	Industrial Biote	echnology Laboratory	0	0	3	2	50	50	100				
07230610P	Comprehensio	n V	0	0	3	0	100	00	100				
07230611P	07230611P Career competency Development I				2	0	100	00	100				
	Total					26			1100				

K.S. Rangasamy College of Technology, Tiruchengode - 637 215												
	Curriculu	m for the Prog	ramme	s und	er Auto	nomous S	cheme					
Regulation		R2007										
Department		Department of	of Biote	chnol	ogy							
Program Code	& Name	23 : B.Tech. I	ch. Biotechnology									
			Semester VII									
Course Code	Course N	lame	Ho	urs/W	'eek	Credit	M	aximum N	Marks			
			L	Т	Р	С	CA	ES	Total			
	THEORY											
07230701G	Total Quality Man	agement	3	0	0	3	50	50	100			
07230702C	Down Stream Pro	3	1	0	4	50	50	100				
07230703C	Plant Biotechnolo	3	0	0	3	50	50	100				
07230704C	Animal Biotechno	3	0	0	3	50	50	100				
072307**E	Elective IV	3	0	0	3	50	50	100				
072307**E	Elective V	3	0	0	3	50	50	100				
	PRACTICAL											
07230707P	Down Stream Pro Laboratory	cessing	0	0	3	2	50	50	100			
07230708P	Plant and Anima Biotechnology La	l boratory	0	0	3	2	50	50	100			
07230709P	Project Work - Ph	ase I	0	0	4	2	100	00	100			
072307010P	Career competen Development V	су	0	0	2	0	100	00	100			
	Total		18	1	12	25			1000			
		:	Semest	ter VI								
Course Code	Course N	lame	Ho	urs/W	'eek	Credit	M	aximum N	Marks			
	THEORY											
07230801C	Biopharmaceutica	al Technology	3	0	0	3	50	50	100			
072308**E	Elective VI		3	0	0	3	50	50	100			
	PRACTICAL											
07230803P	07230803P Project Work - Phase II				30	20	50	50	100			
	Total					26			300			

K.S.Rangasamy College of Technology, Tiruchengode – 637 215										
	Curriculum f	or the Programr	nes uno	der Aut	onom	ous Schem	ie			
Regulation		R 2007								
Department		Department of	Biotech	nology						
Programme C	ode & Name	23 : B.Tech Bio	otechno	logy						
Course	Course No	mo	Hou	rs / We	ek	Credit	Max	kimum Ma	arks	
Code	Course Na	me	L	Т	Ρ	С	CA	ES	Total	
		Ele	ctives I							
07230541E	Environmental Biotech	nology	3	0	0	3	50	50	100	
07230542E	Genomics and Proteor	mics	3	0	0	3	50	50	100	
07230543E	Virology		3	0	0	3	50	50	100	
07230544E	Molecular Biophysics		3	0	0	3	50	50	100	
		Ele	ctives II							
07230651E	Food Science and Te	chnology	3	0	0	3	50	50	100	
07230652E	Marine Biotechnology		3	0	0	3	50	50	100	
07230653E	Metabolic Engineering		3	0	0	3	50	50	100	
07230654E	Chromatographic Sep	arations	3	0	0	3	50	50	100	
EI										
07230661E	Immunotechnology		3	0	0	3	50	50	100	
07230662E	Dairy and Bakery Tech	nnology	3	0	0	3	50	50	100	
07230663E	Nanoscience and tech	nology	3	0	0	3	50	50	100	
07230664E	Biotechnology of Sterr	n cell	3	0	0	3	50	50	100	
		Elec	ctives I\	/						
07230771E	Tissue Engineering		3	0	0	3	50	50	100	
07230772E	Molecular Phylogeny		3	0	0	3	50	50	100	
07230773E	Cancer Biotechnology		3	0	0	3	50	50	100	
07230774E	Systems biology									
		Ele	ective V							
07230781E	Developmental Biolog	у	3	0	0	3	50	50	100	
07230782E	Food Biochemistry and	d Nutrition	3	0	0	3	50	50	100	
07230783E	Bioinstrumentation		3	0	0	3	50	50	100	
07230784E	Clinical Trial Managen	nent	3	0	0	3	50	50	100	
		Ele	ctive VI							
07230891E	Molecular Medicine		3	0	0	3	50	50	100	
07230892E	Biodiversity and biores Management	source	3	0	0	3	50	50	100	
07230893E	Bio- business		3	0	0	3	50	50	100	
07230894E	Principles of Biomedic	al Engineering	3	0	0	3	50	50	100	

K.	S.Rangasa	amy College of Tech	nology	- Autonom	ous Regu	lation		R	2007		
De	partment	Biotechnology	Progr	amme Code	e & Name		23 : B.Te	ch. Bio	technol	ogy	
				Seme	ster I			I			
Cou	ursa Coda	Course Name		Ηοι	urs / Week		Credit	N	laximum	n Marks	
000		Course Maine		L	Т	Р	С	CA	ES	Total	
072	230101G	TECHNICAL ENGLI	SH	3	0	0	3	50	50	100	
Obj	jective(s)	To help learners in appropriately in dif rhetorical functions reading texts, acquin situations and organ	mprove ferent of tech re the a ized aca	their skills academic a nical Engli bility to spe ademic and	s in vocat and profe sh, develo ak effectiv profession	oulary a ssional op strate vely in E nal writing	nd to enat contexts, fa egies that o nglish in rea g.	ole the amiliar could al life a	em to u ize with be adop and care	use words n different pted while eer related	
1	GRAMMA	R AND VOCABULAR	Y				Total Hrs		09)	
Wor – te voic com Britis	Word formation with prefixes and suffixes – synonyms and antonyms – verb patterns-subject – verb agreement – tenses (simple and compound tenses) – simple, compound and complex sentences – impersonal passive voice – use of conditionals – comparative adjectives (affirmative and negative) – expanding nominal compounds – articles – use of prepositions - phrasal verbs – commonly mispronounced and misspelt words – British and American vocabulary.										
2 LISTENING Total Hrs 09											
Exte liste spea mair	Extensive listening – listening for general content – listening to fill up gapped texts – intensive listening – listening for specific information: retrieval of factual information – listening to identify topic, context, function, speaker's opinion, attitude, etc. – global understanding skills and ability to infer, extract gist and understand										
3	SPEAKIN	G	ungunu				Total Hrs		09)	
Vert word oral obje givir	bal and not ds) – sente practice – cts – offer ng instructic	n verbal communicati nces stress – intonati developing confidenc ing suggestions and ns.	ion – s on – Pr ce – inti recomn	peech soun onunciation roducing on nendations	nds – sylla drills, ton neself – as – express	ibles – v gue twis king for ing opin	vord stress ters – forma or eliciting ions (agree	(struc al and inform ement	tures a informa ation – / disagr	nd content I English – describing reement) –	
4	READING						Total Hrs		09)	
Expo skim Iden note	osure to di nming the t tifying lexic -making –	fferent reading techn ext – identifying the al and contextual me understanding discour	iques – topic s anings se cohe	reading fo entence and - reading fo erence – sec	or gist and d its role or structure quencing c	global i in each and det f senten	meaning – paragraph ail – transfe ces.	predic – sca er of in	ting the nning – formatio	content – inferring / on / guided	
5	WRITING						I otal Hrs		09	1	
Intro (topi sequ form work	ductions to ic sentence uencing cor nal letter wi ks in industi	 the characteristics of and its role, unity, connectives) – comparis- riting (letter to the edi- ries) – editing (punctua) 	f techni oherenc on and itor, lett ation, sp	cal style – v e and use o contrast – c er for seeki pelling and o	writing def of cohesive classifying ng practica grammar).	initions a e expres the data al trainin	and descript sions) – pro – analyzing g, and lette	cions – ocess o g / inte r for u	paragra descript rpreting ndertak	aph writing ion (use of the data – ing project	
Tota	I hours to b	e taught	•		<u> </u>				45	,	
Text	: book (s) :										
1.	1. Rizvi M Ashraf, "Effective Technical Communication", 1 st Edition, Tata McGrawhil Publishing Company td., New Delhi, 2005.										
Refe	erence(s) :										
1.	Dr.M.Bala Kumbakor	subraminian and Dr.G nan, 2007.	.Anbala	ıgan, "Perfo	rmance in	English"	Anuradha F	Publica	ations,		
2.	Sharon J. Education	Gerson, Steven M. Ge (Singapore) (p) Ltd.,	erson, " New De	Techinical V Ihi, 2004.	Vriting – P	rocess &	Product". 3	rd Editi	on, Pea	rson	
3.	Mitra K. B University	arun, "Effective Techi Press. New Delhi. 20	nical Co 006.	mmunicatio	on – A Gui	de for Sc	ientists and	Engin	eers", C	vxford	

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
Depa	artment	Biotechnology	Programme (Code & N	lame		23 : B.Te	ch. Bio	otechn	ology	
			Seme	ster I							
Cours		Course	lama	Hou	ırs / We	ek	Credit	Ма	ximun	n Marks	
Cours		Course r	Name	L	Т	Р	С	CA	ES	Total	
0723	80102G	ENGINEERING MAT	THEMATICS I	3	1	0	4	50	50	100	
Obje	ctive(s)	The course aims to o and transform techni of engineering subj electromagnetic theo specialized studies a	develop the skills of iques. This will be ects like heat co ory. The course w ind research.	of the stu necessanduction vill also s	dents ir ary for t , comm serve as	n the ai heir eff nunicat s a pre	reas of bou ective studion system prequisite f	indary lies in ns, ele for pos	value a larg ectro-o st grac	problems e number ptics and duate and	
1	MATRIC	ES				Тс	otal Hrs		0	9	
Colum and Ei (without a sym transfo	Column matrix as vector – linear independent and dependent of vector –Characteristic equation – Eigen values and Eigen vectors of a real matrix –Properties of eigen values and eigenvectors – Cayley – Hamilton theorem (without proof) – Similarity transformation (concept only) – Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation.										
2 GEOMETRICAL APPLICATIONS OF DIFFERENTIAL Total Hrs 09 CALCULUS											
Curvat	ture – Car	tesian and polar co-or	dinates – Centre a	and radiu	is of cu	rvature	- Circle o	f curva	ture -	Involutes	
and ev	and evolutes – Envelopes – Properties of envelopes and evolutes –Evolute as envelope of normals.										
3	FUNCT	UNS OF SEVERAL V				10	tal Hrs		0	9	
and m	ons of two inima – La	agrange's multiplier me	erivatives – Total d ethod – Jacobians	ifferentia	I – Max	ima an	a minima -	- Cons	straine	d maxima	
4	ORDINA	ARY DIFFERENTIAL E	QUATIONS			To	otal Hrs		0	9	
Linear n >0, \$ variab	differentia Sin ax , Co le coefficie	al equations of Second os ax, e ^{a x} x ⁿ , e ^{œ x} Si ents (Cauchy's Form a	d and higher ordeı n ßx, e ^{œ x} Cosß x, ınd Legendre's Lin	r with cor x ⁿ Sinœ lear Equa	nstant c ex and ation).	oefficie x ⁿ Cos	ent when th œx – Diffe	ne R.H erentia	I.S is I Equa	e ^{ax} , x ⁿ ations with	
5	DIFFER	ENTIAL EQUATIONS	AND ITS APPLIC	ATIONS		Т	otal Hrs		0	9	
Simult Solutio harmo	aneous fi on of spe onic motior	rst order linear equat cified differential equ n (Differential equation	tions with constar ations connected s and associated	nt coeffic with ele condition	ectric ci s need	Metho ircuits, be give	od of varia bending (en).	ation c of bea	of para ms ar	ameters – nd simple	
Total h	nours to be	e taught							45	5	
Text b	ook (s) :										
1.	Veeraraj Compan	jan. T., "Engineering I by Limited, New Delhi,	Mathematics (for f 2005.	irst year)), Fourt	h Editio	on Tata Mo	cGraw	- Hill F	Publishing	
2.	Grewal.	B.S., "Higher Enginee	ring Mathematics"	, Thirty E	ighth E	dition,	Khanna Pu	ublishe	ers, De	lhi, 2004.	
Refere	ence(s):										
1.	1. Kandasamy. P, Thilagavathy. K and Gunavathy. K, "Engineering Mathematics" – S.Chand and Co. – New Delhi 2007.										
2.	Kreyszig Limited,	J. E., "Advanced Eng Singapore 2001.	gineering Mathem	natics," E	Eighth	Edition	, John W	iley ar	nd So	ns (Asia)	
3.	 Venkataraman.M.K, "Engineering Mathematics, Volume I & II Revised Enlarged Fourth Edition", The National Pub. Co., Chennai, 2004. 										

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
De	partment	Biotechnology	Programme	Code &	Name		23: B.	Tech. Bio	otechnolo	ogy	
			Sem	nester I							
Col	urea Cada	Course No	mo	Hou	rs/We	ek	Credit	Ma	ximum N	larks	
00		Course Na	ame	L	Т	Р	С	CA	ES	Total	
07	230103G	APPLIED PHYSICS		3	0	0	3	50	50	100	
Ob	jective(s)	Design of acoustical destructive Techniqu and Technology.	ly good building es, Application	gs Struc of Quant	tural ic tum Ph	lentific ysics	ation of e Application	ngineerii n of Lase	ng mater ers in Eng	ials Non gineering	
1	LASERS					То	tal Hrs		09		
Intro inve aser	Introduction – principles of spontaneous emission and stimulated emission and stimulated emission-Population inversion, Pumping-Types of Lasers:He-Ne, Co2, Nd-YAG, Ruby Lasers, Semiconductor Laser- Applications: asers in Microelectronics, Welding, Heat Treatment and Cutting-Holography.										
2	FIBER OP	TICS AND APPLICAT	IONS:			То	tal Hrs		09		
Prine inde optic	Principles-Modes of Propagation-Crucible-Crucible Technique-Classification based on materials, refractive index and modes of propagation-Splicing-Losses in Political fiber-Light Sources for fibre optics-Detectors-Fiber optical Communication Links-Fiber optic Sensors:Temprature, Displacement Measurement.										
3	3 QUANTUM PHYSICS AND APPLICATIONS Total Hrs 09										
Intro prino Scho Scar	Introduction to quantum theory-Dual Nature of Matter and Radiation-De-Broglie wavelength-Uncertainity principle and its applications-Compton effect-Expression for Compton Shift-Experimental Verification-Schordinger's Equation(Time dependent and time Independent)-Particle in a box-Electron microscope-Scanning electron microscope.										
4	ULTRASO	NICS				То	tal Hrs		09		
Intro effec drillin Reso	duction of st,piezoelecting, welding, sonance syste	Ultrasonics Waves-W ric generator-Detection soldering and cleaning em.	lagnetostriction on of ultrasor ng- Non destru	effect,N nic wav ctive tes	/lagneto ves-Pro sting- F	ostricti pertie Pulse	ion gener s-Cavitatio echo syst	ator,inve on-Indust em throu	rse piez rial App ugh trans	coelectric olications smission-	
5	ACOUSTI	CS				То	tal Hrs		09		
Intro Web form build	duction-Clas er –Fechne ula-Absorpti lings and the	ssification of Sound-C r Law-Decibel-Phon, on coefficient-Determ sir remedies-Factors to	Characteristics Sone-Acoustics ination of Abs be followed for	of Musi of build orption good ad	cal So ding-Re Co-effi coustic	ound-L everbe cient-l of bui	oudness-Seration-Rev Factors A ding.	Sound ir verberati ffecting	ntensity on time- the aco	Level(I _L)- Sabine's ustics of	
Tota	I Hours Tau	ight							45		
Text	book (s) :										
1	APPLIED	PHYSICS Authored by	dept. of physic	s KSRC	Т.						
Refe	erence(s) :										
1	Jayakumar	S,"Engineering Physic	cs",R K Publishe	ers,Coim	batore	,2003.					
2	Dr.Arumug	am.M,"Engineering Ph	ysics", Anuradh	a Public	ations,	Kumb	akonam, 2	2006.			
3	Gaur R.K a	ind Gupta S.L,"Engine	ering Physics", I	Jhanpat	Rai a	nd Sor	ns, New D	elhi, 200	1.		
4	Charles Kit	tel, Introduction to Sol	d State Physics	", Dhanp	bati Ra	and S	Sons, New	Delhi, 2	001.		
5	⊦eynman,"	Lecturers in Quantum	Mechanics"Nar	osa Publ	ication	, Delh	2003.				

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Departm	ent Biotechnology	Prog	ramme C	Code &	Name	2	3: B.Te	ch. Bio	technology	
			Seme	ster I		·				
Course C	ode Course Name		Hou	rs / We	ek	Credit		Maxim	um marks	
Course C			L	Т	Р	С	CA	ES	Total	
0723010	4G APPLIED CHEMISTR	Y	3	0	0	3	50	50	100	
Objective	(s) The student should be and its inhibition, treat devices, knowledge v materials.	e convers ment of v with resp	sant with water for pect to f	the pr indust uels a	inciple: rial pur nd cor	s involved i poses and t mbustion a	n electr the con- nd poly	o chen cept of mer a	nistry, corrosion energy storage nd engineering	
1 W	ATER TREATMENT				To	otal Hrs			9	
Turbidity, Water- Ha caustic e demineral 2 El Electroche cell – Ner electrode	Turbidity, color, acidity, alkalinity, nitrogen, fluoride – (Definition, sources and sanitary significance only) – Water- Hardness- Estimation of hardness by EDTA method- Boiler feed water- scale formation, corrosion, caustic embrittlement, priming and forming- softening of water- lime soda process- zeolite process – demineralization – desalination – electro dialysis and reverse osmosis. 2 ELECTRO CHEMISTRY 2 ELECTRO CHEMISTRY 2 Electrochemical cells – reversible and irreversible cells – EMF – measurements – Standard Weston Cadmium cell – Nernst equation – problems – Electrodes – Single electrode potential – Types of electrodes – Calomel electrode – Electrochemical series – significance – Potentiometric titrations – Batteries – Lead acid and Ni-Cd									
batteries.		CONTR			Тс	tal Hrs			9	
Corrosion	 Electrochemical and chemical 	nical – M	ochanism	-cor	rosion	reaction – t	vnes of	corros	ion – differential	
aeration – Protective functions	granular - pitting – corrosion coatings – Preliminary tre - mechanism of drving.	n control atment -	 Sacrific Electro 	cial and plating	ode and (Cr 8	d Impressed Ni) – Pai	d curren ints – (t meth Constit	od – Inhibitors – uents and their	
4 Fl	JELS & COMBUSTION				To	otal Hrs			9	
Fuels – C Coal – pro and polyn octane nu	alorific values – Gross and Noximate and ultimate analysis her petrol – Synthetic petrol mber by additives – Diesel –	Net – The s – their i – Fishei <u>Cetane r</u>	eoretical a mportanc - Tropsc number –	air for c ce – m h and Water	combus etallurg Bergiu gas, p	stion – flue (gical coke – s method – <u>roducer gas</u>	gas ana Petrol - Octan s & LPG	lysis – – Straig e num	Orsat method – ght run, cracked ber – improving	
5 PC	DLYMERS				To	otal Hrs			9	
Polymer polymeriza Nylon6-6, Compoun	structure – Nomenclature – ation – mechanism – indivi Bakelite, Polyester, Epox ding and fabrication – Compr	Polymeri idual pol xy, Polyu ression, I	zation – ymers – irethane njection,	types Polye – Str Extrusi	 mech thylene ucture, on and 	nanism (free e, Polyprop Preparatio I Blow moul	e radica ylene, I on, Pro ding– F	I only) PVC, Toperties oamed	 – co-ordination Feflon, Acrylics, and Uses – plastics. 	
									40	
	JR . ied Chemistry by R Palaniye	lu P Par	imalam F	2 Srivia	lhva K	Tamilarası	u and P	Dadma	nahan	
		iu, n.r ai	inaiain, L	5.311010	iliya, N		anu F.	rauma		
1. Jain 2002	1. Jain P.C. & Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Co. New Delhi, 14 th Edition, 2002.									
2. Clair New	N Sawyer and Perry L Mc Delhi, 14 th Edition, 2002.	Carty,"Cl	nemistry	for En	vironme	ental Engine	eering",	TMH	Book Company,	
3. Dara	S.S. "A text book of Engine	ering Che	emistry, S	S.Chan	d & Co	. Ltd., 2003				
4. Upp	al M.M. revised by S.C.Bhat	tia,"Engir	eering C	hemis	try", Kh	nanna Publi	shers, I	New D	elhi, 6 th Edition,	

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
D	epartment	Biotechnology	Progra	mme	e Cod	e & Nan	ne 23:	B.Tech.	Biotech	nnology	
			Sem	ester	1						
6	urso Codo	Course Name		Н	ours/\	Neek	Credit	Ma	ximum	Marks	
		Course Name		L	Т	Р	С	CA	ES	Total	
07	7230105G	FUNDAMENTALS OF PROGRAMMING		3	0	0	3	50	50	100	
0	Objective(s) To impart knowledge in the fundamentals of computer and programm devices.								anguag	e, storage	
1	COMPUTER	RBASICS				Тс	otal Hrs		8		
Evol Stora lang	Evolution of computers- Generations of computers- Applications of computers Computer Memory and Storage- Input Output Media - Algorithm- Flowchart- Pseudocode – Program control structures Programming languages Computer Software- Definition- Categories of Software.										
2	2 C FUNDAMENTALS Total Hrs 9										
Intro oper	ntroduction to C- Constants- Variables- Data types- Operators and Expressions- Managing Input and Output operations- Decision Making and Branching- Looping.										
3	ARRAYS AN	ID FUNCTIONS				Тс	otal Hrs		10		
Arra	ys- Character	Arrays and Strings- User de	efined fun	ction	s- Sto	torage Classes					
4	STRUCTUR	ES AND FILES				Тс	otal Hrs		10		
Strue Unio	ctures- Definit ns- File Mana	ion- Initialization- Array of S gement.	Structures	- Stru	ucture	es within	structures- S	Structure	es and I	Functions-	
5	POINTERS					Тс	otal Hrs		8		
Poin Poin	ter Basics – P ters and struc	Pointer Arithmetic – Pointers tures.	and array	y Poi	nters	and cha	racter string,	Pointers	s and fu	inctions –	
Tota	I hours to be t	aught							45		
Text	book (s) :										
1.	ITL Education 2005. (Unit	on Solutions Limited, "Intro I)	duction to	o Inf	ormat	ion Tec	hnology", Pe	arson E	ducatio	on (India),	
2.	E.Balagurus	amy, "Programming in ANS	I C", TMH	, Ne	<i>w</i> Del	hi, 2002					
3.	Byron Gottfr	ied, "Programming with C", I	II Edition,	TM⊦	I, 200	2.					
Refe	rence(s):										
1.	Rajaraman \	/, "Fundamentals of Comput	ters", Fou	rth E	dition	, PHI 20	06.				

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
D	epartment	Biotechnology	Prog	gramm	ne Cod	e & Na	me	23: B.Tech	Biotech	nnology	
			Ś	Semes	ster I						
0	ureo Codo	Course No.	mo	Ho	urs / W	eek	Credit	Maxim	ium Ma	rks	
		Course Na	IIIe	L	Т	Р	С	CA	ES	Total	
0.	7230106S	BASICS OF ELEC AND ELECTRONIC ENGINEERING	TRICAL CS	3	1	0	4	50	50	100	
0	bjective(s)	After the completic	on of this co	urse,	student	ts gain	knowledge	e in fundamen	tals of	electrical	
1	DC AND AC	CIRCUITS			yn aspe	Tc	tal Hrs		9		
Defir Ohm alter oper com Cons amm	Definition of current-potential-resistance, power, and energy-symbol and units-international system of units- Ohm's law- Kirchoff's law- solution of series, parallel and series parallel circuits-simple problems. Generation of alternating emf, average and Rms values-form and peak factors, concept of phasor representation- complex operator "j"-AC circuits involving RLC series circuits-reactance and impedance-power factor and power components in ac circuits-simple problems. Construction and principle of operation of Moving Coil and Moving iron instruments (only Voltmeter and ammeters) - dynamometer type wattmeter. Induction type energy meter- Megger										
2 DC MACHINES & TRANSFORMERS Total Hrs 9											
Cons DC r Cons	struction of DC notors-types a struction and p	C machines – Theor nd their characterist rinciple of operation	y of operation of operation of the second se	on of quationers-ty	DC Ge m. ypes- e	nerato mf equ	rs -emf eq	uation. Opera	iting Pri	nciple of	
3	INDUCTION	MACHINES				Тс	otal Hrs		9		
torqu (Qua	struction of thr ue characteris alitative analys	ee phase motors –o tics. Single phase is only)	perating prir motors- ty	pes-	s- types capacit	s of thre or sta	ee phase n rt capacito	notors- torque r run motors	equations- shad	on-speed ed pole.	
4	ELECTRONI	C COMPONENTS A	ND DEVICE	ES		To	otal Hrs		9		
Activ trans	e and passive sistors-CC, CB	e components, basic , CE configuration. S	principles a Symbol, truth	nd chann table	aracter and ci	istics o rcuit of	f PN diode basic logic	, zener diode, gates- univer	bipolar sal gate	iunction s.	
5	POWER SUP	PPLIES				To	tal Hrs		9		
Oper facto	rating principle or, rectifier effic	es of Half wave and iency, Voltage regul	l full wave r ator-types. I	rectifie ntrodu	r, Brido	ge rect	ifier, ripple S and UPS	factor, transf	ormer u	utilization	
Tota	I hours to be ta	aught						theory :45: To	5, Tutori tal: 60	ial : 15	
Text	books:										
1.	B.R.Gupta ar	nd V.Singhal,"Basics	of Electrica	I and E	Electror	nics En	gineering",	S.Chand & C	o., New	Delhi.	
Refe	rences:										
1.	B.R.Gupta, "I	Principles of Electrica	al Engineerir	ng", S.	Chand	& Co.,	2002.				
2.	K.A.Muraleed Computer En	haran, R.Muthusub gineering, Tata McC	oramanian a Graw Hill 199	and S 97.	.Salival	hanan,	"Basic El	ectrical and	Electro	nics and	
3.	V.K.Mehta,"	Principles of Electrica	al Engineerir	ng and	Electr	onics",	S.Chand 8	Co., New De	lhi.		

		K.	S.Rangasamy College of Techno	ology - A	utono	mous F	Regulation			R 2007
De	partr	nent	Biotechnology	Pro	gramm Nar	e Code ne	23:	B.Tech.	Biotec	hnology
			\$	Semeste	r I					
Cal	1500	Codo	Course Name	Hou	rs / We	ek	Credit	Ma	ximum	marks
COL	ise	Code	Course Name	L	Т	Р	С	CA	ES	Total
072	2301	07P	APPLIED PHYSICS LABORATORY	0	0	3	2	50	50	100
Ob	jectiv	/e(s)	Educate the theoretical concepts	Experim	entally					
	(Any 10 experiments)									
1		Deteri	mination of Rigidity modulus of a w	rire by tor	sional	pendulu	ım	Tota	l Hrs	3
2	2 Determination of Young's Modulus of the material of a uniform bar by non-uniform bending method Total Hrs									3
3	3 Determination of Young's Modulus of the material of a uniform bar by uniform bending method Total Hrs 3									3
4	4 Determination of viscosity of liquid by poiseuille's method Total Hrs								3	
5		Deteri pendu	mination of acceleration due to gra	avity by c	ompou	nd (Bar	·)	Tota	l Hrs	3
6		Deteri Gratin	mination of Wavelength of Mercury g.	Spectru	m by S	pectron	neter	Tota	l Hrs	3
7		Deteri	mination of thickness of fiber by air	wedge r	nethod.			Tota	l Hrs	3
8		Deteri deterr	mination of wavelength of laser usi nination.	ng gratin	g and p	article	size	Tota	l Hrs	3
9		Deteri ultraso	mination of velocity of ultrasonic wa	aves and	compr	essibilit	y using	Tota	l Hrs	3
10)	Deteri	mination of band gap energy of a s	emicond	uctor.			Tota	l Hrs	3
11	1	Deteri rings i	mination of radius of curvature of a method.	plano co	onvex le	ens by l	Newton	Tota	l Hrs	3
12	2	Deteri metho	mination of thermal conductivity of od.	a bad co	nducto	r using	lee's disc	Tota	l Hrs	3
Tota	otal hours to be taught 30									
Lab	Lab Manual :									
1.	1. Physics lab manual by V.Mohan, M.Mani and S.Masilamani.									
Refe	erenc	e (s) :								
1.	J.M Edi	landhai tion 200	m, R.C.denney, J.D.Barnes and 04.	N.J.K Tł	nomas,	Vogel'	s text boo	k of phy	sics p	ractical, 6 th

	ŀ	K.S.Rangasamy College of Teo	hnol	ogy - Au	tonom	nous Re	gulation			R 2007
Departr	nent	Bio Technology	Pro	ogramme	Code	& Nam	e 23:	B.Tech.	Biotec	hnology
			Se	mester I						
Course	Codo			Hou	rs/We	ek	Credit	Max	kimum	marks
Course	Code	Course Name		L	Т	Р	С	CA	ES	Total
072301	08P	APPLIED CHEMISTRY LABORATORY		0	0	3	2	50	50	100
Objectiv	re (s):	Educate the theoretical concept	ots Ex	periment	tally.					
	(Any 10 experiments)									
1	Estim	ation of hardness of water by EI	DTA.					Tota	al Hrs	3
2	2 Estimation of alkalinity of water sample. Total Hrs 3 3 Estimation of chlorido content in water sample. Total Hrs 3									
3	3 Estimation of chloride content in water sample. Total Hrs 3									
4	4 Determination of dissolved oxygen in boiler feed water. Total Hrs 3									
5	Deter	mination of water of crystallization	on of a	a crystall	ine sal	t.		Tota	al Hrs	3
6	Cond	uctometric titration of strong acid	d with	strong b	ase.			Tota	al Hrs	3
7	Cond	uctometric titration of mixture of	acids	•				Tota	al Hrs	3
8	Precip	pitation titration by conductomet	ric me	thod.				Tota	al Hrs	3
9	Deter	mination of strength of HCI by p	H Met	ter.				Tota	al Hrs	3
10	Estim	ation of ferrous ion by potention	netric	titration.				Tota	al Hrs	3
11	Deter photo	mination of sodium and potassit metry (Demo only).	um in :	a water s	sample	by flam	ie	Tota	al Hrs	3
12	Estim	ation of ferric ion by spectropho	tomet	ry (Demo	o only).	1		Tota	al Hrs	3
Total hou	urs to be	e taught							30	
Lab Man	ual :									
1. Ch	1. Chemistry Lab Manual by R.Palanivelu, R.Parimalam and B.Srividhya									
Reference	Reference (s) :									
1. J. I An	Mendha alysis, 6	am, R.C. Denney, J.D. Barnes a 5 th Edition, Pearson Education, 2	nd N. 2004.	.J.K. Tho	mas, \	/ogel's	Text book	of Quant	itative	Chemical

K.S.Rangasamy College of Technology - Autonomous Regulation R 2007											
Departme	nt	Biotechnology	Program	nm	e Cod	e & Nar	ne 2	3: B.Te	ch. I	Biotecl	nnology
			Semeste	er I							
	40		Н	our	s/We	ek	Credit		Max	imum	marks
Course Co	ue	Course Name	L		Т	Р	С	С	A	ES	Total
07230109	Р	PROGRAMMING LABORATORY	0		0	3	2	5	0	50	100
Objective (s):	At the end of program students sh	ould be	abl	e to pe	erform p	rogramm	ing in	C la	nguag	e
	(Any 10 experiments)										
1.	Wr	ite a C program to print Pascal's tri	angle.						Tota	l Hrs	3
2.	Wr	ite a C program to print the sine an	d cosine	e se	ries				Tota	l Hrs	3
3. Write a C program to perform Matrix multiplication Total Hrs 3								3			
4. Write a C program to prepare and print the sales report. Total Hrs							3				
5.	5. Write a C program to perform string manipulation functions like string concatenations, comparison, find the length and string copy without using Total Hrs 3								3		
6.	Wr	ite a C program to arrange names	in alphal	oeti	cal or	ler			Tota	l Hrs	3
7.	Wr de ^r	ite a C program to calculate the me viation using functions.	ean, varia	anc	e and	standai	ď		Tota	ll Hrs	3
8.	Wr	ite a C program to perform sequen	tial sear	ch เ	using f	unction	S.		Tota	l Hrs	3
9.	Wr fac	ite a C program to print the Fibona ctorial of the given number using fur	cci serie nctions.	s a	nd to c	alculate	e the		Tota	l Hrs	3
10.	Wr	ite a C program to print the mark sl	heet of n	stu	udents	using s	structure		Tota	l Hrs	3
11.	Wr	ite a C program to merge the given	two files	s					Tota	l Hrs	3
12.	Wr	ite a C Program to perform Swap	using Po	oint	ers				Tota	l Hrs	3
Total hours	to b	e taught									
Reference (Reference (s) :										
1. Balag	1. Balagurusamy.E, Programming in ANSI C, Tata Mc GrawHill publication Pvt Ltd New York, 1992.										
2. Byron New	S. ⁄ork	Gottfried, Jitender Kumar Chhabra, 2006.	a, Progra	amr	ning ir	n C, Ta	ta Mc G	rawHill	pub	olicatio	n Pvt Ltd

K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Department	Biotechnology	Programme C	ode & N	ame		23: B.	Tech. Bi	otechno	ology
		Sen	nester I						
Course Code	Course	Nomo	Hou	rs / Weel	κ	Credit	Ma	aximum	Marks
Course Code	Course	INAME	L	Т	Ρ	С	CA	ES	Total
07230110P	ENGINEERING P LABORATORY	RACTICES	0	0	3	2	50	50	100
Objective(s)	Objective(s) To provide exposure to the students with hands on experience on various basic engineering practices in Mechanical Engineering.								
I PLI	I PLUMBING Total Hrs 9								
Safety aspects G.I. Pipes, St connection to s	in Plumbing, Study udy of valves, taps service line.	of tools and equip and repairing. M	ments - easuring	preparat and m	ion c arkin	of models, g practice	Cutting e of PV	and Th C & G	reading of .I. pipes -
2 SH	EET METAL				T	otal Hrs		12	
Study of Tools making - knock	, Equipments and Sa red up, double groov	afety precautions, I ving joints, Model m	Drawing naking –	of tools a Frays, Ba	and a asket	accessorie ts and Fur	s, Diffei nels.	rent type	es of joints
3 EL	ECTRICAL WIRING				T	otal Hrs		12	
Safety aspects of Electrical wiring, Safety aspects of Electrical wiring, Wiring circuit for a lamp using single and Stair case switches, Wiring circuit for fluorescent lamps, Calculation of power and energy.									
4 WE	LDING AND SOLD	ERING			T	otal Hrs		12	
Safety aspects joints & Corner	of Welding and Solo Joints, Soldering of	dering, Study of Ga Small Electrical an	and A Electro	rc Weldi nic Circu	ng E uits.	quipments	s, Weldi	ng of La	ip, Butt, T-

K.S.R	angasamy Colleg	je of Technology - A	Autonor	nous F	Regula	ation		R 20	07	
Department	Biotechnology	Programme Co	de & Na	ame		23 : E	B.Tech. I	Biotechnol	ogy	
		Se	mester I	l			-			
Course Code	Cours	se Name	Hou	rs/We	ek	Credit	M	aximum N	larks	
	0001		L	Т	Р	С	CA	ES	Total	
07230201G	COMMUNICAT	ON SKILLS	3	0	0	3	50	50	100	
Objective(s)	To equip studer the soft skills a students' perform	nts with effective spe nd people skills whi ms at placement inte	aking a ch will i rviews.	nd liste make ti	ning s hem t	kills in E o excel i	nglish, T n their je	o help the obs, To ei	y develop nhance to	
1 LISTENI	1 LISTENING Total Hrs 09									
Barriers in List	Barriers in Listening - Listening to academic lectures - Listening to announcements at railway stations, airports,									
etc - Listening to news on the radio / TV - Listening to casual conversation - Listening to live speech.										
What is comm	2 COMMUNICATION 101 Involve2 Accuracy fluency and appropriateness - Levels of formality -									
Differences be for permission Giving direction Describing per	Differences between spoken and written communication - Greeting and introduction - Making requests - Asking for permission, giving / denying permission - Offering help, accepting / declining help - Giving instructions - Giving directions - Art of small talk - Taking part in casual conversation - Making a short formal speech Describing people, place, things and Events.									
3 CONVER	SATION SKILLS				Tot	al Hrs		09		
repetitions - S calls - Leaving Reminding - A	pnone - Preparing pelling out names g messages on a Agreeing / disagro nstructions.	g for a call - Stages or words - Giving i Inswer Machines - eeing – Listening -	s of a c nformati Making Listenir	all - Ha ion on / chan ng and	the pl ging a takin	g calls - hone – M appointme g messa	ldentifyi laking re ents - M ges - G	ng seir - / quests - / laking cor iving instr	Asking for Answering nplaints – ructions &	
4 REMIDIA	L GRAMMER & V	OCUBULARY			Tot	al Hrs		09		
Subject – verb Phrasal verbs confused word	agreement – Ten - Correct use of s - Common error	ses - 'Do' forms - Ac words - Use of form s & remedial measur	tive and al word es.	l Passiv s in inf	ve void ormal	ce - Use situation	of negati s – India	ves – Prej anisms - (oositions - Commonly	
5 WRITTE	N COMMUNICAT	ION & CAREER SK	LLS		To	tal Hrs		09		
Writing e-mails letters - Facing	s - Writing Reports an interview - Pre	s - Note – taking an esentation skills - Pe	d note – rsuasion	· makin skills.	g - Pr	eparing o	curriculu	n vitae ar	d cover -	
Total hours to	be taught							45		
Text book (s) :										
1. Rizvi M Ashraf, "Effective Technical Communication", 1 st Edition, Tata McGrawhil Publishing Company Ltd., New Delhi, 2005.										
Reference(s) :										
1. Kiranmai Cambride	1. Kiranmai Dutt P, Geetha Rajeevan and Prakash C L N, "A Course in Communication Skills", by Ebek – Cambridge University Press India Pvt. Ltd.									
2. Naterop,	cup "Telephoning	in English – Cambri	dge Univ	/ersity l	Press	India Pvt	.Ltd., 20)7.		
3. Richard, Cambridg	"New Interchange ge University Pres	e Services (Student' s India Pvt.Ltd., 2007	s Book) [;] 7.	" – Intr	oducti	on, Leve	l – 1, Le	evel – 2, I	_evel – 3,	

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Depar	rtment	Biotechnology	Pr	ogram	me Co	de & N	lame	23 : B.1	ech. Biote	echnology
			Sem	ester I	l					
Couro	o Codo			Ηοι	urs / W	eek	Credit	М	aximum M	larks
Course	e Coue	Course Name		L	Т	Р	С	CA	ES	Total
07230	0202G	ENGINEERING MATHEMATIC	S II	3	1	0	4	50	50	100
Objec	ctive(s)	An aim of the course is to train necessary for grooming them in	n the s nto suc	tudent cessfu	s in ad I engin	lditiona eers.	al areas o	of engine	ering mat	hematics,
1 M	IULTIPLE	INTEGRALS				Tot	al Hrs		09	
Double curves (Simple	integration – Area a problem	on in Cartesian and Polar coord is double integrals – Triple inte s only).	dinates gratior	s – Ch n in Ca	ange o artesiar	of orde n coor	er of inte dinates -	gration – - Volume	Area bet as Triple	ween two integrals
2 V	ECTOR (CALCULUS				Tot	al Hrs		09	
Gradier theoren	Gradient, divergence and curl – Line, surface and volume integrals – Green's, Gauss divergence and Stoke's theorems (without proof) – Verification of the above theorems and evaluation of integrals using them.									
3 A	3 ANALYTIC FUNCTIONS Total Hrs 09									
Functio Sufficie Analytic	Function of a complex variable – Analytic function – Necessary conditions – Cauchy– Riemann equations – Sufficient conditions (excluding proof) – Properties of analytic function – Harmonic conjugate – Construction of Analytic functions -Conformal mapping: $w = z+a$, az, $1/z$ and bilinear transformation.									
4 C	OMPLEX	INTEGRATION	,			Tot	al Hrs		09	
Cauchy Singula contour	y's theore arities – (rs (exclud	m (without proof) – Cauchy's in Classification – Cauchy's residu ing poles on real axis).	ntegra ue the	l formu orem ·	ula – T –Conto	aylor our inte	and Lau egration	rent serie – circula	es (withou r and ser	it proof) – mi-circular
5 L/	APLACE	TRANSFORM				To	tal Hrs		09	
Laplace Derivati theoren Convolu simulta	e Transfo ives and ms – Tran ution the ineous eq	orm – Conditions for existence integrals of transforms – Trar nsform of unit step function – orem – Solution of linear ODE uations with constant coefficients	 Transform Transf of s using 	ansforr s of d orm of econd g Lapla	m of e lerivativ f period order ace trar	elemen ves ar dic fur with nsform	itary fund nd integra nctions. I constant ation.	ctions – als – Ini nverse L coefficie	Basic pro tial and f aplace tra nts and f	operties – inal value ansform – first order
Total ho	ours to be	e taught							45	
Text bo	ook (s) :									
1. V	'eerarajan company l	 n. T., "Engineering Mathematics Limited, New Delhi, 2005. 	(for f	irst ye	ar), Fo	ourth E	Edition Ta	ata McG	aw- Hill I	Publishing
2. G	Frewal. B.	S., "Higher Engineering Mathem	atics",	Thirty	Eighth	Editio	n, Khann	a Publisi	iers, Delh	i, 2004
3. K Si	3. Kreyszig. E., "Advanced Engineering Mathematics," Eighth Edition, John Wiley and Sons (Asia) Limited, Singapore 2001.									
Referer	nce(s) :									
1. Ka	andasam Ielhi 2007	y. P, Thilagavathy. K and Guna	vathy.	K, "Er	ngineer	ing M	athematio	cs" – S.C	hand and	I Co. New
2. V	 Venkataraman.M.K, "Engineering Mathematics, Volume I & II Revised Enlarged Fourth Edition", The National Pub. Co., Chennai, 2004 									
3. W	Vidder. D.	V., "Advanced Calculus", Second	d Editi	on, Pre	entice H	Hall of	India, Ne	w Delhi,	2000.	

K.S.Ra	ingasamy Colleg	e of Technolog	y - Auto	onomous	Regul	ation		R 20	07
Department	Biotechnology	Programme	e Code 8	Name		23 :	B.Tech. Bi	otechnolo	gy
			Semes	ter II	•				
Course Code	Course	Nome	Но	urs / Wee	k	Credit	Ma	ximum M	arks
Course Code	Course	Name	L	Т	Р	С	CA	ES	Total
07230203G	MATERIALS SC	CIENCE	3	0	0	3	50	50	100
Objective(s)	Impart fundame conducting, Sup and Nanomater	ntal knowledge perconducting a ials in Modern T	in variou nd Mag echnolog	us enginee netic Mate gy.	ering s erials,	ubject an dielectric	nd applicat , New en	ions. App gineering	lication of Materials
1 CONDUC	TING AND SUPE	RCONDUCTING	G MATE	RIALS	Tot	al Hrs		09	
Conductivity-Ex Verification of Superconductor superconductor Magnetic Levita 2 SEMICON	xpression for t Ohm's Law-Cla rs-Critical Field rs-Josephson ef ation.	hermal Condu assical Free E I-Meissner's E Ifect (Qualitativ	ctivity-Lo lectron ffect-Iso /e)-High	tope eff T _c Su	umber dvanta ect-BC percor Tot	Widemai iges and S theo iductors-/	nn Franz d drawbao pry- Typ Applicatior	z Law(D cks. Prop e-I and ns:SQUID	erivation)- perties of Type-II ,Cryotron,
Elemental an		Semiconductors	Intrinsic	and F	vtrinci		conductors	-Properti	es-Carrier
Concentration Temprature Coefficient,App	in intrinsic and and impurities lications.	Extrinsic semi s-Hall effect-h	conducto Hall C	ors(Deriva coefficient-	tion)-F Exper	ermilevel imental	-Variation Determi	of fermi nation	level with of Hall
3 MAGNETI	C MATERIALS				Tot	al Hrs		09	
Classification o Hard and Soft r out-Bubble mer	f Magnetic materi nagnetic material norv-Magnetic Ta	als-properties-H s-Ferrites-Struct ape-Floppy Disc	eisenbe ure,prep and Mac	rg and Dor pration and pnetic hard	main tl I Appli d disc.	neory of f cations-N	erromagne Iagnetic R	etism-Hys ecording	tersis- and read
4 DIELECT	RIC MATERIALS		· · · · ·		Tot	al Hrs		09	
Introduction-Po dependence of Dilectric Losses	larisation: Electr polarization-Acti s-Dilectric breakc	onic, ionic, or ve and Passive lown Mechanism	ientatior Dielect h-Ferroe	al and irc-interna lectric mat	space I field erials:	charge- -Clasius properties	frequency –mosotti s and appl	and Torelation(Direlations.	emprature erivation)-
5 NEW ENG	SINEERING MAT	ERIALS			Tot	al Hrs		09	
Shape Me glasses:Prepra milling,Nanolith nanotubes:Fab	mory Alloy(S tion,properties a ography-Bottom rication and Appli	SMA):Characteris and application up process:Va cations.	stics,pro .Nanom apor Pl	perties aterials:Fa nase dep	of abricati oosistic	NiTi on meth on meth	alloy,A hods-Topo od(PVD	opplication down pro and CVI	ns,Metallic ocess:Ball D)-Carbon
Total hours to b	be taught							45	
Text book (s) :									
1. Material S	cience-Authored	by dept. of Phys	ics KSR	CT.					
Reference(s) :									
1. Raghavan	V.,"Materials Sci	ence and Engine	eering"-F	Prentice Ha	all of Ir	ndia, New	/ Delhi,200	01.	
2. Rajendran	V.,"Materials Sci	ence"-Tata McG	iraw Hill,	New Delh	ni, 200	5.			
3. Palanisam	y P.K.,"Materials	Science"-SCITE	CH Pub	lications, (Chenn	ai, 2002.			
4. Dr.Arumu	4. Dr.Arumugam M.,"Materials Science"-Anuradha Agencies, Kumbakonam, 2003.								
5. Dr.S.Muth	ukumaran, V.Moł	nan, S.Masilama	ni, M.Ma	ani-"Materi	al Scie	ence"-Sri	Krishna P	ublication	s (2007).

	K.S	Rangasamy College of Technology	- Auton	omous	s Regul	ation		R	2007
Dep	artment	Biotechnology	Progra	amme Name	Code & e	23 :	B.Tech.	Biotech	nnology
		Se	mester II			-	_		
Cour	se Code	Course Name	Hou	rs / We	ek	Credit	Ma	ximum ı	marks
Cour	se coue		L	Т	Р	С	CA	ES	Total
072	30204G	ENVIRONMENTAL SCIENCE	3	0	0	3	50	50	100
Obje	ctive(s)	The student should be conversant wi environmental studies, focuses on th sustainability, significance and prote degradation and the significant inte environment.	ith the even and various ection of the rnational	olution natura pio dive conve	of envir al resou ersity a ntions	ronmentalis irces and th nd various and protoc	m and the currer forms of ols for t	he impo nt threat f envir he prot	ortance of ts to their onmental rection of
1	ATMOSP	HERE AND ECOSYSTEM			То	tal Hrs		9	
Ozor warn ecos Ecolo featu Studi	osphere - he and oz hing – Clir ystem – s ogical su res-struct ies in curr	 composition of atmosphere (tropo zone depletion – Air pollution – sou mate change – Acid rain - Planet Eau structure and functions of ecosystem- ccession-Food chains-Food webs- ures and function of forest, grasslar ent scenario. 	sphere, s rces, effe rth – Bios producer Ecologic nd and a	stratos ects ar sphere rs, con cal py quatic	nere, nd conti – Hydr sumers ramids- ecosys	rol – Green rosphere – and decor Introduction stems (pon	e and f n house Lithosph nposers n, types ds and	effect here. Co - Ener s, char rivers	- Global oncept of gy flow – acteristic) - Case
2	WATER F	RESOURCES AND ITS TREATMENT			To	tal Hrs		9	
Wate pollu Tsun Ther	er – hydrol tion – Oc amis – Gl mal polluti	ogic cycle – ground water – water she eans and fisheries – salinity – tempe aciers – Water pollution – dissolved of on, noise pollution and control - Case	ed – wate erature – xygen – s Studies i	r use a densit surface n curre	ind qua ty – pre water t ent scen	lity – point a essure – lig reatment – ario.	and non- jht – bic waste w	-point s olumine: /ater tre	ources of scence – eatment –
3	LAND RE	SOURCES AND ITS DEGRADATION			То	tal Hrs		9	
Land defor solid curre	d – weather estation- and haza ent scenar	ering and erosion - types of weathering deserts – types – desertification – land ardous waste, chemical waste, radio io.	g – types d degrada active w	of soil ation – aste –	- soil e feature - non h	erosion – lai s of desert azardous v	nd slides - geoch vaste -	s – Wet nemical Case S	land and cycling – tudies in
4	FUTURE	POLICY AND ALTERNATIVES			10	tal Hrs	Ļ	9	
ener polic	ire policy gy – geoti y Case	and alternatives – fossil fuels – nucl hermal energy – tidal energy – susta Studies in current scenario.	inability -	gy – so - greer	n power	ergy – wind r – nano te	chnolog	/ – nya y – inte	roelectric ernational
5	BIO DIVE	RSITY AND HUMAN POPULATION			То	otal Hrs		9	
Intro Bioge biodi envir envir	eduction to eographic versity in onment p onment a	 Bio diversity-Definition, genetic special classification of India – Biodiversit India – threats to biodiversity – endem Protection act – issues and possible India human health - Case Studies in current 	es and ec y in India ic and en e solution rrent scen	cosyste a – Ind dange – po nario.	em diver lia as n red- hal pulatior	rsity. nega divers bitat – cons n growth -	sity natio ervation populat	on – hc of biod ion exp	tspots of liversity – blosion –
Total	hours to	be taught						45	
Text	book :								
1.	Environn	nental Science by R.Palanivelu, R.Par	imalam, a	and B.S	Srividhy	a.			
Refe	rences :						-		
1.	Linda D. 2005.	Williams – "Environmental Science I	Demystifie	ed", Ta	ta McG	raHill Publi	shing Co	ompany	/ Limited,
2.	G. Tyler	Miller, JR _ "Environmental Science ",	Ihomsor	n, 2004	·. ,, , , ,	Magazin		L' 000	7
3.	William F	2. Cunningham – "Principles of Enviror	nmental S		er, Tata	McGraHill,	New Del	nı, 200	(.
4.	Bharucha	a Erach – The Biodiversity of INDIA", f	viapin Pul	DIIShing	g Privat	e Limited,A	nameda	Dad, Ind	ua.
5.	Volume I	& II, Environmedia.	Laws, R	uies, (Juidelin	ies, Compl	iances a	and Sta	andards",

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Dep	Department Biotechnology Programme Code & Name 23 : B.Tech. Biotechnology									
		S	emester		•					
Court	aa Cada		Hou	rs/We	ek	Credit	Ma	aximum M	arks	
Cours	se Code	Course Name	L	Т	Р	С	CA	ES	Total	
0723	30205C	APPLIED BIOLOGY	3	1	0	4	50	50	100	
Obje	ctive(s)	To Impart basic knowledge in the Microbiology To focus on fundamentation	biology I entals as	ntroduc a Pre-	tion to requis	o various ite for for	s subjects	s like bio g semeste	chemistry, r.	
1	ORIGIN				Tot	al Hrs		09		
The S Organ and P	The Science of Biology; The Nature of Molecules; The Chemical Building Blocks of Life; Cells, Tissues and Organisms; The Origin and Early History of Life; The Evidence for Evolution; The Origin of Species; Evolution and Phylogeny.									
2	2 DIVERSITY OF LIFE ON EARTH Total Hrs 09									
Syster Inverte	Systematics and Diversity; Prokaryotes; Protists; Fungi; Higher Plants; Coelomate and Noncoelomate Invertebrates; Vertebrates; Viruses.									
3	STRUCT	URES			Tot	al Hrs		09		
Microb Digest Syster	bes & Pla tion; Circul m; Sensory	nts: Vegetative development; Rep ation; Respiration; Reproduction; N y System; Endocrine system.	roductio ervous	n; Tran	isport;	Nutrition	n Animale	es; Dévelo	oppement;	
4	FUNCTIO	ONS			Tot	al Hrs		09		
Cell S Photos Mende	Structure; synthesis; elian and N	Membranes; Cell-Cell Interactions How Cells Divide; Laws of inheritar Ion-Mendelian laws.	s; Enerç ice –	gy and	Meta	oolism; H	low Clel	ls Harves	t Energy;	
5	ECOLOC	BY AND BEHAVIOR			Tot	al Hrs		09		
Behav Conse bisect	vioral Biolo ervation Biolo and transe	ogy; Population Ecology; Commu ology; Biogeochemical cycle – C, N ect.	nity Eco N, P; Me	ology; [thods o	Dynam f stud	iics of E ying natu	cosysten ral vegeta	ns; The E ation by c	Biosphere; quadrants,	
Total I	Total hours to be taught45									
Refere	Reference(s) :									
1.	1. Raven, P.H., Johnson, G.B., Losos, J.B. and Singer, S.R. "Biology", Tata Mc.Graw-Hill Publ. 7th Edition, 2005.									
2.	2. McKee E and Mckee T, "Biochemistry – an Introduction", Win.C.Brown Publ., Dubuque, 1996.									
3.	Soper R Edition, 7	, Taylor D J, Green NPO and Sto 1998.	out GW,	"Biolog	gical S	cience",	Cambrid	ge Univ. F	Press, 3rd	

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Depa	artment	Biotechnology	Programme	Code &	Name		23 : B.	rech. Bi	otechnol	ogy
			Sen	nester II						
Cour		Course No		Hou	rs/We	ek	Credit	Ma	aximum I	Marks
Cours	se Code	Course Na	ame	L	Т	Р	С	CA	ES	Total
0723	30206C	OBJECT ORENTED PROGRAMMING		3	0	0	3	50	50	100
Obje	ctive(s)	At the end of the se objects, constructors	mester students , Destructors, ir	s should heritand	l have ce, Stre	the kn ams ir	owledge o n C++ and	f C++ p file hand	rogramn dling.	ning class
1	INTROD	UCTION TO C++				То	tal Hrs		09	
Softwa Structo variab statem	Software evolution, OOProgramming paradigms, Basic concepts and benefits of OOP, Application of OOP, Structures, tokens, keywords, identifiers, Basic data types, symbolic Constants, dynamic initialization, reference ariables, scope resolution operator, type casting, operators and control statements, input and output tatements in C++.									
2	2 CLASSES AND OBJECTS Total Hrs 09									
Functi functic specifi memb	on prototy on, default cation- Me er functior	ping, function compor arguments, overload ember function definiti is. Instance creation, (ients, passing p ed function, int on, nested men Objects as argui	aramete roductio nber fun ments, F	ers – ca n to fr ction, a Returnir	all by i iend fi access ng obje	reference, unction an qualifiers, ects, Friend	return b d templ static c d class.	y referer ate func lata men	ice, inline tion.Class ibers and
3	CONSTR	UCTOR, DESTRUCT	OR AND OVER	RLOADI	١G	To	tal Hrs		09	
Const copy c	ructors – constructor	parameterized constr s, Destructors. Operation	uctors, overloa tor function – O	ded cor verloadii	nstructo ng una	ors, Cors, Co	onstructors binary ope	with d erator, D	efault ai ata Conv	guments, version.
4	INHERIT	TACE				То	tal Hrs		09	
Definir level ir	ng derived nheritance	classes, Single inheri , Hierarchical inheritar	tance, Protecte ice, Hybrid inhe	d data w ritance,	ith priv Abstra	ate inh	neritance. I sses, Virtua	Multiple al Functi	inheritan ons.	ces, Multi
5	STREAM	IS AND FILE HANDLI	NG			Тс	otal Hrs		09	
Strear file op	ns in C++, en and clo	Stream classes, form se, Sequential and Ra	natted and unfo Indom Access F	rmatted	data, I eption l	- ile str handlir	eams, file	pointer	and mar echanism	ipulation, 1.
Total h	nours to be	e taught							45	
Text b	ook (s) :									
1.	1. E. Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill, Second Edition									
Refere	ence(s) :									
1.	Ashok N. Delhi, 20	Kamathane, "Object C 03.	Driented Program	mming v	vith AN	SI & T	urbo C++"	, Pearsc	on Educa	tion, New
2.	2. SB Lippman and J Lajoie, "C++ Primer", Pearson Education, New Delhi, 2001.									
3.	H Schidt,	"C++: The Complete	Reference", Tat	a McGra	aw Hill,	New I	Delhi, 2003	3.		

K.S.Ra	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Departme	ent	Biotechnology	Program	nme Co	de & N	lame		23: B	.Tech. E	Biotechnology
				Seme	ster II					
Course Co	do		mo	Hou	rs / We	ek	Credit		Maxir	num Marks
Course Coo	ue	Course Na	ame	L	Т	Р	С	CA	ES	Total
07230207	Ρ	ENGINEERING GE	RAPHICS	1	0	3	3	50	50	100
Objective(s	s)	Student's skill in engineering product hand sketches of s Use of drawing boa	the graphica cts are to be o imple engined ard and mini o	al com obtaine ering ol drafter i	munica d by tra ojects a s not a	ation aining and co at all re	of conce them to u omputer 2 equired.	pts an underst 2D and	d ideas and obj 3D mod	in the design of ects by making free leling techniques.
1 CUR PRO	VES DUC	S AND SHAPES USE	ED IN ENGIN	EERIN	G	То	tal Hrs			8
CONCEPTS – equations cycloids – applications	CONCEPTS AND CONVENTIONS- Primitive and Prismatic shapes - Conics – ellipse, parabola and hyperbola – equations used and parametric interpretations – ellipsoid, paraboloid and hyperboloid – involutes and cycloids – applications - tangents and normals – mathematical requirements – their importance and applications to engineering products									
2 FREE	E HA	AND SKETCHING P	RACTICES			To	tal Hrs			7
Representationsorientationsviews fromsimple exercise3DEVE	Representation of Three Dimensional objects – Need for and importance of multiple views and their orientations – Concept of orthographic projection - Developing skills through free hand sketching of multiple views from pictorial views of objects – Isometric (pictorial) representation of objects from multiple views – simple exercises to practice.									
Developmer freehand sk	nt o	f lateral surfaces of	f simple and le exercises to	trunca	ted so	lids -	- prisms,	pyram	ids, cyli	nders and cones -
4 2D D	RAF	TING				To	tal Hrs			20
Importance diagram and software page	of 2 d pij ckag	D drafting – sketch bing layout drawings ges.	ing, mirroring s - Practice c	, scalir of Com	ig, cop outer A	ying Aided	(simple a Drafting a	nd mul and dir	tiple) dir nension	mensioning - wiring ing usingppropriate
5 SOLI	DM	ODELING				To	tal Hrs			20
3D modeling solid modeli (one) half, I modeling ar	g teo ing o bolts nd e	chniques - construct of simple and moder and nuts, compute xtraction of 2D views	ive solid geor ately comple er monitor, sl s using appro	netry ((x engin otted a priate s	CSG) a leering ingle ra oftwar	nd bo prod ack a e pac	oundary re ucts – tat nd such kages.	epresei ble, cha other p	ntation (air, V-blo products	BRep) techniques - ock, flange coupling - Practice of solid
Total hours	to b	e taught								60
Text book (s	s) :									
1 K.Vei	1 K.Venugopal, "Engineering Graphics", New Age International (P) Limited, 2002.									
Reference(s	s) :									
1. Dhan	nanja	ay.A. Jolhe, "Enginee	ering Drawing	j", Tata	McGra	aw Hil	l Publishi	ng Co.,	2007.	
2. K.V.N	Vata	raajan "A text book o	of Engineering	g Grapl	nics", E	Dhana	ılakshmi F	Publish	ers, Che	ennai, 2006.
3. M.B.	Sha	h and B.C. Rana, "E	ingineering D	rawing	', Pear	son E	ducation,	2005.		
4. Luza 2001	ddei	and Duff, "Fundam	entals of Eng	gineerir	ng Dra	wing"	Prentice	Hall of	India P	vt Ltd, XI Edition –

K.S.Rangasamy College of Technology - Autonomous Regulation R 200									R 2007	
De	partmer	nt Biotechnology	F	Programm	ne Cod	e & Nar	ne 23:	B.Tech.	Biotecl	nnology
		· ·	Se	emester II						
Cou				Hou	rs/We	ek	Credit	Max	imum	marks
Cou	irse Co	de Course Name		L	Т	Р	С	CA	ES	Total
072	230208	P APPLIED BIOLOGY LABORATORY		0	0	50	50	100		
Obje	ective (At the end of this course, the Biology and its application. T the area of Modern Biotechno	e stuc his w logy.	dents wou ill be stre	uld hav ngth fo	e learn or stude	t basic tecl ents to take	nniques up rese	used i arch p	n Applied rojects in
		(/	Any 9	experime	ents)					
	1 Qualitative analysis of carbohydrates such as Glucose, Fructose, Sucrose and Starch. Total Hrs 4									
	2 Qualitative analysis of amino acids such as Tyrosine, Phenyl alanine and Total Hrs 4								4	
	3	Quantitative analysis of protein by	Low	ry's <i>et al</i> .	, metho	bd		Tota	al Hrs	4
	4	Quantitative analysis of glucose b	y Ant	hrone's m	ethod			Tota	4	
	5	Quantitative analysis of cholester	ol by Z	Zak's met	hod			Tota	al Hrs	4
	6	Quantitative analysis of DNA by D	ipher	nyl amine	metho	d		Tota	al Hrs	4
	7	Blood cell count by Haemocytome	eter					Tota	al Hrs	4
	8	Differential count by Leishman's s	tain n	nethod				Tota	al Hrs	4
	9	Bioassay - Effect of pH on the act	vity c	of salivary	amyla	se		Tota	al Hrs	4
	10	Staining of different stages of mito	sis					Tota	al Hrs	4
Tota	otal hours to be taught 40									
Refe	Reference (s) :									
1.	1. Sadasivam, S. and Manickam, A. 2004. "Biochemical Methods ", Second Edition, New Age International Pvt .Ltd., New Delhi.									
2.	David	T. Plummer, 2002. "An Introduction	to P	ractical Bi	iochem	istry", T	ata McGra	w- Hill, N	lew De	elhi.

		K.S.Rangasamy College of Techr	nology - Au	tonom	nous Re	egulation			R 2007	
De	partment	Biotechnology	Programm	ne Cod	e & Nar	ne 23:	B.Tech.	Biotec	hnology	
			Semester II							
Cou	urao Codo	Course Name	Hou	rs / We	ek	Credit	Max	imum	marks	
Cou	ise Code		L	Т	Р	С	CA	ES	Total	
072	230209P	OBJECT ORIENTED PROGRAMMING LABORATORY	, 0	0	3	2	50	50	100	
Obje	bjective (s): At the end of the semester the students would have learnt the basic technique simple applications of java.									
		(Any	9 experime	ents)						
1	Program of Call by	s Using Functions: Functions with o y Value, Call by Address and Call b	default argu y Referenc	ments, e.	Impler	nentation	Tota	al Hrs	4	
2	Simple C Classes Classes data mer	Classes for understanding objects, r with primitive data members, Class with pointers as data members – S mbers, Classes with static member	member fun ses with arra tring Class, functions.	ctions ays as Classe	and Co data me es with	nstructors: embers, constant	Tota	al Hrs	4	
3	Compile Operator	time Polymorphism: Operator Over s, Function Overloading.	rloading inc	luding	Unary a	and Binary	Tota	al Hrs	4	
4	Runtime Template	Polymorphism: Inheritance, Virtual	functions,	Virtual	Base C	lasses,	Tota	Total Hrs		
5	File Han	dling: Sequential access, Random	access.				Tota	al Hrs	4	
6	Simple J (object),	ava applications: For understandin methods, Handling Strings in Java	g reference	to an i	nstance	e of a class	Tota	al Hrs	4	
7	Simple F	Package creation: Developing user	defined pac	kages	in Java		Tota	al Hrs	4	
8	Interface predefine	 Developing user-defined interface interfaces. 	es and imp	lement	ation, L	Jse of	Tota	al Hrs	4	
9	Threadin	g: Creation of thread in Java appli	cations, Mu	ltithrea	ding		Tota	al Hrs	4	
10	Exceptio Handling	n Handling Mechanism in Java: Ha user-defined exceptions.	Indling pre-	defined	except	ions,	Tota	al Hrs	4	
Tota	otal hours to be taught 40									
Refe	Reference (s) :									
1.	E. Balagu	rusamy, "Object Oriented Program	ming with C	;++", Ta	ata McC	Graw Hill, S	econd E	dition		
2.	SB Lippm	an and J Lajoie, "C++ Primer ["] , Pea	rson Educa	tion, N	ew Del	hi, 2001.				
3.	H Schidt, "C++: The Complete Reference", Tata McGraw Hill, New Delhi, 2003.									

	K.S.Ran	gasamy Colle	ge of Technolog	y - Auto	nomou	s Reg	ulation			R 20	07
Depa	artment	Bioteo	chnology	Progr	amme (Code 8	& Name	23 :	B.Te	ch. Biote	chnology
				Semes	ter II						
Course		Course		Hou	rs / We	ek	Credit		Мах	kimum Ma	arks
Cours	se Code	Cours	se name	L	Т	Р	С	CA	١	ES	Total
0723	0210P	COMPREHE	NSION I	0	0	3	0	100)	00	100
Obje	ctive(s)	i. To improve ii. To improve	the skill level of level of the employabilit	Enginee y of stud	ring, Teo lents in	chnolo placen	gy and Ap	plied S iews.	cien	ce studen	its.
1	For each using the	n subject 200 K e students.	eywords/importa	nt words	or term	ıs (5 ur	nits x 40 w	ords) a	are to	be prepa	ared
2	These 200 Keywords are to be printed in double column (2 x 50 words) and in 2 pages and is to be handled over each student for all the subjects.										
3	The staf	f who handled / semester) as	the subject in the given below.	previou	s semes	ster wil	ll handle th	neir diso	cussi	ion perioc	l (3
4	The staf	f will question t	he students using	g 'W' and	d 'H' typ	e ques	stions linkir	ng the l	keyw	ords.	
5	In a simi	lar way the stu	dents have to pre	epare the	emselve	s for a	ll the keyw	ords.			
6	Each tes and 'H' t	st will carry 100 ype questions	questions and tw by attaching with	vo hours keyword	duratio ds.	n. The	questions	will be	e of o	bjective t	ype: 'W'
7	Based o	n Test-I and Te	est-II, sessional m	narks (m	aximum	50 ma	arks) will b	e awar	ded.		
8	Test-III v subjects	vill be held for (i.e. minimum	all the units and a 50/100 marks)	all the su	bjects.	The pa	issing norn	ns will	be si	milar as c	other
			Schedule for Con	duct of C	Compret	nensio	n Subject				
Total N	o of week	s planned:10	Total No of su	bjects: 5	to 7		Total dura	ation pe	er we	ek: 3 per	iods
Wee	ek No	Duration: 1½ p (No of units)	period Subject No)	Dur (No	ation: [·] o of uni	1½ period its)	Subjec	t No		
V	V1	· · · · ·	S1(3)				*	S2(3	5)		
V	V2		S3(3)					S4(3	5)		
V	٧3		S5(3)					S6(3	5)		
V	V4		Tes	st-I (Porti	on: 3 ur	nits in e	each subje	ect)			
V	V5		S1(2)					S2(2	2)		
V	V6		S3(2)					S4(2	2)		
V	V7		S5(2)					S6(2	2)		
V	V8		Tes	t-II (Port	ion: 2 ui	nits in (each subje	ect)			
V	V9				Discu	ssion					
W	W10 Test-III (All 5 units and all the subjects)										

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
Depa	rtment	Biotechnology	Programme Co	ode & N	ame		23: B	.Tech. Bi	otechnol	ogy	
			Sem	ester III							
Course	o Codo	Course	Namo	Hou	rs/We	ek	Credit	Ma	ximum N	larks	
Course	e Coue	Course	ename	L	Т	Р	С	CA	ES	Total	
07230	0301G	ENGINEERING N	IATHEMATICS III	3	1	0	4	50	50	100	
Objec	ctive(s)	The course aims and transform teo of engineering s electromagnetic t specialized studie	to develop the skills chniques. This will bubjects like heat of heory. The course and research.	s of the s be neces conduction will also	student ssary fo on, cor o serve	s in th or theil mmun e as a	e areas o r effective ication s prerequ	of bounda e studies ystems, isite for p	iry value in a larg electro-o post grac	problems e number ptics and duate and	
1 P/	1 PARTIAL DIFFERENTIAL EQUATIONS Total Hrs 09										
Format of stan differer	tion of pai ndard typ ntial equa	rtial differential eques of first order p tions of second and	ations by eliminatio partial differential e d higher order with o	n of arb quations constant	itrary c s – La coeffic	onstar grango cients.	nts and a e's lineai	rbitrary fu r equatio	inctions - n – Line	- Solution ear partial	
2 FC	OURIER S	SERIES				Tot	al Hrs		09		
Dirichle cosine	et's condi series – I	tions – General Fo Parseval's identity	urier series – Odd - Harmonic Analysi	and eve s.	n funct	ions –	Half ran	ge sine s	eries – ł	Half range	
3 BC	OUNDAR	Y VALUE PROBLE	EMS			Tot	al Hrs		09		
Classifi equatio	ication of	second order qua dimensional heat e	isi linear partial diff quation – Fourier	erential series se	equations	ons – s in Ca	Solution: Intesian c	s of one oordinate	dimensio s	onal wave	
4 FC	OURIER ⁻	TRANSFORM	•			Tot	al Hrs		09		
Fourie Cosine Probler	r transfor transforr ms.	m pair – Sine and ns – Properties – T	ransforms of simple	e functio	ns – Co	onvolu	tion theo	rem – Pa	rseval's i	dentity –	
5 Z	-TRANSF	FORM AND DIFFE	RENCE EQUATION	1S		Tot	al Hrs		09		
Z-trans theorer	sform - El m – Solut	lementary propertion of difference economics and the second second second second second second second second se	es – Initial and fina Juations using Z - tra	al value ansform	theore	m – Ir	nverse Z	- transfo	orm – Co	onvolution	
Total h	ours to be	e taught							45		
Text bo	ook (s) :										
1. Ve Co	eerarajan ompany L	. T., "Engineering imited, New Delhi,	Mathematics (for f 2005.	irst yea	r), Fou	rth Ec	lition Tat	a McGra	w- Hill F	Publishing	
2. Gi	2. Grewal. B.S., "Higher Engineering Mathematics", Thirty Eighth Edition, Khanna Publishers, Delhi, 2004.										
Refere	nce(s) :										
1. Ka De	andasam <u>y</u> elhi 2007.	y. P, Thilagavathy.	K and Gunavathy.	K, "Engi	neerinę	g Math	ematics"	– S.Cha	nd and C	Co. – New	
2. Kr Si	reyszig. E ngapore 2	., "Advanced Engi 2001.	neering Mathemation	cs," Eigł	nth Edi	tion, J	ohn Wile	y and So	ons (Asia) Limited,	

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007											
D	epartment	Biotechnology	Progra	amme C	Code 8	Name	23 :	B.Te	ech. Biote	echnology		
		Se	mester I									
0			Hou	rs/We	ek	Credit		Ma	ximum M	arks		
	ourse Code	Course Name	L	Т	Р	С	CA	٩	ES	Total		
0	7230302C	BIOORGANIC CHEMISTRY	3	0	0	3	50)	50	100		
0	bjective(s)	At the end of the course the Stereochemistry, Stereochemistry will be very helpful for learning ot	studer y of enz her subj	nts wor yme rea ects in	uld ha actions subse	ave gain s and Pro quent ser	ed in otein fo mester	de oldin rs.	pth know ig. This k	wledge in nowledge		
1	1 CONCEPTS IN ORGANIC CHEMISTRY Total Hrs 09											
Ster mec Harr	eochemistry – hanisms of s imond's postu	- R,S notation – re-si faces – e,z sn1 sn2 reactions, e1 e2 reacti late – h/d effects. Catalysis – gene	isomeris ons – o eral acid	sm- cor ester fo – base	forme ormation and c	rs- ethar on and ovalent c	ie – cy hydrol atalys	ycloj lysis is.	pean - re , reactio	activates- n rates -		
2	2 STEREOCHEMISTRY OF ENZYMATIC REACTIONS Total Hrs 09											
Ster reac	eospecific enz tions - Stereo	zymatic reactions – fumarase cata chemistry of nucleophilic reactions	lysed re – chiral	actions methyl	– NA group	D depen – chiral	dent c phosp	oxida hate	ation and	reduction		
3	CASE STUD	IES OF ENZYME STRUCTURE AI 1	ND		Tot	al Hrs			09			
The trade	dehydrogena eoff.	ses – the proteases – ribonuclea	ises – l <u>i</u>	ysozym	e- sta	bility of	proteir	าร –	stability	 activity 		
4	KINETICS O	F PROTEIN FOLDING			Tot	al Hrs			09			
Basi meti	c methods – 1 10ds – folding	two state kinetics – multistate kine of peptides.	tics – tr	ansitior	state	s in prote	ein folo	ding	– 1h/2h	exchange		
5	FOLDING PA	THWAYS & ENERGY LANDSCAP	PES		Tot	al Hrs			09			
Fold theo	ing of ci2 – r ry – optimizati	nucleation condensation mechanis ion of folding rates – molecular cha	sm – fol Iperones	ding of 3.	barna	ase – tim	ne res	oluti	on – insi	ghts from		
Tota	I hours to be t	aught							45			
Text	book (s) :											
1.	 Structure And Mechanism In Protein Science: A Guide To Enzyme Catalysis and Protein Folding; A. R. Fersht, W.H. Freeman, 1999. 											
Refe	erence(s) :											
1.	Structure And A. R. Fersht,	d Mechanism In Protein Science: A , W.H. Freeman, 1999.	Guide	To Enzy	yme C	atalysis a	and Pr	oteir	n Folding	,		
2.	Bioorganic Chemistry; H. Dugas, Springer Verlag, 1999.											

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
Depa	artment	Biotechnology	Programme	Code &	Name		23: E	3.Tech. Bi	otechnolo	gy	
			S	emester							
0		Courses		Hou	rs / We	ek	Credit	Ma	ximum M	arks	
Cours	se Code	Course	Name	L	Т	Р	С	CA	ES	Total	
0723	0303C	MICROBIOLOGY	,	3	0	0	3	50	50	100	
Obje	ctive(s)	At the end of the their growth char when they undert	course the stu- acteristics and ake project work	dents wo their ind (in Biote	ould hav lustrial echnolog	ve lea uses. gy.	rnt about This wil	all types I be very	of microc helpful to	organisms, o students	
1	INTROD	JCTION				Tot	al Hrs		10		
History Tyndal of Ligh stainin	 of Micro I, Joseph and elegendary g, flagella 	biology-contributio Lister, Robert Koc ctron microscope. staining, and cap	n of Anton vor h, Edward Jenn Staining metho ule staining. Tax	n Leewe er, Elie I ds-Simp konomy a	nhoek, Vetchni le stain and nor	Louis koff. N ing, gi nencla	Pasteur licroscop ram stain ture.	, Lazzaro y - Princip ing, acid t	Spallanz bles and a fast stain	ani, John application ing, spore	
2	MICROB	ES-STRUCTURE		CATION		Tot	al Hrs		12		
Bacter organis	ial anaton sms like fu	ny-Structure, functingi, algae, and pro	ion, properties, ptozoa. Viruses-	cellular Structur	compo e and F	onents Replica	, sporula tion.	tion. Struc	cture of I	Eukaryotic	
3	MICROB	IAL NUTRITION A	ND GROWTH			Tot	al Hrs		8		
Nutritic kinetics interac	onal requi s, factors tions.	rements of bacter affecting growth	ia and differen and different	t media metho	used ds to	for ba quanti	cterial cu tate bac	ulture; gro terial gro	wth curv wth. Hos	e, growth st-microbe	
4	CONTRO	OL OF MICROOR	GANISMS			Tot	al Hrs		8		
Physic Pasteu of actio	cal and ch rization ,F on and res	emical control of n Radiation and Vario istance.	nicroorganisms- ous chemical ag	Sterilizat jents. A	ion and nti-bact	l disinf erial, a	ection- D anti-funga	ry heat, M al and anti	oist heat, -viral age	Filtration, nts, mode	
5	INDUST	RIAL AND ENVIRC	DNMENTAL MIC	ROBIOL	OGY	Tot	al Hrs		7		
Primar alcoho microo	y metabol I, vit.b-12; rganisms	ites; secondary me biogas; bioremedi and pollution contr	tabolites and the ation; leaching of the state of the sta	eir applic of ores b Recent a	cations; by micro dvance:	prese oorgan s in mi	rvation of isms; bio crobiolog	food; prod -fertilizers ly.	duction of and bio-p	[;] penicillin, pesticides;	
Total h	ours to be	taught							45		
Text be	ook (s) :										
1.	Talaron H 1993.	K, Talaron A, Casit	a, Pelczar And F	Reid. Fou	undatior	ns In №	licrobiolo	gy, W.C.B	rown Pub	lishers,	
2.	Pelczar N	/J, Chan ECS and	Krein NR, Micro	obiology,	Tata N	lcGrav	v-Hill Edit	ion, New I	Delhi, Ind	ia.	
3.	Prescott	LM, Harley JP, Kle	in DA, Microbio	logy, 3 rd	Edition,	Wm.	C. Brown	Publisher	s, 1996.		
Refere	nce(s):										
1.	Ronald M	1. Atlas.1997. Princ	ciples of Microbi	ology. W	CB Mc	Graw-l	Hill.				
2.	Salle. A.	J.1971 Fundament	al Principles of N	Microbiol	ogy. TN	/H Edi	tion.				

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
Depa	artment	Biotechnology	Programme	Code &	Name		23 :	B.Tech. E	Biotechnol	ogy	
			Se	mester	11	•					
0		O a uma a	1	Hou	rs/We	ek	Credit	М	aximum N	larks	
Cours	se Code	Course	Name	L	Т	Р	С	CA	ES	Total	
0723	30304C	PRINCIPLES OF (ENGINEERING	CHEMICAL	3	1	0	4	50	50	100	
Obje	ctive(s)	At the end of the Conservation, Law to understand cert	course the stud s of Thermodyn ain subjects of E	dents wo amics a ingineeri	ould ha nd Prine ng offei	ve gai ciples red in	ned knov of Fluid N this progr	wledge in Mechanic ramme.	n Mass ai s. This wi	nd Energy Il help him	
1	1 OVERVIEW OF PROCESS INDUSTRY Total Hrs 08										
Mass mathe	Mass and energy conservation; process automation; environment; SI units; conservation factors; applied mathematics for experimental curve fitting; numerical differentiation; integration.										
2	2 MATERIAL BALANCES Total Hrs 10										
Overa steady	II and com	ponent balances; n eady state; unit ope	naterial balances rations; recycle a	s without and by p	t and w ass; hu	ith che midity	emical reaction calculation	actions; (ons.	degrees o	f freedom;	
3	FIRST A	ND SECOND LAW	S OF THERMOR	YNAMI	CS	Tot	al Hrs		09		
Energ	y balances	s; sensible heat, late	ent heat; vapour	pressure	; stead	y and	unsteady	v state ca	Iculations		
4	FLUID N	IECHANICS				Tot	al Hrs		10		
Fluids	; fluid sta	tics and application	is in chemical e	engineer	ing; flu	id flov	v; lamina	ır; turbul	ent press	ure drops;	
compr	essible flu	id flow concepts; mi	ultiphase flow co	ncepts.		То			00		
5 Eluidia	TLOW I	trifugal and piston p		istics: co	mnroce				08		
Total	bours to be	taught	umps, character	151105, 00	mpres	5015, W	JUIK.		15		
Total									40		
1	Bhatt B I	Vora S.M. Stoichi	ometry 3 rd Editic	n Tata	McGray	M-Hill	1077				
2		W Smith C H	arriot P "I Init Or	n. raid		amical	Enginee	rina" 5 th	Edition	McGraw-	
2.	Hill Inc., 1993.										
Refere	ence(s):										
1.	Geankop	olis C.J. "Transport I	Processes and L	Init Oper	ations",	, Prent	ice Hall I	ndia, 200)2.		

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
Depa	artment	Biotechnology	Programme	Code &	Name		23 :	B.Tech.	Biotechnolo	gy	
				Semeste	r III						
Cour	aa Cada	Course	Nomo	Hou	rs / We	ek	Credit		Maximum M	arks	
Cours	se Code	Course	Name	L	Т	Р	С	CA	ES	Total	
0723	30305C	BIOCHEMISTRY	/	3	0	0	3	50	50	100	
Obje	ctive(s)	At the end of the Pathways. This w	e course, the st vill be helpful fo	udents w or course	vould ha s like, E	ave ga Sioinfor	ined extermatics, F	nsive ki Protein E	nowledge in Engg. etc.	Metabolic	
1	BIOMOL	ECULES- INTRO	DUCTION			Tot	al Hrs		09		
Carbol Introdu structu	Carbohydrates: Introduction, Classification: Monosaccharides, Disaccharide, poly saccharides. Lipids: Introduction, classification, Saturated and Unsaturated fatty acids. Nucleic acid: Nucleotide and Nucleoside – structure.										
2	CARBOH	IYDRATES &LIPII	D METABOLIS	М		Tot	al Hrs		09		
Biosyn degrad Glucor	nthesis of dation of neogenesis	Fatty acids, chol Starch and Glyco S.	esterol, Tri ac ogen. Glycolys	syl glyce is, TCA	rol and cycle	oxida Interm	ation of f nediatory	atty aci Metabo	ids, Biosynt olism: HMPs	hesis and shunt and	
3	AMINO A	ACIDS & NUCLEI	CACID METAB	OLISM		Tot	al Hrs		09		
Biosyn Salvag	thesis of ge pathway	Amino acids, Urea /), Degradation of	a Cycle. Biosyr nucleotides by	nthesis c exo and	of nucle endo nu	otides- uclease	· Purine a	and Pyr	imidine (De	novo and	
4	Protein					Tot	al Hrs		09		
Proteir proteir and Re	ns, Primai ns. simple, enaturatior	y structure-Secor conjugated and d n.	ndary structure erived proteins	e-Teritary . Propert	structies of p	ure-Qu roteins	iartnary s (physica	struct al and ch	ture. Classi hemical), De	ication of naturation	
5	ENZYME	S				Tot	al Hrs		09		
Introdu hypoth Applica	uction -cla nesis. MM ations of E	assification of en kinetics. LB Plot. nzymes in food ar	zymes. Definit Enzyme inhibi id other industr	ion. Acti ition- Co ies.	ive site mpetitiv	struc e Unc	ture Loc competitiv	k & ke e, Non	ey model, lı competitive	nduced fit inhibition.	
Total hours to be taught 45											
Text b	ook (s) :										
1.	"Fundam	entals Of Biochem	nistry", J.L.Jain,	S.Chano	d and co	ompan	y publica	tion.			
Refere	ence(s) :										
1.	. Leinnger "Principles Of Biochemistry", Nelson & Fox Maxwell publication pvt ltd.										

K.S	Rangasamy Colleg	e of Technology - Aut	onomo	us Re	gulati	on		R 20)07
Department	Biotechnology	Programme Cod	e & Nar	ne		23 : B	.Tech	. Biotechno	ology
		Semest	er III						
Course Code	Cour	so Namo	Hou	rs / We	ek	Credit		Maximum N	Marks
	Cour	se maine	L	Т	Р	С	CA	S ES	Total
07230306C	INSTRUMENTAT	ION TECHNIQUES	3	0	0	3	50	50	100
Objective(s)	At the end of the s methods, radioiso to do the research	syllabus the students we topes, spectroscopy ar work innovatively.	ould ha nd sepa	ve lear ration	nt abo metho	out the work work work work work work work work	orking will fa	principles acilitate the	of optical students
1 ELECTF	OCHEMICAL AND	CENTRIFUGATION TE	CHNIQ	UES	Tot	tal Hrs		05	
Buffers- Bicar measuremen centrifuge – a	bonate-blood buffer ts. Centrifugation-Ba pplications.	systems, Principles of r isic principles, centrifug	edox re je and i	action, their us	, Glas ses. T	s electro ypes- P	de for repara	pH ative, analy	rtical ultra
2 RADIOIS	SOTOPES				Tot	al Hrs		06	
Nature of Ra matters. Dete scintillation.	adioactivity- Types of ction and measuren	of radioactive decay, un nents of radioactivity- r	units of nethods	radioa based	activity d on g	y. interac gas ioniz	ction ation	of radioact and excita	tivity with tion-liquid
3 CHROM	ATOGRAPHIC TEC	HNIQUES			Tot	al Hrs		13	
Classification Ion exchange	 Principles-adsorption chromatography-Ty 	on chromatography- co pes of ion exchangers,	lumn, p affinity-	artition GLC-H	r chro IPLC	matograp Principle	ohy-pa and a	aper, size e application.	exclusion.
4 ELECTR	OPHORESIS				Tot	al Hrs		08	
General prino focusing, Iso sequencing g	iples-support media tachophoresis. Elec els, PFGE, electroph	-Electrophoresis of pro ctrophoresis of Nucleic noresis of RNA.	tein-SD acid-	OS PAC Agaro	GE, T ⁱ ise gi	wo dime el electro	nsiona ophor	al PAGE, I esis of DI	soelectric NA, DNA
5 SPECTE	OSCOPIC TECHNI	QUES			To	tal Hrs		13	
Atomic and Nephlomerty- IR,Raman,NM	molecular electronic Vibrational spe IR,ESR,Mass spectr	c spectroscopy- Beers ectroscopy and nu roscopy.	-Lambe clear	ert's la spin	w-UV orie	-Visible-0 ntation	ORD,(in	CD,Turbido magnetics	metryand fields-
Total								45	
Text book (s)	:								
1. Principle	s of Instrumental and	alysis, V edition- Skoog	, Holler	, Niema	an.				
2. Biophysi	cal chemistry – Upa	dhaya Upadhaya Nath.							
Reference(s)									
1. Practica	Biochemistry – Kiet	h Wilson and John Wall	ker.						
2. Chromo	ography-K.H.Kaur.								

	К.	S.Rangasamy College of Techno	ology -	Auto	nomo	us Reg	ulation		F	R 2007									
Depar	rtment	Bio Technology	Progra	amme	e Code	& Nam	ie 23:	B.Tech.	Biotech	nology									
		· · · · · · · · · · · · · · · · · · ·	Semes	ter III															
Course	o Codo			Hou	s/We	ek	Credit	Max	imum	marks									
Course	e Code	Course Name		L	Т	Р	С	CA	ES	Total									
07230	0307P	BIOORGANIC CHEMISTRY LABORATORY		0	0	3	2	50	50	100									
Objecti	ive (s):	At the end of this laboratory concepted and the end of this laboratory concepted and the end of the	ourse, v. In ado	the s dition	tudent the stu	s would udent w	d have lea ill also gair	irnt abou n knowled	t spec lge of (troscopy, operating									
		(Any	' 10 exp	perime	ents)														
1	Synth	nesis of aspirin						Tota	l Hrs	3									
2	Hydro	olysis of sucrose						Tota	l Hrs	3									
3	Prepa	aration of pyruvic acid from tartaric	c acid					Tota	l Hrs	3									
4	Prepa	aration of oleic acid from tartaric ac	cid					Tota	Total Hrs										
5	Prepa	aration of alpha d- glucopyranose p	pentaad	cetate	•			Tota	l Hrs	3									
6	Isolat	ion of lycopene from tomato paste	;					Tota	l Hrs	3									
7	Prepa	aration of I-cysteine from hair						Tota	l Hrs	3									
8	Cellu	lase degradation by Acid Hydrolys	is					Tota	l Hrs	3									
9	Isolat	ion of Albumin from Egg						Tota	l Hrs	3									
10	. Isola	ation and purification casein from n	nilk.					Tota	l Hrs	3									
Total he	ours to b	e taught								30									
Lab Ma	anual :																		
1. P	Practical I	Biochemistry – Kieth Wilson and Jo	ohn Wa	alker															
Referer	nce(s) :																		
1. F E	ummis I dition, 1	3.S., Hannaford A.J., Smith P.W 995.	′.G., "T	ext E	Book o	f Pract	ical Organ	ic Chemi	stry",	. Fummis B.S., Hannaford A.J., Smith P.W.G., "Text Book of Practical Organic Chemistry", Longman Edition, 1995.									

	K.S	Rangasamy College of Techno	ology - A	utono	nous F	egulation			R 2007	
De	partment	Bio Technology	P	rogram & N	me Coo ame	le 23:	B.Tech.	Bio Te	chnology	
		S	emester	III						
Co	urso Codo	Course Name	Ηοι	irs / We	ek	Credit	Ma	aximum	marks	
00		Course Maine	L	Т	Р	С	CA	ES	Total	
07	230308P	MICROBIOLOGY LABORATORY	0	0	3	2	50	50	100	
Obj	ective (s):	To learn about the culturing of m	icroorga	nism, tł	neir idei	ntification b	y hands	on trair	ning.	
		(Any 1	0 experi	ments)						
1	Laborator	y safety and sterilization technique	es				Tot	al Hrs	3	
2	Preparation	on of culture media – nutrient brot	h and nu	trient a	gar		Tot	al Hrs	3	
3	Pure cultu	are techniques-(Pour plate, streak	plate, S	pread p	late)		Tot	al Hrs	3	
4	Preservat	ion of bacterial cultures					Tot	al Hrs	3	
5	Staining t	echniques – Gram's staining & fur	ngal stair	ning			Tot	al Hrs	3	
6	Isolation	of microorganisms from soil					Tot	al Hrs	3	
7	Physiolog	ical characteristics of Microorgani	sms Sta	rch hyd	rolysis		Tot	al Hrs	3	
8	Carbohyd	rate fermentation test					Tot	al Hrs	3	
9	Urease te	st					Tot	al Hrs	3	
10	Triple sug	jar iron agar test					Tot	al Hrs	3	
11	Catalase	test					Tot	al Hrs	3	
12	Antibiotic	sensitivity test					Tot	al Hrs	3	
13	Growth cu	urve – observation and growth cha	aracterist	ics of b	acteria		Tot	al Hrs	3	
Tota	hours to be	taught						3	9	
Lab I	_ab Manual :									
1.	Kannan,N (2	2002).Laboratory manual in Gene	ral Micro	biology	. Panim	na Publishi	ng corpo	ration .	New Delhi	
Refe	rence(s) :									
1.	Cappuccin	o, J.G., Sherman, N (2004). Microb	iol <mark>ogy.</mark> A	Labora	atory Ma	anual.AWL				

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
Departm	nent	Biotechnology	F	rogram & N	me Coo ame	le 23:	B.Tech.	Biotech	nology		
		Se	mester	11							
Course) o d o	Course Name	Ho	urs / We	ek	Credit	Max	kimum	marks		
Course	Jode	Course Name	L	Т	Р	С	CA	ES	Total		
0723030)9P	INSTRUMENTATION TECHNIQUES LABORATORY	0	0	3	2	50	50	100		
At the end of this laboratory course, the students would have learnt about spectrosco Objective (s): nephelometry & chromatography. In addition the student will also gain knowledge of operat these equipments.									troscopy, operating		
		(Any 10) experir	nents)							
1.	Prec	ision and validity in an experiment usi	ng abso	rption s	pectros	сору.	Tota	al Hrs	3		
2.	2.Validating Lambert-Beer's law using kmno4Total Hrs3										
3.	Find pher	ing the molar absorbtivity and stoichio nanthroline) 3 using absorption spectro	metry o ometry	f the Fe	(1, 10		Tota	al Hrs	3		
4.	Find	ing the pKa of 4-nirophenol using abs	orption s	spectros	сору.		Tota	al Hrs	3		
5.	UV s	spectra of nucleic acids.					Tota	al Hrs	3		
6.	Che	mical actinometry using potassium fer	ri oxolat	е			Tota	al Hrs	3		
7.	Estir	nation of SO-4 by nephelometry.					Tota	al Hrs	3		
8.	Estir	nation of AL3+ by flourimetry					Tota	al Hrs	3		
9.	Limit	s of detection using aluminum alizarin	comple	x			Tota	al Hrs	3		
10.	Chro	matography analysis using TLC.					Tota	al Hrs	3		
11.	Chro	matography analysis using column ch	romato	graphy.			Tota	al Hrs	3		
Total hou	irs to I	be taught						30			
Lab Man	ab Manual :										
1. Pra	ctical	Biochemistry - Kieth Wilson and Johr	n Walke	ſ							
Reference	e (s) :										
1. Prii	Principles of Instrumental analysis, V edition- Skoog, Holler, Nieman.										
	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
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Depa	artment	Biot	echnology	Prog	ramme	Code a	& Name	23:	B.T	ech. Biote	echnology
			S	Semestei	r III						
Cours	e Code	Col	ursa Nama	Hou	irs / We	ek	Credit		M	aximum N	/larks
Cours		000		L	Т	Р	С	С	A	ES	Total
0723	80310P	COMPREH	ENSION II	0	0	3	0	10	00	00	100
Obje	ctive(s)	i. To improv ii. To improv	e the skill level of Er	ngineerin of studer	ig, Tech hts in pla	nology aceme	/ and Applient interviev	ed S vs.	cien	ce studer	nts.
1	For each using the	n subject 200 e students.	Keywords/important	words o	r terms	(5 unit	s x 40 word	ds) a	re to	be prepa	ared
2	These 2 handled	00 Keywords over each stu	are to be printed in o dent for all the subje	double co ects.	olumn (2 x 50	words) and	l in 2	pag	ges and is	to be
3	The staf	f who handled / semester) as	the subject in the p given below.	revious	semeste	er will h	nandle their	' disc	cuss	ion period	1 (3
4	4 The staff will question the students using 'W' and 'H' type questions linking the keywords.										
5	5 In a similar way the students have to prepare themselves for all the keywords.										
6	Each tes and 'H' t	st will carry 10 ype questions	0 questions and two by attaching with ke	hours d eywords.	uration.	The q	uestions w	ill be	of	objective t	ype: 'W'
7	Based o	n Test-I and T	est-II, sessional ma	rks (max	imum 5	i0 marl	<s) a<="" be="" td="" will=""><td>awar</td><td>ded.</td><td>i.</td><td></td></s)>	awar	ded.	i.	
8	Test-III v subjects	vill be held for (i.e. minimum	all the units and all 50/100 marks)	the subj	ects. Th	ie pass	sing norms	will	be s	imilar as o	other
			Schedule for Condu	uct of Co	mprehe	nsion	Subject				
Total N	o of week	s planned:10	Total No of sub	jects: 5 t	o 7	-	Total durati	on p	er w	veek: 3 pe	riods
Wee	ek No	Duration: 1 ¹ / ₂ (No of units)	period Subject No		Durat (No c	ion: 1½ of units	∕₂ period Su)	ıbjec	t No)	
V	V1	· · · · · · · · · · · · · · · · · · ·	S1(3)		Ì		,	S2(3)		
V	V2		S3(3)				:	S4(3)		
V	V3		S5(3)					S6(3)		
V	V4		Test-	I (Portior	n: 3 unit	s in ea	ch subject)				
V	W5 S1(2) S2(2)										
V	V6		S3(2)				:	S4(2)		
V	V7		S5(2)					S6(2)		
V	V8		Test-I	I (Portio	n: 2 unit	s in ea	ch subject)			
V	V9				Discuss	sion					
W	W10 Test-III (All 5 units and all the subjects)										

K.S.R	angasamy College	of Technology -	Autonoi	nous F	Regula	tion		R 20	07			
Department	Biotechnology Programme Code & Name 23: B.Tech. Biotechnology											
		Se	nester II									
			Hou	rs / We	ek	Credit	M	aximum N	Marks			
Course Code	Course	Name	L	Т	Р	С	CA	ES	Total			
07230311P	CAREER COMPE	TENCY	0	0	2	0	100	00	100			
	i. To improve the s	kill level of Engine	ering, Te	echnolo	gy and	d Applied S	Science	students.				
Objective(s)	ii. To improve the e	mployability of stu	dents in	placen	nent in	terviews						
Skills sets to	a. Aptitude skills											
be improved	Arithmetic	ability										
	Verbal Rea	Bossoning										
	 Non verba b Programming sk 	ills										
	Clanguage	3										
	 OOPS con 	 OOPS concepts and C++ (BT, EEE, ECE,CSE,IT) 										
	 Data Struct 	Data Structures (BT, EEE,ECE,CSE,IT)										
	c. Written Commur	Written Communication Skills										
	 Comprehe 	nsion										
	Grammar											
	 Essay Write Technical 	ing										
	Technical	Report Writing										
	d Oral Communica	ation Skills										
	News Rea	dina										
	 Informing a 	News item										
	 Self introduced 	uction										
	 2 minutes 	alk – Informed										
	 2 minutes 	alk - Extempore										
	e. Technical Paper	Presentation										
	Presenting f. Group Interaction	a paper on recen	topics									
	 Debate 											
	Group Disc	cussion – Informed	Topic									
	Group Disc	cussion – Topic or	the spo	ot								
	g. Technical Intervi	ew Skills										
	Broad Kno	wledge of the brar	h									
	 Indepth kn 	owledge on specif	ic subied	cts of in	terest							
	h. HR Interview Sk	ills										
	 Adoptabilit 	у										
	 Creativity 											
	 Flexibility 											
	Achieveme	ent orientation										
	Continuous Hardworkii	s learning										
	Self develo	pment										
	Questionin	g										
Focus	The focus of CCD in another two sem	s to develop these esters (CCD IV ar	e in three nd V).	e seme:	sters (CCD-I, II a	nd III) ai	nd reinfor	ce them			
Execution	Total No. c	f weeks : 12										
	3 Hrs/weel	and 2 credits		-		· · · ·						
	Only Conti	nuous Assessmer	t and No	b End S	emest	er examination	ation.	totion				
	Evaluation	based on written	est, oral	test ar	ia tech	nical pape	ing com	ilation.	n hour			
	 Every 20 s and oral te 	iuueniis snoulu de st	engage	ируаз	stall m		ing com	municallo	nnour			
	 Every 30 s 	tudents should be	monitor	ed by a	staff r	nember to	conduct	written t	est.			

Schedule	Week	Activity
	1	Training
	2	Training
	3	Evaluation I - Written
	4	Evaluation I -
	5	Training
	6	Evaluation II - Written
	7	Evaluation II - Oral
	8	Training
	9	Evaluation III - Written
	10 - 12	Evaluation III - Oral
Evaluation	Evaluation I	60 marks(average of 3 tests)
	Evaluation II	20 marks
	Evaluation III	20 marks
	Total	100 marks

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
Dep	artment	Biotechnology	Progra	mme Co	de & N	Name	23 : B	.Tech	Biotech	nology	
			Se	emester	IV						
Cour	so Codo	Course Nan		Hou	rs / W	eek	Credit	N	laximum	Marks	
Cour	se coue	Course Main		L	Т	Р	С	CA	ES	Total	
0723	30401C	PROBABILITY AND STATISTICS		3	1	0	4	50	50	100	
Obje	ective(s)	At the end of the couprobability concepts. variable and function contribute to the provariation.	arse, the stur Acquire skil s of random pocess of ma	dents w Ils in ha n variab aking sc	ould h andling le. Be cientific	ave the situati expos judgr	e fundamenta ions involving ed to statistic nents in the	l know more al me face c	ledge of than on thods de of uncert	the basic e random signed to ainty and	
1	PROBAE	BILITY AND RANDOM	VARIABLES				Total Hrs		09		
Axiom Proba	Axioms of probability – Conditional probability – Total probability – Baye's theorem – Random variable – Probability mass function – Probability density function – Moments – Moment generating function – Properties.										
2	2STANDARD DISTRIBUTIONSTotal Hrs09										
Binom Distrib	Binomial Distribution – Poisson Distribution – Geometric Distribution – Negative Binomial Distribution – Normal										
3	TWO DI	MENSIONAL RANDOM	I VARIABLE	S	-		Total Hrs		09		
Margii variab	hal and Colles - Cent	onditional Distributions ral limit theorem.	- Covariance	e - Corr	elation	and F	Regression - T	ransfo	rmation of	of random	
4	TESTING	G OF HYPOTHESIS					Total Hrs		09		
Test c Squar of sigr	of significat e test – G nificance -	nce of small samples – oodness of fit – Indepe single mean – Differen	Students 't' ndence of At ce of means	test – S ttributes	imple ı – Larç	mean - ge Sarr	Difference of Differe	mean nce of	s – F – T proportic	est – Chi- ons – Test	
5	DESIGN	OF EXPERIMENTS A	ND QUALITY	Y CONT	ROL		Total Hrs		09		
Analys charts	sis of varia	ance – One way classif – R chart – C chart.	ication – CR	D – Tw	o way	classif	cation – RBD	– Lati	n square	 Control 	
Total	hours to be	e taught							45		
Text b	Text book (s) :										
1.	1. Kapur J.N. and Saxena H.C., "Mathematical Statistics", S Chand, NewDelhi, 1997.										
2.	Gupta S	.C. and Kapur J.N., "F Delhi, 1996.	undamentals	s of Mat	themat	tical St	atistics", S Ch	and, I	Ninth Edi	ition, New	
Refere	ence(s) :										
1.	 Walpole R.E. Myers R.H. Myers R.S.L. and Ye K., "Probability and Statistics for Engineers and Scientists", Seventh Edition, Pearsons Education, Delhi, 2002. 										
2.	Mille I.R.	and Freund J.E., "Prob	ability and St	tatistics	for En	gineers	s", Prentice Ha	II, 199	5.		

	K.S.Ran	gasamy College of Te	chnology - A	Autono	mous	Regula	ition		R 20	007	
D	epartment	Biotechnology	Program	mme Co	de & N	Name	23: E	3.Tech.	Biotech	nology	
			Seme	ester IV							
Col	uraa Cada	Course Nor	20	Hou	rs / W	eek	Credit	Ma	aximum I	Marks	
000		Course Main	le	L	Т	Р	С	CA	ES	Total	
072	230402C	GENETICS		3	0	0	3	50	50	100	
Ob	jective(s)	At the end of the cour methods of mutation Biotechnology.	rse, the stud ns, problems	ent wou s. It he	ild hav elps th	re learn ne stu	it the basic dents to ta	of gene ake up	etics and PG co	l various ourse in	
1	GENETICS	AND HEREDITY				-	Total Hrs		09		
Introdu Structu telome chrom inherit	Structural organization of eukaryotic chromosomes: Nucleosome structure, Euchromatin, heterochromatin, telomeres, Satellite DNA, centromeres, Types of chromosome on the basis of centromeres; Lampbrush chromosomes; polytene chromosomes; Extrachromosomal inheritance; maternal effects and cytoplasmic nheritance, Chi square analysis.										
2	LINKAGE A	ND CROSSING OVER				-	Total Hrs		09		
Fine s break cross,	tructure of the model, Holida Haploid map	e gene: cistron, recon, r ay model, Genetic map ping; Lod score analysi	mutan; Linkag bing of chrom s.	ge; cros nosome	sing o s: Diple	ver: mo oid ma	plecular mec oping- two p	hanism oint cro	n- double oss, thre	e strand e point	
3	CYTOGENE	ETICS				٦	Fotal Hrs		09		
Sex d Types Alleles	etermination ; Sex differe s; Lethality an	in plants and animals ntiation; Dosage comp d Interaction of genes.	: Concepts o pensation; S Karyotyping	of autos ex linke - amnio	somes ed inh centes	and a eritanc sis; ban	llosomes, X e, Sex influ ding technic	(X-XY,) Jenced Jues	XX-XO,Z inherita	W-ZZ,ZO ince Multi	
4	CHROMOS	OMAL ABERRATIONS	& MUTATIO	ONS		-	Total Hrs		09		
Struct polypl chemi	ural changes oidy ; Types cal mutagens	 duplications, translo of mutations; lethal mu , ionizing and non-ioniz 	ocations, inv tations, silen ing radiation	ersions t mutations s; Ames	; Num ons, ao s Test.	nerical daptive	changes: a mutations, l	aneuple biochei	bidy ; E mical mu	Euploidy; itations&	
5	GENETIC N	ATERIAL IN POPULA	TIONS			-	Total Hrs		09		
Popula allele specia	ation genetics frequencies- ation; pedigree	s: gene pool, gene fre selection, mutation, e analysis.	equencies, H migration a	ardy-W and ge	einberg netic	g lawa drift; I	nd its appli nbreeding	cations depres	, factors sion; H	affectin eterosis;	
Total I	nours to be ta	ught							45		
Text b	Text book (s) :										
1.	1. Tamarin, R.H. 2002. "Principles of Genetics", Tata McGraw Hill, New Delhi.										
2.	Verma, P.S. New Delhi.	. and Agarwal, V.K. 19	91. "Cell Bio	logy, G	enetics	3 & Evo	olution & Ec	ology",	S.Chan	d & Co.,	
Refere	ence(s) :										
1.	Gardner, E. New Delhi.	J, Simmons, M.J, and	Snustad, D.	P. 199	1. "Prii	nciples	of Genetics	s", Joh	n Wiley	& Sons,	
2.	Strickberger	, M.W. "Genetics", Prer	ntice Hall of I	ndia, Ne	ew Del	hi. 199	6.				

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007											
De	partment	Biotechnology	Program	me Code	& Nam	е	23:B.	Tech. Bi	otechnolog	ду		
		· · ·		Seme	ester IV							
Cour	raa Cada	Course Nor		Hou	ırs / Wee	ek	Credit	N	1aximum N	/larks		
Cou	se coue	Course Man	le	L	Т	Р	С	CA	ES	Total		
072	30403C	MOLECULAR BIOL	OGY	3	0	0	3	50	50	100		
Obje	ective(s):	To develop skills of students would hav expression is regula subjects in Modern	the Stude e learnt a ated. This biology &	nts in the bout the Knowlec biotechno	e area of structur Ige will blogy.	f Molec e of N be very	ular Biology ucleic acid, y useful for	, At the DNA rep students	end of the plication and to study	course the nd how the specialized		
1	1 OVERVIEW OF MOLECULAR BIOLOGY Total Hrs 08											
DN/ and	DNA and RNA as the genetic Material, Griffith experiment, Hershey and Chase experiment, Avery Mc Cleod and Mc Carthy experiments. Transformation, Conjugation and Transduction.											
2	STRUCT REPLICA	URE OF NUCLEIC A	CIDS AN	D DNA		Тс	otal Hrs		10			
Con Enzy	firmation (of DNA and RNA. R	eplication echanism	in Proka and even	aryotes a ts in Rep	and Eu olicatio	ikaryotes. R n. Phage rep	eplicatio	n models	and types.		
3	TRANSC	RIPTION				Тс	otal Hrs		10			
Prok Post Proc	aryotic an transcript essing of i	d Eukaryotic Transci ional modification. (mRNA, rRNA and tRN	ription, RN Capping, a NA.	IA polymadenylatio	erase, ti on. Feat	ranscrij tures c	otion factors of promoters	, mecha and er	nism of tra hancers,	anscription, ribozymes.		
4	TRANSL	ATION				To	otal Hrs		08			
Gen term Phos	etic code, ination of sphorylatio	Protein synthesis me Protein synthesis. n and Sulfation. Prote	echanism. Inhibitors ein targeti	Prokaryo of Trai	otic and nslation.	Eukary Post	otic translat/ translationa	tion- initi al modif	ation, elor ication-Gly	ngation and vcosylation,		
5	REGULA	TION OF GENE EXP	PRESSION	٧		To	otal Hrs		09			
Oper Muta	ron Conce ation –Spo	pt. Negative Control ntaneous and Induce	l (Lac Op d. Repair	eron), Po of DNA. N	sitive c Method o	ontrol	(Arabinose o /ing gene ex	operon), pression	Tryptopha	an Operon.		
Tota	I Hours Ta	aught							45			
Text	Text book (s) :											
1.	1. David Frifelder (1999). Molecular Biology, Narosa Publication House. New Delhi.											
2.	2. Benjamin Lewin (2000). Gene VIII, Oxford University Press. New Delhi.											
Refe	rence(s):											
1.	Watson C Gene. Th	J.D., Hopkins, W.H., I ne Benjamin/Cummin	Roberts J. gs Publica	W., Steit ition Com	z, J.A., a pany, C	and We aliforni	einer A.M (19 a, USA.	987). Mo	lecular Bio	ology of the		
2.	Old, B., Genetic I	Richard, M.T., and Engineering, Black W	Primrose, ell Scienc	S.B (200 e Publica	01).Princ tion, Ma	ciples o Iden. U	of Gene Ma ISA.	nipulatio	n: An intr	oduction to		

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
De	Department Biotechnology Programme Code & Name 23 : B.Tech. Biotechnology										
			Sem	ester IV							
Co	uraa Cada	Course Name		Hou	ırs / We	ek	Credit	Ν	<i>l</i> laxim	um M	arks
0		Course Marile		L	Т	Р	С	CA	E	S	Total
07	230404C	BASIC INDUSTRIAL BIOTECHNOLOGY		3	0	0	3	50	5	50	100
Ot	jective(s)	At the end of the course secondary metabolites, enz very beneficial for certain sp	the stud tymes ar	ents wo Id single d course	ould hav e cell pr es & pro	ve lea oteins ject w	rnt abou on an ii ork.	it produ ndustria	uction I scale	of pi e. Thi	rimary & is will be
1	INTRODUC	CTION TO INDUSTRIAL BIO	PROCES	SS				Total ⊢	Irs		07
Basi subs	Basis and Development of industrial fermentation processes-Screening for new metabolites, stock cultures, substrates for industrial fermentation, media and innoculum preparation										
2	2 PRODUCTION OF PRIMARY METABOLITES Total Hrs 10										
A br lactio	ief outline of acid, acetic	processes for the productio acid); amino acids (glutamic	n of som acid, ph	ie comn enyalani	nercially	/ impo artic a	rtant org	janic ac alcoho	ids (e ls (eth	e.g. ci anol,	tric acid, butanol)
3	PRODUCT	ION OF SECONDARY MET	ABOLITE	S				Total H	Irs		10
Stud (pen Ribo	y of produci icillin, cepha flavin, gibbe	ction processes for various alosporin) aminoglycosides (rellins.	s classe (streptom	s of se iycin) m	econdar nacrolid	y met es (er	tabolites ythromy	: antibi cin), vit	otics: tamins	beta s-Vita	-lactams min B ₁₂ ,
4	PRODUCT	ION OF ENZYMES AND OT	HER BIC	PRODL	JCTS			Total H	lrs		08
Prod biofe	uction of inc	dustrial enzymes such as propreservatives (Nisin), biopolyr	oteases, ners (xai	amylas hthan gu	es, lipa: ım).	ses, P	roductio	n of Mi	crobia	ıl inse	ecticides,
5	PRODUCT	ION MODERN BIOTECHNO	LOGÝ P	RODUC	TŚ			Total H	lrs		10
Prod Tran	uction of Sir sformation o	ngle cell Proteins from Wood f steroids, ascorbic acid, antil	, Carboh biotics ar	ydrates, nd pestic	, Sewaç cides.	ge and	l Alkane	s. Micro	bial tr	ansfo	rmation-
Tota	I hours to be	taught									45
Text	book (s) :										
1.	 Wulf Cruger and Anneliese Crueger, "Biotechnology: A Textbook of Industrial Microbiology", Panima Publishing Corporation, New Delhi. 										
2.	Casida Jr,	L.E., "Industrial Microbiology"	', New Ag	ge Interr	national	(P) Lte	d. New D	Delhi.			
Refe	rence(s) :										
1.	Murrey Mo	o & Young, D. 1998. "Compre	ehensive	Biotech	nology"	, Perg	amon. N	ew Dell	ni		
2.	Presscott,	D. 2002. "Industrial Microbiolo	ogy", CB	S Publis	hers, N	ew De	lhi.				

ŀ	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007											
Depai	rtment	Biotechnology	Programm	e Code	& Nar	ne	23	3 : B.Te	ech. Biotechn	ology		
			S	emeste	er IV							
Course	a Coda	Course N	amo	Hou	rs / We	ek	Credit		Maximum M	arks		
Course		000130 11	ame	L	Т	Р	С	CA	ES	Total		
07230	0405C	CHEMICAL REACT	ION	3	1	0	4	50	50	100		
Objec	tive(s)	At the end of the or reactors and how the Biochemical engine	course, the stune ney function. The ering, and also	ident whis will l	ould h help th oject w	ave le e stud ork.	arnt chem lent to take	nical ki e up P	netics, variou G course in E	is types of Bioprocess,		
1	SCOPE	OF CHEMICAL KINE	TICS & CHEM	1ICAL R	REACT	ION E	ENGINEEF	RING	Total Hrs	08		
Broad rate eq order re	Broad outline of chemical rectors; rate equation; concentration and temperature dependence; development of rate equation for Irreversible uni molecular type first- order reactions, Irreversible Bio molecular type Second - order reactions, Irreversible Tri molecular type Third- order reactions, Irreversible reactions in series.											
2	IDEAL R	EACTORS							Total Hrs	10		
Autoca Reaction Perform	talytic R ons in se	for a single Reaction eactions Design for eries, First-Order foll juation for single rect	n, Design for a parallel Reacti owed by Zero- ors; multiple re	ons, Po order r actor sy	Reaction ptpourrine eactior ystem;	on, M i of M ns, Re multip	ultiple-readultiple Readultiple Readultiple Readultiple Readultiple Readultiple readultiple reactions and the sections and th	ctor sy actions eactior ons.	stems, Recyc , Irreversible is semi-batc	First-order h reactors,		
3	FLOW A	ND NON IDEAL FLC	DW				_		Total Hrs	10		
RTD in Convec non-ide	n ideal fl ction mod eal flow.	ow; Non- ideal flow del for Laminar flow,	models; Com Earliness of mi	partmer xing, Se	nt mod egrega	lels, D tion ai	hispersion nd RTD, F	Model Reacto	, Tank in se r performance	ries Model, e with		
4	GAS-SC	LID, GAS-LIQUID R	EACTIONS						Total Hrs	09		
Resista particle ,Produc	ance and es, Heat ct distribu	d rate equations; Po effects during reaction ution in multiple reaction	ore diffusion re on, Performanc ions, heteroge	esistanc ce equa neous c	ce con ition fo catalys	nbined r reac is; rea	with surf tors conta ction steps	face k iining p s.	inetics ,Poro porous cataly	us catalyst st particles		
5	FIXED E	BED AND FLUID BED	REACTORS						Total Hrs	08		
G/L reaction	actions (n; tank R	on solid catalysis ; teactors ,fluid-fluid re	trickle bed, sl actors, fluid-pa	urry rea irticle re	actors; action	three s and	-fluidized reaction ra	beds ate and	; reactors fo	r fluid-fluid ng steps.		
Total h										40		
		iol 0 1000 "Chomic	al Poaction En	ainoorir	a" 2 rd	Editio		liov N	ow Dolbi			
	Gavhan	• KA 2000 "Chem	ical Reaction F	Indinee	rina "\			ali Pra	akashan Puhl	isher New		
2.	2. Delhi.											
Refere	nce(s) :						<u></u>	<u> </u>				
1.	1. Missen, R.W., Mims, C.A. and Saville B.A.1999. "Introduction to Chemical Engineering and Kinetics"; John Wiley, New Delhi.											
2.	Fogler, H	I.S. 2002. "Elements	of Chemical E	ngineer	ing" Pi	entice	Hall India	, New	Delhi.			

Department Biotechnology Programme Code & Name 23: B. Tech. Biotechnology Semester IV Course Code Course Name Hours / Week Credit Maximum Marks 07230406C CHEMICAL L T P C CA ES Total 07230406C CHEMICAL A T P C CA ES Total 07230406C CHEMICAL A 0 4 50 50 100 BIOTHERMODYNAMICS AND BIOTHERMODYNAMICS 3 1 0 4 50 50 100 Volumetric properties of fluids exhibiting non ideal behavior, residual properties, estimation of thermodynamic properties using equations of state; calculations involving actual properties; estimation of thermodynamic properties and applications. Total Hrs 10 Parial SOLUTION THERMODYNAMICS Total Hrs 10 Total Hrs 10 Criteria for phase equilibria; Phase equilibria in single-component system, Duhem theorem, Vapor-Liquid equilibria, Bubble-point equilibria, Dew-point equilibria, Phase equilibria, Phase equilibria, Phase equilibria, Phase equilibria, Phase equilibria molitagrams, Burk equilibria molitagrams, Using adram		K.S.Rang	asamy College of	Technology	- Autono	omous	Regu	lation			R 2007	
Semester IV Course Name Credit Maximum Markstressem 07230406C CHEMICAL THERMODYNAMICS AND BIOTHERMO DYNAMICS 3 1 0 4 50 50 100 0/// 0230406C At the end of the course the students would have learnt about thermodynamic properties of fluids, Chemical potential, fugacity, Gibbs-Duhem equation, Phase equilibria etc. The knowledge gained in this course will be verse will be verse verse verse equilibria etc. The fluids, Chemical potential, fugacity, Gibbs-Duhem equation, Phase equilibria etc. The showledge gained in this course will be verse verse verse verse verse equilibria etc. The fluids, Chemical potential, fugacity, Gibbs-Duhem equation, Phase equilibria etc. The showledge gained in this course will be verse verse verse verse verse equilibria. Total Hrs 08 Volumetric properties of fluids exhibiting non ideal behavior; residual properties; estimation of thermodynamics properties using equations of state; calculations involving actual properties; estimation of thermodynamics; oncepts and applications of excess properties of mixtures; activity coefficient; composition models; Gibbs Duhem equation. Total Hrs 10 Partial molar properties; concepts and applications, Atage equilibria in single-component system, Duhem theorem, Vapor-Liquid equilibria, Bubble-point equilibria, Dew-point equilibria, Gibbs Duhem equation. Total Hrs 10 Criteria for phase equilibria and termary equilibria in single-component system, Duhem theorem, Vapor-Liquid equilibria, Bubble-point equilibr	Depa	artment	Biotechnology	Programm	ne Code	& Nam	е	23: I	B.Tec	h. Bi	otechnolog	ду
Course Name Hours / Werk Credit Maximum Marks 07230406C CHEMICAL THERMODYNAMICS AND BIOTHERMO DYNAMICS 3 1 0 4 50 50 100 0/230406C At the end of the course the students would have learnt about thermodynamic properties of fluids, Chemical potential, fugacity, Gibbs-Duhem equation, Phase equilibria etc. The knowledge gained in this course will be very useful properties; estimation of thermodynamic offered in later semesters. Total Hrs 08 1 THERMODYNAMICS PROPERTIES OF FLUIDS Total Hrs 08 Volumetric properties of fluids exhibiting non ideal behavior; residual properties; estimation of thermodynamic properties using equations of state; calculations involving actual properties; estimation of thermodynamic properties using equations of state; calculation involving actual properties; estimation of thermodynamic properties and applications of excess properties of mixtures; activity coefficient; composition models fluibs Duhem equation. 10 2 SOLUTION THERMODYNAMICS Total Hrs 10 Principa for phase equilibria; Phase equilibria in single-compert system. Duhem teorem, Vapor-Liquid equilibria, Bubble-point equilibria in muft comporent system. Duhem theorem, Vapor-Liquid equilibria, Bubble-point equilibria in muft fluid-liquid equilibria and tenary equilibrium constant; calculation state sinary liquid-liquid equilibria and rung equilibrium constant; calculations. 10 4 CHEM				ç	Semeste	r IV						
CHUISE Code CHUISE Value L T P C CA ES Total 07230406C THERMODYNAMICS AND BIOTHERMO DYNAMICS 3 1 0 4 50 50 100 Volumetric propertises (s) At the end of the course the students would have learnt about thermodynamic properties of fluids, Chemical potential, fugacity, Gibbs-Duhem equation, Phase equilibria etc. The knowledge gained in this course will be very useful for studying certain specialized subjects offered in later semesters. 1 THERMODYNAMIC PROPERTIES OF FLUIDS Total Hrs 08 Volumetric properties of fluids exhibiting non ideal behavior; residual properties; estimation of thermodynamic properties using equations of state; calculations involving actual properties; estimation of thermodynamic properties and applications of excess properties of mixtures; activity coefficient; composition models; Gibbs Duhem equation. Total Hrs 10 2 SOLUTION THERMODYNAMICS Total Nrs 10 2 SOLUTION THERMODYNAMICS Total Hrs 10 2 SOLUTION THERMODYNAMICS Total Hrs 0 3 PHASE EQUILIBRIA Total Hrs 0 Criteria for phase equilibria; Phase equilibria in single-component systems, Phase equilibria in multi component system, Duhem theorem, Vapor-Liquid equilibria, Bubble-point equilibria, Bubware, Liquid-liqui	Cour	rea Cada	Course	lamo	Hou	rs/We	ek	Credit		Max	kimum Ma	rks
07230406C CHEMICAL THERMODYNAMICS AND BIOTHERMO DYNAMICS 3 1 0 4 50 50 100 0bjective(s) At the end of the course the students would have learnt about thermodynamic properties of fluids. Chemical potential, tygacity, Gibbs-Duhem equation, Phase equilibria etc. The knowledge gained in this course will be very useful for studying certain specialized subjects offered in later semesters. 1 THERMODYNAMIC PROPERTIES OF FLUIDS Total Hrs 08 1 THERMODYNAMIC PROPERTIES OF FLUIDS Total Hrs 10 2 SOLUTION THERMODYNAMICS Total Properties; estimation of thermodynamic properties using equations of state; calculations involving actual property exchanges; Maxwell's relations and applications. 10 2 SOLUTION THERMODYNAMICS Total Hrs 10 Partial molar properties; concepts of chemical potential and fugacity; ideal and non-ideal solutions; concepts and applications of excess properties of mixtures; activity coefficient; composition models; Gibbs Duhem equation. Total Hrs 10 3 PHASE EQUILIBRIA Total Hrs 09 10 Criteria for phase equilibria; Phase equilibria in single-component system, puhem theorem, Vapor-Liquid equilibria, Bubble-point equilibria, Dew-point equilibria, Flash vaporization, phase diagram for binary solutions, Azeotrope, Liquid-liquid equilibrium diagrams, Binary liquid-liquid equilibria and ternary equilibrium constant; effect of temperature and	Coul	se coue	Course h	ame	L	Т	Р	С	CA	4	ES	Total
At the end of the course the students would have learnt about thermodynamic properties of fluids, Chemical potential, fugacity, Gibbs-Duhem equation, Phase equilibria etc. The knowledge gained in this course will be very useful for studying certain specialized subjects offered in later semesters. 1 THERMODYNAMIC PROPERTIES OF FLUIDS Total Hrs 08 Volumetric properties of fluids exhibiting non ideal behavior; residual properties; estimation of thermodynamic properties using equations of state; calculations involving actual property exchanges; Maxwell's relations and applications. 2 SOLUTION THERMODYNAMICS Total Hrs 10 Partial molar properties; concepts of chemical potential and fugacity; ideal and non-ideal solutions; concepts and applications of excess properties of mixtures; activity coefficient; composition models; Gibbs Duhem equation. Total Hrs 10 Criteria for phase equilibria; Phase equilibria in single-component system, Duhem theorem, Vapor-Liquid equilibria, Bubble-point equilibria, Dew-point equilibria, Flash vaporization, phase diagram for binary solutions, Azeotrope, Liquid-liquid equilibrium diagrams, Binary liquid-liquid equilibria and ternary equilibrium diagrams. 4 Chell Hrs 09 Equilibrium criteria for homogeneous chemical reactions; evaluation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; effect of single and multiple reactions. 5 Total Hrs 08 Concopt of lost work; entropy generation; Entropy and irreversibility	072	30406C	CHEMICAL THERMODYNAN	AICS AND	3	1	0	4	50)	50	100
1 THERMODYNAMIC PROPERTIES OF FLUIDS Total Hrs 08 Volumetric properties of fluids exhibiting non ideal behavior; residual properties; estimation of thermodynamic properties using equations of state; calculations involving actual property exchanges; Maxwell's relations and applications. 2 SOLUTION THERMODYNAMICS Total Hrs 10 Partial molar properties; concepts of chemical potential and fugacity; ideal and non-ideal solutions; concepts and applications of excess properties of mixtures; activity coefficient; composition models; Gibbs Duhem equation. 10 3 PHASE EQUILIBRIA Total Hrs 10 Criteria for phase equilibria; Phase equilibria in single-component system, Duhem theorem, Vapor-Liquid equilibria, Bubble-point equilibria molulibria, Bubble-point equilibria dagrams, Binary liquid-liquid equilibria and ternary equilibria diagrams. 1 Total Hrs 09 Equilibrium criteria for phase equilibria and trenary equilibria constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of lost work; entropy generation; Vapour-compression cycle, Adsorption refrigeration, Rankin cycle, Reheat cycle, Regenerative cycle, Otto cycle, Diesel cycle, Dual cycle. 45 Total Hrs 10 10 Criteria for phase approximation of component system 4 4 CHEMICAL REACTION EQUILIBRIA	Obje	ective(s)	At the end of the fluids, Chemical knowledge gaine offered in later se	Course the stup potential, fug d in this cours mesters.	udents w gacity, C e will be	vould ha Gibbs-D very u	ave lea Duhem Iseful f	arnt about equation, or studying	therm Pha certa	odyn se e ain sp	amic prop quilibria pecialized	erties of etc. The subjects
Volumetric properties of fluids exhibiting non ideal behavior; residual properties; estimation of thermodynamic properties using equations of state; calculations involving actual property exchanges; Maxwell's relations and applications. 2 SOLUTION THERMODYNAMICS Total Hrs 10 Partial molar properties; concepts of chemical potential and fugacity; ideal and non-ideal solutions; concepts and applications of excess properties of mixtures; activity coefficient; composition models; Gibbs Duhem equation. 10 3 PHASE EQUILIBRIA Total Hrs 10 Criteria for phase equilibria; Phase equilibria in single-component systems, Phase equilibria, Dew-point equilibria, Flash vaporization, phase diagram for binary solutions, Azeotrope, Liquid-liquid equilibrium diagrams, Binary liquid-liquid equilibria and ternary equilibrium diagrams. Total Hrs 09 Equilibrium criteria for homogeneous chemical reactions; evaluation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of performance, Refrigerator capacity, Vapour-compression cycle, Adsorption refrigeration, Liquefaction, Rankin cycle, Reheat cycle, Regenerative cycle, Otto cycle, Diesel cycle, Dual cycle. 45 Text book (s) : 1 Smith, J.M., Van Ness, H.C. and Abbot, M.M. 2001. "Chemical Engineering Thermodynamics". Prentice Hall India, New Delhi. 45 Reference(s) :	1	THERMO	DYNAMIC PROPE	ERTIES OF FL	UIDS					Тс	otal Hrs	08
2 SOLUTION THERMODYNAMICS Total Hrs 10 Partial molar properties; concepts of chemical potential and fugacity; ideal and non-ideal solutions; concepts and applications of excess properties of mixtures; activity coefficient; composition models; Gibbs Duhem equation. Total Hrs 10 3 PHASE EQUILIBRIA Total Hrs 10 Criteria for phase equilibria; Phase equilibria in single-component systems, Phase equilibria, Dew-point equilibria, Dew-point equilibria, Dew-point equilibria, Dew-point equilibria, Dew-porization, phase diagram for binary solutions, Azeotrope, Liquid-liquid equilibrium diagrams, Binary liquid-liquid equilibrium criteria for homogeneous chemical reactions; evaluation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; effect of temperature and pressure on equilibrium constant; effect of temperature and pressure on equilibrium constant; effect of temperature (s work; ent	Volum prope applic	Volumetric properties of fluids exhibiting non ideal behavior; residual properties; estimation of thermodynamic properties using equations of state; calculations involving actual property exchanges; Maxwell's relations and applications.										
Partial molar properties; concepts of chemical potential and fugacity; ideal and non-ideal solutions; concepts and applications of excess properties of mixtures; activity coefficient; composition models; 3 PHASE EQUILIBRIA Total Hrs 10 Criteria for phase equilibria; Phase equilibria in single-component systems, Phase equilibria, Dew-point equilibria, Flash vaporization, phase diagram for binary solutions, Azeotrope, Liquid-liquid equilibrium diagrams, Binary liquid-liquid equilibria and ternary equilibrium diagrams. 1 4 CHEMICAL REACTION EQUILIBRIA Total Hrs 09 Equilibrium criteria for homogeneous chemical reactions; evaluation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and yields for single and multiple reactions. 5 Total Hrs 08 Concept of lost work; entropy generation; Entropy and irreversibility processes; power cycle; Coefficient of performance, Refrigerator capacity, Vapour-compression cycle, Adsorption refrigeration, Liquefaction, Rankin cycle, Reheat cycle, Regenerative cycle, Otto cycle, Diesel cycle, Dual cycle. 45 Text book (s) : 1 Smith, J.M., Van Ness, H.C. and Abbot, M.M. 2001. "Chemical Engineering Thermodynamics". Prentice Hall India, New Delhi. 2. Narayanan, K.V. 2002. "A Text Book of Chemical Engineering Thermodynamics". Prentice Hall India, New Delhi. 3. Smith, J. J. Juliana Boerio Goats., 2000."Chemical Thermodynamics" Elsevier Ltd., USA. <td>2</td> <td colspan="11">2 SOLUTION THERMODYNAMICS Total Hrs 10</td>	2	2 SOLUTION THERMODYNAMICS Total Hrs 10										
3 PHASE EQUILIBRIA 10 Criteria for phase equilibria; Phase equilibria in single-component systems, Phase equilibria in multi component system, Duhem theorem, Vapor-Liquid equilibria, Bubble-point equilibria, Dew-point equilibria, Flash vaporization, phase diagram for binary solutions, Azeotrope, Liquid-liquid equilibria, Dew-point equilibria, Binary liquid-liquid equilibria and ternary equilibrium diagrams. Mass equilibria equilibria and ternary equilibrium diagrams. In multi equilibria equilibria and ternary equilibrium diagrams. 4 CHEMICAL REACTION EQUILIBRIA Total Hrs 09 Equilibrium criteria for homogeneous chemical reactions; evaluation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature, Refrigerator capacity, Vapour-compression cycle, Adsorption refrigeration, Liquefaction, Rankin cycle, Reference, Regenerative cycle, Otto c	Partia conce Gibbs	l molar pro pts and ap Duhem equ	perties; concepts plications of exces Jation.	of chemical p ss properties o	otential of mixtur	and fug es; act	gacity; tivity c	ideal and oefficient;	non-i comp	ideal ositic	solutions on models	,
Criteria for phase equilibria; Phase equilibria in single-component systems, Phase equilibria in multi component system, Duhem theorem, Vapor-Liquid equilibria, Bubble-point equilibria, Dew-point equilibria, Flash vaporization, phase diagram for binary solutions, Azeotrope, Liquid-liquid equilibrium diagrams, Binary liquid-liquid equilibria and ternary equilibrium diagrams. Dew-point equilibria, Dew-point equilibria, Dew-point equilibria, Flash vaporization, phase diagram for binary solutions, Azeotrope, Liquid-liquid equilibrium diagrams, Binary liquid-liquid equilibria and ternary equilibrium diagrams. 4 CHEMICAL REACTION EQUILIBRIA Total Hrs 09 Equilibrium criteria for homogeneous chemical reactions; evaluation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature, Refrigerator capacity, Vapour-compression cycle, Adsorption refrigeration, Liquefaction, Rankin cycle, Reheat cycle, Regenerative cycle, Otto cy	3	PHASE E	QUILIBRIA							То	otal Hrs	10
4 CHEMICAL REACTION EQUILIBRIA Total Hrs 09 Equilibrium criteria for homogeneous chemical reactions; evaluation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of temperature and yields for single and multiple reactions. Total Hrs 08 5 THERMODYNAMIC ANALYSIS OF PROCESSES Total Hrs 08 Concept of lost work; entropy generation; Entropy and irreversibility processes; power cycle; Coefficient of performance, Refrigerator capacity, Vapour-compression cycle, Adsorption refrigeration, Liquefaction, Rankin cycle, Reheat cycle, Regenerative cycle, Otto cycle, Diesel cycle, Dual cycle. 45 Total hours to be taught 45 1. Smith, J.M., Van Ness, H.C. and Abbot, M.M. 2001. "Chemical Engineering Thermodynamics". 6 th Edition McGraw-Hill, New Delhi. 2. Narayanan, K.V. 2002. "A Text Book of Chemical Engineering Thermodynamics". Prentice Hall India, New Delhi. 2. Sandler, S.I. 1989. "Chemical and Engineering Thermodynamics." John Wiley, New Delhi. 2. Bevan Ott, J. Juliana Boerio Goats., 2000."Chemical Thermodynamics" Elsevier Ltd., USA.	Criteri compo Flash liquid-	a for phas onent syste vaporizatio liquid equilil	e equilibria; Pha m, Duhem theore n, phase diagram bria and ternary eq	se equilibria em, Vapor-Liq for binary sol juilibrium diagr	in single uid equi utions, A ams .	e-comp ilibria, Azeotro	bonent Bubble pe, Lic	systems, e-point equ quid-liquid	Phas uilibria equilit	se e , De prium	quilibria in ew-point e n diagrams	n multi quilibria, s, Binary
Equilibrium criteria for homogeneous chemical reactions; evaluation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium constant; effect of conversion and yields for single and multiple reactions. 5 THERMODYNAMIC ANALYSIS OF PROCESSES Total Hrs 08 Concept of lost work; entropy generation; Entropy and irreversibility processes; power cycle; Coefficient of performance, Refrigerator capacity, Vapour-compression cycle, Adsorption refrigeration, Liquefaction, Rankin cycle, Reheat cycle, Regenerative cycle, Otto cycle, Diesel cycle, Dual cycle. 45 Total hours to be taught 45 1. Smith, J.M., Van Ness, H.C. and Abbot, M.M. 2001. "Chemical Engineering Thermodynamics". 6 th Edition McGraw-Hill, New Delhi. 2. Narayanan, K.V. 2002. "A Text Book of Chemical Engineering Thermodynamics". Prentice Hall India, New Delhi. Reference(s) : 1. 3. Sandler, S.I. 1989. "Chemical and Engineering Thermodynamics." John Wiley, New Delhi. 2. Bevan Ott, J. Juliana Boerio Goats., 2000."Chemical Thermodynamics" Elsevier Ltd., USA.	4	CHEMICA	AL REACTION EQ	UILIBRIA						Тс	otal Hrs	09
5THERMODYNAMIC ANALYSIS OF PROCESSESTotal Hrs08Conc⇒t of lost work; entropy generation; Entropy and irreversibility processes; pow=rcycle; Coefficient of performance, Refrigerator capacity, Vapour-compression cycle, Adsorption refrigeration. Liquefaction. Rankin cycle, Reheat cycle, Regenerative cycle, Otto cycle, Diesel cycle, Dual cycle.Liquefaction. RankinTotal Hrs08Total burs to be taught45Text burs to be taught1Smith, J.M., Van Ness, H.C. and Abbot, M.M. 2001. "Chemical Engineering Thermodynamics". Fermodynamics". 6 th Edition McGraw-Hill, New Delhi.2.Narayanan, K.V. 2002. "A Text Book of Chemical Engineering Thermodynamics". Prentice Hall India, New Delhi.Refererce(s) :1.Sandler, S.I. 1989. "Chemical and Engineering Thermodynamics." John Wiley, New Delhi.2.Bevan Ott, J. Juliana Boerio Goats., 2000."Chemical Thermodynamics" Elsevier Ltd., USA.	Equilit tempe conve	rium criteri rature and rsion and yi	a for homogeneous pressure on equilit elds for single and	s chemical rea prium constant multiple react	ctions; e ; calculat ions.	valuation of e	on of e equilibi	quilibrium (rium	consta	ant; e	effect of	
Concept of lost work; entropy generation; Entropy and irreversibility processes; power cycle; Coefficient of performance, Refrigerator capacity, Vapour-compression cycle, Adsorption refrigeration, Liquefaction, Rankin cycle, Reheat cycle, Regenerative cycle, Otto cycle, Diesel cycle, Dual cycle. Total hours to be taught 45 Text book (s) : 1. 1. Smith, J.M., Van Ness, H.C. and Abbot, M.M. 2001. "Chemical Engineering Thermodynamics". 6 th Edition McGraw-Hill, New Delhi. 2. Narayanan, K.V. 2002. "A Text Book of Chemical Engineering Thermodynamics". Prentice Hall India, New Delhi. Refererce(s) : 1. 1. Sandler, S.I. 1989. "Chemical and Engineering Thermodynamics." John Wiley, New Delhi. 2. Bevan Ott, J. Juliana Boerio Goats., 2000."Chemical Thermodynamics" Elsevier Ltd., USA.	5	THERMO	DYNAMIC ANALY	SIS OF PROC	ESSES					То	otal Hrs	08
Total hours to be taught 45 Text book (s) : 1. 1. Smith, J.M., Van Ness, H.C. and Abbot, M.M. 2001. "Chemical Engineering Thermodynamics". 6 th Edition McGraw-Hill, New Delhi. 2. Narayanan, K.V. 2002. "A Text Book of Chemical Engineering Thermodynamics". Prentice Hall India, New Delhi. Reference(s) : 1. 1. Sandler, S.I. 1989. "Chemical and Engineering Thermodynamics." John Wiley, New Delhi. 2. Bevan Ott, J. Juliana Boerio Goats., 2000."Chemical Thermodynamics" Elsevier Ltd., USA.	Conce perfor cycle,	ept of lost v mance, Ref Reheat cyc	work; entropy gen frigerator capacity, le, Regenerative c	eration; Entrop Vapour-comp ycle, Otto cycl	oy and i pression e, Diesel	irrevers cycle, l cycle,	sibility Adsorp Dual c	processes; otion refrige cycle.	powe eratio	er cy n, Lio	cle; Coef quefaction	icient of , Rankin
Text book (s) : 1. Smith, J.M., Van Ness, H.C. and Abbot, M.M. 2001. "Chemical Engineering Thermodynamics". 6 th Edition McGraw-Hill, New Delhi. 2. Narayanan, K.V. 2002. "A Text Book of Chemical Engineering Thermodynamics". Prentice Hall India, New Delhi. Reference(s) : 1. 1. Sandler, S.I. 1989. "Chemical and Engineering Thermodynamics." John Wiley, New Delhi. 2. Bevan Ott, J. Juliana Boerio Goats., 2000."Chemical Thermodynamics" Elsevier Ltd., USA.	Total I	nours to be	taught									45
1. Smith, J.M., Van Ness, H.C. and Abbot, M.M. 2001. "Chemical Engineering Thermodynamics". 6 th Edition McGraw-Hill, New Delhi. 2. Narayanan, K.V. 2002. "A Text Book of Chemical Engineering Thermodynamics". Prentice Hall India, New Delhi. Reference(s) : 1. 1. Sandler, S.I. 1989. "Chemical and Engineering Thermodynamics." John Wiley, New Delhi. 2. Bevan Ott, J. Juliana Boerio Goats., 2000."Chemical Thermodynamics" Elsevier Ltd., USA.	Text b	ook (s) :										
2. Narayanan, K.V. 2002. "A Text Book of Chemical Engineering Thermodynamics". Prentice Hall India, New Delhi. Reference(s) : 1. 1. Sandler, S.I. 1989. "Chemical and Engineering Thermodynamics." John Wiley, New Delhi. 2. Bevan Ott, J. Juliana Boerio Goats., 2000."Chemical Thermodynamics" Elsevier Ltd., USA.	1.	 Smith, J.M., Van Ness, H.C. and Abbot, M.M. 2001. "Chemical Engineering Thermodynamics". 6th Edition McGraw-Hill, New Delhi. 										
Reference(s) : 1. Sandler, S.I. 1989. "Chemical and Engineering Thermodynamics." John Wiley, New Delhi. 2. Bevan Ott, J. Juliana Boerio Goats., 2000."Chemical Thermodynamics" Elsevier Ltd., USA.	2.	 Narayanan, K.V. 2002. "A Text Book of Chemical Engineering Thermodynamics". Prentice Hall India, New Delhi. 										
1.Sandler, S.I. 1989. "Chemical and Engineering Thermodynamics." John Wiley, New Delhi.2.Bevan Ott, J. Juliana Boerio Goats., 2000."Chemical Thermodynamics" Elsevier Ltd., USA.	Refere	ence(s) :										
2. Bevan Ott, J. Juliana Boerio Goats., 2000."Chemical Thermodynamics" Elsevier Ltd., USA.	1.	Sandler, S	5.I. 1989. "Chemica	al and Enginee	ring The	rmodyr	namics	." John Wil	ey, Ne	ew D	elhi.	
	2.	Bevan Ott	, J. Juliana Boerio	Goats., 2000."	Chemica	al Therr	modyn	amics" Else	evier L	_td.,	USA.	

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
De	epart	tment	Biotechnology	Programm	ne Cod	e & Na	ame	23: B.	Tech. Bi	iotechr	nology
				Se	meste	r IV					
6		Codo	Course No	mo.	Ho	ours / V	Veek	Credit	Ma	aximun	n marks
	uise	Coue	Course Na	IIIE	L	Т	Р	С	CA	ES	Total
07	7230	407P	MOLECULAR BIOL LABORATORY	OGY	0	0	3	2	50	50	100
Ot	ojecti	ve (s)	At the end of this co Biology and its appl in the area of molec	urse, the stud ication. This ular biology.	dents v will be	vould h streng	have lea of for s	arnt basic tec tudents to ur	hniques ndertake	used i e resea	in Molecular rch projects
	Any Five experiments										
	1	Agarose	e gel electrophoresis					Total Hrs			3
	2	Extracti	on of plasmid DNA					Total Hrs			3
	3	Extracti	on of genomic DNA fr	om bacteria				Total Hrs			3
	4	Extracti	on of genomic DNA fr	om plants				Total Hrs			3
	5	Extracti	on of genomic DNA fr	om animal ce	ells			Total Hrs			3
	6	Extracti	on of total RNA					Total Hrs			3
	7	Gel elut	ion					Total Hrs			3
	8	Phage t	itration					Total Hrs			3
Tota	Total hours to be taught 24										
Refe	Reference(s) :										
1.	Sar Spr	nbrook, 、 ing Harb	J. and Russsel, D.W or Laboratory Press, (. 2001. "Mole Cold Spring h	ecular arbor,	cloning New Y	g – Ala ′ork, US	aboratory ma SA.	anual", ⁻	Third e	dition, Cold
2.	Ansubel, F.M., Brent, R., Kingston, R.E. and Moore, D.D. 1988. "Current Protocols in Molecular Biology".										

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
De	partm	ent	Biotechnology	Progra	amme Cod	le & Na	ame	23: B	.Tech., E	Biotech	inology
				Sen	nester IV						
Cou		odo	Course Name		Hours	s/Wee	ek	Credit	Ma	ximum	marks
	iise C	oue	Course marine		L	Т	Р	С	CA	ES	Total
072	23040	8P	CHEMICAL REACTION ENGINEERING LABORATORY		0	0	3	2	50	50	100
Obj	Objective (s) At the end of the course, the student would have learnt about Performance characteristic of reactor procedures and how to perform them. This will be very useful for specialized project work that the students undertake in the subsequent semesters.										
			А	ny Seve	n Experim	ents					
1		Perforn	nance characteristic of se	mi batch	reactor-I		-	Total Hrs			4
2		Perforn	nance characteristic of se	mi batch	reactor-II			Total Hrs			4
3		Kinetic	study in batch Reactor -I					Total Hrs			4
4		Kinetic	study in batch Reactor –I	I				Total Hrs			4
5		RTD st	udies in mixed flow reacto	or				Total Hrs			4
6		RTD st	udies in plug flow reactor					Total Hrs			4
7		Perforn	nance characteristic of mi	xed flow	reactor			Total Hrs			4
8	8 Performance characteristic of plug flow reactor Total Hrs 4										
Total h	nours t	to be ta	ught							3	32
Refere	ence (s	s) :									
1.	Paul	ine M.D	oran, 2003. "Bioprocess l	Engineer	ring Princip	oles". A	Acader	nic Press,	New Yo	rk, US	A.

	Κ.	S.Rangasamy College of Te	Autonom	omous Regulation R						
Departm	ent	Biotechnology	Pr	ogramme	e Code &	Name	e 23:	B.Tech.	Biotec	hnology
			S	emester	IV					
Course C	odo	Course Nome		Ηοι	urs / Wee	ek	Credit	Ma	iximum	marks
Course C	oue	Course Marine		L	Т	Р	С	CA	ES	Total
0723040)9P	CHEMICAL ENGINEERING LABORATORY	i	0	0	3	2	50	50	100
Objective (s) At the end of the course, the student would have procedures and how to perform them. This will that the students undertake in the subsequent se						earnt a be ver nesters	about filtrat y useful fo s.	ion, Dist r special	illation, lized p	Extraction roject work
		An	y Se	ven Expe	eriments					
1	Flow	measurement using Venturin	neter				Total Hrs 4			
2	Flow	measurement using Orifice m	neter				Total Hrs	S		4
3	Press	sure drop in pipes					Total Hrs	S		4
4	Studi	es on packed columns					Total Hrs	S		4
5	Studi	es on Fluidization					Total Hrs	S		4
6	Studi	es on Filtration					Total Hrs	S		4
7	Studi	es on Roll crusher					Total Hrs	S		4
8	Studi	es on steam distillation					Total Hrs	S		4
9	Distil	lation in packed column					Total Hrs	S		4
10	10 Liquid-liquid equilibria in extraction						Total Hrs	S		4
11	Studi	es on Jaw crusher					Total Hrs	S		4
12	12 Studies on Simple distillation					Total Hrs 4				4
Total hours	otal hours to be taught							48		

	K.S.Ran	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Depa	artment	Biot	echnology	Prog	ramme	Code a	& Name	23:	B.T	ech. Biote	echnology
			S	Semester	٠IV						
Cours	o Codo	Col	urso Nomo	Hou	ırs / We	ek	Credit		Ма	aximum N	/larks
Cours		00		L	Т	Р	С	C	A	ES	Total
0723	80410P	COMPREH	Biotechnology Programme Code & Name 23: B.Tech. Biotechnology Semester IV Course Name Hours / Week Credit Maximum Marks L T P C CA ES Total DMPREHENSION III 0 0 3 0 100 00 100 To improve the skill level of Engineering, Technology and Applied Science students. To improve the employability of students in placement interviews. Dipect 200 Keywords/important words or terms (5 units x 40 words) are to be prepared idents. Ceywords are to be printed in double column (2 x 50 words) and in 2 pages and is to be r each student for all the subjects. o handled the subject in the previous semester will handle their discussion period (3 nester) as given below. question the students using 'W' and 'H' type questions linking the keywords. way the students have to prepare themselves for all the keywords. It carry 100 questions and two hours duration. The questions will be of objective type: 'W' questions by attaching with keywords. st-1 and Test-II, sessional marks (maximum 50 marks) will be awarded. *e held for all the units and all the subjects. The passing norms will be similar as other fW' and the subjects. The passing norms will be similar as other								
Obje	ctive(s)	i. To improv ii. To improv	e the skill level of Er	ngineerin of studer	ig, Tech hts in pla	nology aceme	/ and Applient interview	ed So vs.	cien	ce studer	its.
1	For each using the	n subject 200 e students.	Keywords/important	words o	r terms	(5 unit	s x 40 word	ds) ai	re to	be prepa	ared
2	These 2 handled	00 Keywords over each stu	are to be printed in o ident for all the subje	double c ects.	olumn (2	2 x 50	words) and	l in 2	pag	ges and is	to be
3	The staf	f who handled / semester) as	l the subject in the p s given below.	revious	semeste	er will h	nandle their	r disc	cuss	ion period	3 (3
4	The staf	f will question	the students using "	W' and '	H' type	questi	ons linking	the k	eyw	ords.	
5	In a simi	lar way the st	udents have to prepa	are them	selves	for all t	the keywor	ds.			
6	Each tes and 'H' t	st will carry 10 ype questions	0 questions and two by attaching with ke	hours d eywords	uration.	The q	uestions w	ill be	of c	bjective t	ype: 'W'
7	Based o	n Test-I and T	est-II, sessional ma	rks (max	s duration. The questions will be of objective type: 'W' ds. naximum 50 marks) will be awarded.						
8	Test-III v subjects	vill be held for (i.e. minimum	all the units and all 50/100 marks)	the subj	ects. Th	ne pass	sing norms	rds. /ill be of objective type: 'W' awarded. s will be similar as other			
		•	Schedule for Condu	uct of Co	mprehe	nsion	Subject				
Total N	o of weeks	s planned:10	Total No of sub	jects: 5 t	07	-	Total durati	on pe	er w	eek: 3 pe	riods
Wee	ek No	Duration: 1 ¹ / ₂ (No of units)	period Subject No		Durat (No c	ion: 1½ of units	∕₂ period Su ∋)	ibject	t No		
V	V1	x	S1(3)					S2(3))		
V	V2		S3(3)				:	S4(3))		
V	V3		S5(3)					S6(3))		
V	V4		Test-	I (Portior	n: 3 unit	s in ea	ch subject)				
V	V5		S1(2)					S2(2))		
V	V6		S3(2)					S4(2))		
V	V7		S5(2)				:	S6(2))		
V	V8		Test-I	I (Portio	n: 2 unit	in ea	ach subject))			
V	V9				Discuss	sion					
W	/10		Test-I	II (All 5 i	units an	d all th	e subjects)				

K.S.Ra	ngasamy College	of Technology -	Autono	mous F	Regula	ation		R 20	07		
Department	Biotechnology	Programme C	Code & N	lame		23: B.	Tech. Bi	iotechnol	ogy		
		Sei	nester l'	V							
			Hou	rs / We	ek	Credit	М	aximum I	Marks		
Course Code	Course	Name	L	Т	Р	С	CA	ES	Total		
07230411P			0	0	2	0	100	00	100		
	i. To improve the	skill level of Engin	eerina. ⁻	Techno	loav ai	nd Applied	Science	e students	S.		
Objective(s)	ii. To improve the	employability of s	tudents	in place	ement	interviews			-		
Skills sets to	a. Aptitude skills										
be improved	 Arithmetic 	c ability									
	Verbal Re	Verbal Reasoning Non verbal Reasoning									
	Non verb	Non verbal Reasoning									
	Clanguar										
	 OOPS co 	ncepts and C++ (I	BT. EEE	ECE.	CSE.IT	Г)					
	Data Stru	ctures (BT, EEE,E	CE,CSI	Ξ,IT)	,	,					
	c. Written Commu	inication Skills									
	Compreh	ension									
	Grammar										
	 Essay Will Technica 	Report Writing									
	 Technica Technica 	naper Writing									
	d. Oral Communi	cation Skills									
	News Re	ading									
	 Informing 	a News item									
	Self intro	duction									
	2 minutes	talk – Informed									
	2 minutes 2 minutes	s talk - Extempore									
	e. rechnical Pape	a a paper on rece	nt tonics								
	f. Group Interaction	n	ni topica	,							
	Debate										
	Group Dis	scussion – Informe	ed Topic								
	Group Di	scussion – Topic c	on the sp	oot							
	g. Lechnical Inter	view Skills									
	Basic IVIP Broad Kn	C knowledge	anch								
	 Indepth k 	nowledge on spec	ific subi	ects of	interes	st					
	h. HR Interview S	kills	,								
	 Adoptabil 	ity									
	Creativity										
	Flexibility										
	Acnieven Continuo	ient orientation									
	 Hardwork 	ing nature									
	Decisiver	less									
	 Self deve 	lopment									
	Question	ng									
Focus	The focus of CCE in another two set) is to develop the mesters (CCD IV a	se in thre and V).	ee sem	esters	(CCD-I, II	and III)	and reinfo	orce them		
Execution	Total No.	of weeks : 12		-	-						
	3 Hrs/wee	ek and 2 credits			-						
	Only Con	tinuous Assessme	ent and I	No End	Seme	ster exami	nation.				
	Evaluatio	n based on writter	test, or	al test a	and teo	cnnical pap	per prese	entation.	ion hour		
	Every 20 and oral t	students should b	e engag	eu by a	I STATT I	member di	uning cor	nmunical	non nour		
	 Every 30 	students should b	e monito	ored by	a staff	f member t	o condu	ct written	test.		

Schedule	Week	Activity
	1	Training
	2	Training
	3	Evaluation I - Written
	4	Evaluation I -
	5	Training
	6	Evaluation II - Written
	7	Evaluation II - Oral
	8	Training
	9	Evaluation III - Written
	10 - 12	Evaluation III - Oral
Evaluation	Evaluation I	60 marks(average of 3 tests)
	Evaluation II	20 marks
	Evaluation III	20 marks
	Total	100 marks

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Dep	artment	Biotechnology	Pro	ogramm Nar	e Code ne	e &	23 :B.T	ech. Bi	otechno	ology
			Se	mester	V					
Cour	aa Cada	Course Name		Ho	ours / V	/eek	Credit	Ma	aximum	Marks
Cour	se Code	Course Name		L	Т	Р	С	CA	ES	Total
072	30501S	PRINCIPLES OF MANAGEM	IENT	3	0	0	3	50	50	100
Obje	ective(s)	Knowledge on the principles organizations. After studying the managerial functions like will also gain some basic know	of mar this cou plann wledge	nageme urse, st ing, org in inter	ent is e udents ganizin mation	ssentia will be g, staffi <u>al aspe</u>	I for all kinds able to have ng, leading a ct of manage	of peo a clear and con ment.	ple in a unders itrolling.	II kinds of tanding of Students
1	HISTOR	ICAL DEVELOPMENT				Т	otal Hrs		9	
Defin	ition of Ma	anagement – Science or Art – tribution of Taylor and Fayol –	- Manag	gement	and A	dministi ment –	ation – Deve	elopmer siness (it of Ma Droanis	nagement
2	PLANNI	NG	1 unotic		lanage	T	otal Hrs		9 9	
Natu Mana	re & Purpo agement b	ose – Types of Plans – Steps i y Objectives – Strategies, Poli	nvolved cies & F	l in Plar Plannin	nning – g Prem	Object	ives – Setting Forecasting -	g Objec - Decisi	tives – on mak	process of ing.
3	ORGAN	SING				Т	otal Hrs		9	-
Depa Cent Effec	rtmentation ralization tiveness.	on by difference strategies and Delegation of Authority –	 Line Staffing 	and S g – Sel	Staff a ection	uthority proces	v – Benefits s – Techniqu	and I ues – H	imitatio RD – N	ns – De- Ianagerial
4	DIRECT	NG				Т	otal Hrs		9	
Scop Theo Barri	e – Huma ries – Mo ers and Br	ın Factors – Leadership – Typ otivational Techniques – Job eakdown – Effective Commun	Des of L Enrich ication	Leaders Iment - – Electi	hip – I - Com ronic m	Motivati munica iedia in	on – Hierarc tion – proce Communicat	hy of ne ess of (tion.	eeds – Commu	Motivation nication –
5	CONTRO	DLLING				Т	otal Hrs		9	
Syste Inforr and I Envir	em and pr mation Teo Managemo onment –	ocess of Controlling – Require chnology in Controlling – Use o ent – Control of Overall Perfor Globalization and Liberalizatio	ements of comp rmance on – Inte	for effe outers in – Diree ernation	ective of hand of and al Mar	control ing the prevent ageme	 the Budget information - ive Control - nt and Globa 	t as Cor - Produ - Repor I theory	ntrol Te ctivity – ting – T of Man	chnique – Problems he Global agement.
Total	hours to b	be taught							45	
Text	book (s):									
1.	Harold K	ooritz & Heinz Weihrich, "Esse	entials o	of Mana	gemer	it", Tata	McGraw-Hil	l, 1998.		
2.	Joseph L	. Massie, "Essentials of Manag	gement"	', Prenti	ce Hal	l of Indi	a, (Pearson)	Fourth	Edition,	2003.
Refe	rence(s):									
1.	Tripathy	PC And Reddy PN, "Principles	s of Mar	nageme	ent", Ta	ta McG	raw Hill, 199	9.	<u> </u>	
2.	Decenzo India, 19	David, Robbin Stephen A, " 96.	Person	nel and	d Hum	an Rea	sons Manag	ement"	, Prenti	ce Hall of
3.	JAF Stor	ner, Freeman R. E and Daniel	R "Gilb	ert Mar	nagem	ent", Pe	arson Educa	tion, Six	kth Editi	on, 2004.
4.	Fraidoon	Mazda, "Engineering Manage	ement",	Addiso	n Wesl	ey, 200	0.			
5.	Prasad L.M, "Principles of Management", Sultan Chand & Sons Ltd, 2003.									

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Depa	artment	Biotechnology	Program	me Coo	de & N	ame	23:B.Te	ch. Biote	chnology	
		·	Semest	er V						
Cours	se Code	Course Name	Hours	s / Wee	k	Credit	Ma	kimum M	arks	
Cours	se coue	Course Marile	L	Т	Р	С	CA	ES	Total	
0723	30502C	GENETIC ENGINEERING	3	0	0	3	50	50	100	
Obje	ective(s)	To develop skills of the s requisite for electives like g its application. This will be Modern Biology.	tudents in th enomics & pr very useful f	te area oteomi or the s	i of ge cs, vai studen	enetic Eng rious aspe t to under	gineering. cts of gene take resea	This will tic engin ch /proje	be a pre- eering and ect work in	
1 E	BASICS OF	RECOMBINANT DNA TEC	HNOLOGY		То	tal Hrs		08		
Role modify	Role of genes within cells, genetic elements that control gene expression, Restrictions enzymes, DNA nodifying enzymes, restriction enzyme mapping safety guidelines of recombinant DNA research.									
2 C	CREATION	OF RECOMBINANT MOLE	CULES		То	tal Hrs		10		
Restr	riction map	ping, design of linkers and a	adaptors. Ch	aracter	istics (Mam	of plasmid	and phage	e vectors	, cosmids,	
3 C		CTION OF LIBRARIES	5. III3601, TE	astanc	То	tal Hrs		11		
Const	ruction of	genomic and c DNA librarie	s including e	xpress	ion lib	raries in p	hage and	plasmid	vectors; -	
phage proteir	e, -ZAP, ns.	T7-based plasmid expression	on vectors, b	aculovi	ral exp	pression a	nd purificat	ion of re	combinant	
4 T	FECHNIQU	ES IN GENETIC ENGINEER	RING		То	tal Hrs		10		
PCR-N RAPD	Mechanism),RFLP site	n-Types-Inverse PCR, Nese directed mutagenesis, method Microarray, t	ted PCR, F nods of nucle	RACE ic acid	PCR, seque	Taqman ncing- Sai	assay, M ngers meth	lolecular od, Maxa	beacons, am Gilbert,	
5 A	APPLICATI	ONS OF RECOMBINANT D	NA	NA IIIY	To ⁻	tal Hrs		06		
Т	FECHNOLO	DGY								
Clonin techno	ng in plant: ology, term	s, Ti plasmid, Chromosome inator technology, and trans-	engineering	in plar s. Knoc	its, En kout tr	igineered i ansgenic r	novel traits mice.	in plants	s by RNAi	
Tota	I Hours Ta	lught	<u>.</u>	,				45		
Text b	book (s) :						•			
1. C	Old, P.W. a Malden, US	and Primrose S.B. (2001). A.	Principles of	gene	manip	ulation. Bla	ackwell Sc	ience Pu	blications,	
2. C	Glick, B.R. ecombinan	., and Pasternak, J.F (19 It DNA, ASM Press, Washing	98). Molecu gton, USA.	ılar Bi	otechn	ology. Pr	inciples a	nd appli	cations in	
3. E	Benjamin L	ewin (2000). Gene IX, Oxfor	d University F	Press. N	lew De	elhi.				
Refere	ence(s) :									
1. V	Vinnacker, Book Ageng	E.L. (1987). From Genes t cv. New Delhi.	o Clones, Int	troducti	on to	Gene Tec	hnology, F	anima E	ducational	
2. A	Ansubel, F. Greene Put	M., Brent, R., Kingston, R.E blishing Associates, New Yor	., and Moore k.	, D.D (1988).	Current P	Protocols In	Molecula	ar Biology.	

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
D	epartment	Biotechnology	P	rogramme	e Cod	e & Nam	ne	2	23: B.Te	ch. Bio	technology
				Se	emeste	ər V					
0	ourso Codo	Course Nam	0	Ηοι	ırs/We	ek	С	redit		Maxim	um Marks
		Course Main	e	L	Т	Р		С	CA	ES	Total
0	7230503C	BIOINFORMAT	CS	3	1	0		4	50	50	100
С	bjective(s)	At the end of the using various so the subject.	e cours oft war	se, the st es. Stude	udent ents ge	s would et knowle	have l edge ii	earnt ab n algorit	oout Bioi hms and	informa d data s	tics and its tools structure through
1	INTRODUCT	ION TO BIOINFO	RMAT	ICS		T	otal Hr	rs			08
Defii sear Data	nition –scope (ch engines-sea bases.	of Bioinformatics- arch algorithms-In	use o troduc	f comput ction to D	ers ir ataba	n predict se –Cha	tion of aracter	structu ristics ar	re of D nd cateo	NA, pr gories (otein and RNA- of Bioinformatics
2	MANAGING I	BIOLOGICAL DAT	FABAS	SE		T	otal Hr	rs			10
Data sequ CAT	base in Molec iencing-Genba H.	ular Biology-Pub nk-Swissprot. De	med-p rived (orimary – database	derive s-Pfar	ed datab n-BLOC	ase-se KS. S	equencir tructura	ng datab I datab	bases-E bases-F	DNA and protein DB, SCOP and
3	PATTERN M	ATCHING				T	otal Hr	ſS			08
Pair prog	wise sequence ramming: Need	e alignment –Loca dleman Wunch & :	l Vs g Smith	lobal alig watermar	nmen n meth	t-dot ma nod – BL	atrix ar _AST-	nalysis- FASTA-	Substitu Multiple	ition ma	atrices- Dynamic ence alignment.
4	MACHINE LE	ARNING AND PH	IYLOC	GENY		Т	otal Hr	s			13
Neu pred meth	ral networks-st liction –gene p nods of evaluat	tatistical methods rediction tools-Ph ing phylogenies.	s-hidde ylogei	en Marko netic ana	ov mo lysis-l	del- Ge Distance	ene pr matri	ediction x metho	algorit ods, cha	hm: m iracter	ethods of gene based methods,
5	APPLICATIO	N OF BIOINFORM	ΛΑΤΙΟ	S		T	otal Hr	rs			06
Meth path Mole	nods of RNA s ways-microarra ecular Docking.	structure prediction ay design and Da	on-Pro ita ana	tein struc alysis-Dru	ture ug des	predictio signing -	n-2D –Quan	and 3D	structu structure	re preo e activi	diction-metabolic ty relationship –
Tota	I hours to be ta	ught									45
Text	book (s) :										
1.	S.C.Rastogi, 2003.	'Bioinformatics –C	Concep	ots, skills	& app	lications	' – CB	S publis	shers &	Distribu	itors, New Delhi,
2.	B.Bergeron, E	Bioinformatics con	nputing	g, Prentic	e Hall	of India	, New	Delhi, 2	002.		
Refe	erence(s):										
1.	C.Gibas and Pvt,Ltd, New	P.Jambeck, 'Dev york,USA,1999.	elopin	g Bioinfo	ormatio	cs Skills	"O'Re	eilly Shr	off Pub	lishers	and Distributors
2.	2. Dan Gus field,'Algorithms and string, trees and sequences', Cambridge University Press, New York, USA, 1997.										
3.	Attwood, T.K 2001.	and parry Smith,	D.J. '	Introducti	on to	Bioinfor	matics	s', Pears	on Edu	cation /	Asia, New Delhi,

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Depa	artment	Biotechnology	Programme	Code &	Name		23: B.	Tech. B	iotechnolo	ogy
			S	emester	V					
0		0	Marra	Hou	rs / We	ek	Credit	M	laximum I	Marks
Cours	se Code	Course	Name	L	Т	Р	С	CA	ES	Total
0723	0504C	BIOPROCESS E	NGINEERING	3	1	0	4	50	50	100
Obje	ctive(s)	At the end of the Disruption Metho understand Biose	e course, the stude ods and Purificate paration proces	udents v ition pro s in deta	vould ha cesses. il.	ave lea This	arnt about will serve	fermen as an	tation pro effective	cess, Cell course to
1	INTROD	UCTION				To	otal Hrs		09	
Historio Biotech Problei fermen	Historical development of Bioprocess technology, An overview of traditional and modern applications ofBiotechnological processes.Biotechnological processes.Problems and requirements of bioproduct purification, characterization of biomolecules, characterization ofermentation broth, morphology of cells, rheological behaviour, etc.2FERMENTATION PROCESSESTotal Hrs									
2	FERMEN	ITATION PROCES	SSES			То	tal Hrs		09	
Techni constru comme	ques of e uction of ercial med	nzyme immobiliza fermenters and a for industrial ferr	ation, General re ancillaries; me mentation; Sterili	equireme dium re zation of	ents of quiremo air, liqu	ferme ents f uid me	ntation pro or fermen dia.	tation	; basic d processes	esign and s; various
3	PROCES	S DESIGN AND (CTORS	OPERATION OF			То	tal Hrs		09	
Phases subme continu formati	s of Cell g rged ferm Jous cultiv ion; biopro	rowth in batch cu entation processe vation; recombina cess design consi	ltures; Mass trai es, Operational nt cell culture derations for plai	nsfer in I modes process nt and ar	heterog of biore es; bio nimal ce	eneou eactors reacto ell cultu	s biochem s: batch, c r strategie ure.	ical syst continuc s for r	tems; O ₂ bus, fed-t naximizin	transfer in batch, and g product
4	PRIMAR	Y SEPARATION	·			То	tal Hrs		09	
Deade filtratio	nd filtration n, cell disr is and incl	n, filter media, type uption methods fo usion and solubilis	e of filters used, s r intracellular pro ation of body for	sedimen ducts, p mation.	tation a hysical	nd cen -mech	trifugation, anical met	centrifu nods, ch	iges, cros nemical m	ss flow ethods,
5	FINAL P	JRIFICATION				Tot	al Hrs		09	
Precipi Electro Electro	itation, ad ophoretic s o dialysis, d	sorption, Principle separation procest crystallization, lyop	es of chromatog ses; dialysis, re hilisation and dr	raphic s verse os ying.	eparati smosis,	on, va Ultraf	irious chro iltration, ci	matogra oss flo	aphic se w ultrafilt	parations, ration and
Total h	ours to be	taught							45	
Text bo	ook (s) :									
1.	1. Bailey, J. and Ollis, David F. "Fundamentals of Biochemical engineering", Tata McGraw Hill, New Delhi, 1986.									
2.	Belter, P	A. and Cussler, E.	Bioseparations	, Wiley –	Intersc	ience l	Publication	, Canad	la 1988.	
Refere	nce(s) :									
1.	Stanbury Ltd, 1997	, F.P., Whitaker, <i>F</i> ′.	A. and Hall, S.G	"Principl	es of fe	erment	ation Tech	nology",	Aditya B	ooks, Pvt,
2.	Shuler,M New Dell	.L. and Kargi, F. ni, 2003.	" <i>Bioprocess</i> En	gineerin	g Basic	: Conc	epts", Prei	ntice Ha	all of India	a, Pvt Ltd,

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Depa	artment	Biotechnology	Programme (Code &	Name		23 : B	.Tech. I	Biotechno	ology
			Se	mester	V					
0		0	Nama	Hou	irs / We	ek	Credit	Ν	/laximum	Marks
Cours	se Code	Course	Name	L	Т	Р	С	CA	ES	Total
0723	30505C	ENZYME ENGINI TECHNOLOGY	EERING AND	3	0	0	3	50	50	100
Obje	ctive(s)	At the end of the Kinetics of enzym & Biosensors. Th the semesters.	course the stude e action and tech is knowledge gai	nt would iniques ined thr	d have like enz ough th	learnt zyme i nis cou	about enz mmobilizat urse will be	ymes, t tion, put e helpfu	heir mod rification Il for proj	e of action, of enzymes ject work in
1	INTROD	UCTION TO ENZY	MES			To	tal Hrs		09	
Class conce princip	Classification and Nomenclature of enzymes. General properties of enzymes. Mechanisms of enzyme action; concept of active site and energetics of enzyme substrate complex formation; specify of enzyme action; principles of catalysis – collision theory, transition state theory; role of entropy in catalysis.									
2	KINETIC	S OF ENZYME AC	TION			То	tal Hrs		09	
regula deacti	anisms an tion of ei vation kine	e substrate reaction d kinetics; turnove nzymes, Monod (etics.	ns; estimation of er number; types Changeux Wyma	s of inf mod	s – Mer nibition el, pH	and	arameters, idels – su temperatu	ibstrate ire, effe	, produc ect on e	reactions – t. Allosteric enzymes &
3	ENZYME	IMMOBILIZATION	1			То	tal Hrs		09	
Physic cross- factors	cal and ch linking, co s on enzyn	emical technique f valent binding etc. ne immobilization.	or enzyme immo , - examples, ac	bilizatio Ivantage	n – ad es and	sorptio disad	on, matrix vantages.	entrapr Effect	nent, end of biotic	capsulation, and abiotic
4	PURIFIC ENZYME	ATION AND CHAR	ACTERIZATION	OF		То	tal Hrs		09	
Production character protea	ction and cterization ise, lysozy	purification of crude of enzymes; dev me, ribonuclease,	e enzyme extract elopment of enz polymerase, etc.,	s from zymatic	plants, assays	anima s. Re	Is and mic combinant	crobial s enzym	sources; ies such	methods of as serine
5	ENZYME	APPLICATIONS	<u> </u>			То	tal Hrs		09	
Applic indust techno	ation of e ry, healtho blogy and l	nzymes in analys are and environm Bioinformatics.	is; design of en ent, Biotechnolog	zyme e gical ap	electrod plicatio	es an ns of	d their ap enzymes.	plicatio Role o	n as bio f enzym	sensors in es in rDNA
	Total H	Hours to be taught							45	
Text B	Book (s) :									
1.	1. Palmer, T. "Enzymes: Biochemistry, Biotechnology and Clinical chemistry". Affiliated East – West Press Pvt. Ltd., New Delhi. 2004.									
2.	Voet, D.	and Voet, G. "Biocl	nemistry", Third E	dition.	John W	iley ar	nd Sons, Si	ingapor	e, 2001.	
Refere	ence (s) :									
1.	James. I Hill, New	E. Bailey and Davi Delhi. 1986.	d F. Ollis, "Bioch	emical	Engine	ering	Fundamer	ntals", 2	end Edition	n. McGraw-
2.	Nicholas publication	C.Price and Levon, New Delhi. 200	wis Stevens. "F 1.	undame	entals o	of En	zymology"	, Oxfor	d Unive	rsity Press

		K.\$	S.Rangasamy College of Techn	ology - Αι	Itonon	nous Re	egulation			R 2007
De	partmer	nt	Biotechnology	Programm	ne Cod	e & Nar	ne 23:	B.Tech.	Biotec	hnology
			S	emester V				B.Tech. Biotech Maximum r CA ES 50 50 miques used in Total Hrs Total Hrs		
Cou		do		Hou	rs / We	ek	Credit	in F 23: B.Tech. Biotechno 23: B.Tech. Biotechno it Maximum ma CA ES 50 50 50 50 50 50 techniques used in C Total Hrs Z7	marks	
Cou	ise Coo	ue	Course Name	L	Т	Р	С	CA	ES	Total
072	2305071	P L	GENETIC ENGINEERING LABORATORY	0	0	3	2	50	50	100
Obje	ective (s	s): A	At the end of this course, the stu Engineering.	his course, the students would have learnt basic techniques used in Gene						n Genetic
			(Any	9 experime	ents)					
	1	Rest	riction enzyme digestion					Tota	al Hrs	3
	2	Ligat	tion of DNA					Tota	al Hrs	3
	3	Tran	sformation and screening for reco	ombinants				Tota	al Hrs	3
	4	Conj	ugation					Tota	al Hrs	3
	5	PCR						Tota	al Hrs	3
	6	Gel E	Elution					Tota	al Hrs	3
	7	SDS	PAGE					Tota	al Hrs	3
	8	Wes	tern Blot					Tota	al Hrs	3
	9	Sout	hern Blotting					Tota	al Hrs	3
Tota	I hours	to be t	taught						27	
Lab	Lab Manual :									
1.	Samb Spring	rook, 、 g Harb	J. and Russsel, D.W. 2001. "Mole or Laboratory Press, Cold Spring	cular cloni harbor, Ne	ng – A ew Yorl	laborato <, USA.	ory manual	", Third e	dition,	Cold
2.	Ansubel, F.M., Brent, R., Kingston, R.E. and Moore, D.D. 1988. "Current Protocols in Molecular Biology".									
	Geone		ication Associates, New YOR, US	л.						

	k	(.S.Rangasamy College of Techno	ology - Au	tonom	ious Re	gulation			R 2007
Departmer	nt	Biotechnology	Programm	e Code	e & Nar	ne 23: I	B.Tech. I	Biotec	hnology
		Se	emester V						
Course Co	40	Course Name	Hour	rs / We	ek	Credit	n I I I I I I I I I I I I I I I I I I I	marks	
Course Coo	Je	Course Name	L	Т	Р	С	CA	ES	Total
07230508	P	BIOPROCESS ENGINEERING LABORATORY	0	0	3	2	50	50	100
Objective (s	s):	Educate the theoretical concepts of	f Biosepar	ation e	xperime	entally to th	e studen	ts	
		(Any 7	′ experime	nts)					
1	Me	dia Optimization – Plackett Burman	design				Tota	l Hrs	3
2	Me	dia Optimization – Response surfac	e methodo	ology			Tota	l Hrs	3
3	Pre	paration of bioreactor, utilities of bio	preactor op	peration	n		Tota	l Hrs	3
4	Th	ermal Death Kinetics					Tota	l Hrs	3
5	Ba	tch Sterilization					Tota	l Hrs	3
6	Ba ana	tch cultivation, Estimation kla – dyna alysis – carbon balancing, gas balar	amic gassi Icing	ng met	:hod, ex	thaust gas	Tota	l Hrs	3
7	Fe ba	d Batch cultivation, exhaust gas ana ancing	ilysis – car	bon ba	alancing	j, gas	Tota	l Hrs	3
8	To ga	tal cell retention Cultivation, exhaus s balancing	st gas ana	lysis –	carbon	balancing,	Tota	l Hrs	3
Total hours	to be	e taught						24	
Lab Manual	ab Manual :								
1. Paulin	e M	Doran, 2003. "Bioprocess Engineer	ing Princip	oles". A	cademi	c Press, Ne	ew York,	USA.	

K.S.Ranga	asamy College of Techi	nology, Tiruch	nengode	- Aut	onomo	us R	egul	ation		R 2007
Department	Biotechnology	Programme	e Code &	Name	Э	23	B:B.T	ech. Bio	techno	ology
		Seme	ester V							
Course Code	Course Non		Hou	rs / We	eek	Cre	dit	Max	kimum	marks
Course Code	Course Main	le	L	Т	Р	C	;	CA	ES	Total
07230509P	ENZYME ENGINEERIN LABORATORY	IG	0	0	3	2	2	50	50	100
Objective (s)	To develop skills of the	students in the	e area of	f Enzy	/me En	ginee	ring	•		
		(Any 9 ex	periment	s)						
1	Isolation of Intra cellula	r Enzyme from	Fungi				To	tal Hrs		3
2	Isolation of Extra cellula	ar Enzyme from	n Bacteri	а			To	tal Hrs		3
3	Enzyme Assay - Protea	se					To	tal Hrs		3
4	Enzyme Kinetics - Mich	aels Mendon p	paramete	ers			To	tal Hrs		3
5	Acid phosphates activit	y – Effect of dif	fferent te	mpera	iture ai	nd	To	tal Hrs		3
6	Acid phosphates activit	y – Effect of di	ifferent s	ubstra	tes		To	tal Hrs		3
7	Enzyme immobilization	- Gel entrapme	ent by sc	dium a	alginate	÷	To	tal Hrs		3
8	Enzyme immobilization	- Cross Linkin	ıg				To	tal Hrs		3
9	Enzyme inhibition Kinet	ics					To	tal Hrs		3
10	Production of amylas	e, Invertase an	d Cellulo	ose			To	tal Hrs		3
Total hours to be	e taught									30
Lab Manual :										
1. Talwa Distril	ar, G.P. and Gupta, S.K. butors, New Delhi.	2004. A Handb	ook of P	ractica	al and li	nmur	olog	IY. CBS I	Publisł	ners &

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007											
Depa	artment	Biot	echnology	Prog	ramme	Code a	& Name	23:	B.T	ech. Biote	echnology	
			S	Semeste	r V							
Cours	o Codo	Col	urso Nomo	Hou	ırs / We	ek	Credit		Ма	aximum N	/larks	
Cours		COL	ise name	L	Т	Р	С	C	A	ES	Total	
0723	80510P	COMPREH	ENSION IV	0	0	3	0	10	0	00	100	
Obje	ctive(s)	i. To improv ii. To improv	e the skill level of Er	ngineerin of studer	ig, Tech hts in pla	nology aceme	and Applient of the applient of the applied of the application of the application of the application of the applied of the application of the applied of the application of the applied	ed So vs.	cieno	ce studer	its.	
1	For each using the	n subject 200 e students.	Keywords/important	words o	r terms	(5 unit	s x 40 word	ds) a	re to	be prepa	ared	
2	These 2 handled	00 Keywords over each stu	are to be printed in o dent for all the subje	double co ects.	olumn (2 x 50	words) and	l in 2	pag	les and is	to be	
3	The staf	f who handled / semester) as	l the subject in the p s given below.	revious	semeste	er will h	nandle their	' disc	ussi	ion period	1 (3	
4	The staf	f will question	the students using '	W' and '	H' type	questi	ons linking	the k	eyw	ords.		
5	In a simi	ilar way the st	udents have to prep	are them	selves	for all t	the keywor	ds.				
6	Each tes and 'H' t	st will carry 10 type questions	0 questions and two by attaching with ke	hours d eywords.	uration.	The q	uestions w	ill be	of o	bjective t	ype: 'W'	
7	Based o	n Test-I and T	est-II, sessional ma	rks (max	imum 5	i0 marl	<s) a<="" be="" td="" will=""><td>awaro</td><td>ded.</td><td></td><td></td></s)>	awaro	ded.			
8	Test-III v subjects	will be held for (i.e. minimum	all the units and all 50/100 marks)	the subj	ects. Th	ie pass	sing norms	will b	be of objective type: 'W' varded. ill be similar as other			
			Schedule for Condu	uct of Co	mprehe	nsion	Subject					
Total N	o of week	s planned:10	Total No of sub	jects: 5 t	o 7	-	Fotal durati	on pe	er w	eek: 3 pe	riods	
Wee	ek No	Duration: 1 ¹ / ₂ (No of units)	period Subject No		Durat (No c	ion: 1½ of units	₂ period Su)	ibject	t No			
V	V1	· · · · ·	S1(3)					S2(3))			
V	V2		S3(3)				:	S4(3))			
V	V3		S5(3)					S6(3))			
V	V4		Test-	I (Portior	n: 3 unit	s in ea	ch subject)					
V	V5		S1(2)					S2(2))			
V	V6		S3(2)					S4(2))			
V	V7		S5(2)					S6(2))			
V	V8		Test-I	I (Portio	n: 2 unit	is in ea	each subject)					
V	V9				Discuss	sion						
W	/10		Test-	III (All 5 ເ	units an	d all th	e subjects)					

K.S.Ra	ngasamy College	of Technology -	Autono	mous F	Regula	tion		R 20	07	
Department	Biotechnology	Programme C	ode & N	lame		23: B.	Tech. Bi	otechnol	ogy	
		Se	mester \	/						
			Hou	rs / We	ek	Credit	M	aximum I	Marks	
Course Code	Course	Name	L	Т	Р	С	CA	ES	Total	
07230511P			0	0	2	0	100	00	100	
	i. To improve the	skill level of Engin	eerina.	Techno	logy ar	l nd Applied	Science	students	3.	
Objective(s)	ii. To improve the	employability of s	tudents	in place	ement i	interviews				
Skills sets to	a. Aptitude skills	ptitude skills								
be improved	 Arithmetic Verbal Re 	 Arithmetic ability Verbal Reasoning 								
	 Non verball 	al Reasoning								
	b. Programming s	kills								
	C language	ge								
	OOPS co Data Struct	ncepts and C++ (I	BT, EEE	, ECE,(CSE,IT)				
	Data Stru	Clures (BI, EEE,E	CE,CSI	=,11)						
	Compreh	ension								
	Grammar									
	 Essay Wi 	iting								
	Technica	Report Writing								
	Technica	paper Writing								
	d. Oral Communic	cation Skills								
		aung a News item								
	 Self introd 	duction								
	 2 minutes 	talk – Informed								
	2 minutes	talk - Extempore								
	e. Technical Pape	er Presentation								
	Presentin	g a paper on rece	nt topics	;						
	f. Group Interaction	n								
	Debale Group Div	scussion - Inform	d Tonic							
	Group Dis	scussion – Topic c	on the sc	ot						
	g. Technical Inter	view Skills								
	Basic MP	C knowledge								
	 Broad Kn 	owledge of the bra	anch							
	Indepth k	nowledge on spec	ific subj	ects of	interes	st				
	h. HR Interview S	KIIIS								
	Adoptabli Creativity	ity								
	 Elexibility 									
	Achieven	ent orientation								
	Continuo	us learning								
	 Hardwork 	ing nature								
	Decisiver	ess								
	Self deve	iopment								
		ng								
Focus	The focus of CCD	is to develop the mesters (CCD IV a	se in thre	ee sem	esters	(CCD-I, II	and III) a	and reinfo	orce them	
Execution	Total No. of weeks : 12									
	3 Hrs/week and 2 credits									
	Only Continuous Assessment and No End Semester examination.									
	 Evaluatio 	 Evaluation based on written test, oral test and technical paper presentation. 								
	Every 20	students should b	e engag	ed by a	a staff r	member du	uring cor	nmunicat	ion hour	
	and oral t	esi studonte chould h	o monite	and by	0 0toff	mombort	o condu	ot writton	tost	
	■ Every 30	SUUGHIS SHOULD D		лей ру	a ડાંતા	nempert	o conaŭ	ci written	ເຮວເ.	

Schedule	Week	Activity
	1	Training
	2	Training
	3	Evaluation I - Written
	4	Evaluation I -
	5	Training
	6	Evaluation II - Written
	7	Evaluation II - Oral
	8	Training
	9	Evaluation III - Written
	10 - 12	Evaluation III - Oral
Evaluation	Evaluation I	60 marks(average of 3 tests)
	Evaluation II	20 marks
	Evaluation III	20 marks
	Total	100 marks

ŀ	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Departm	nent	Biotechnology	Program Na	me Coc ame	le &		23:B.T	ech. Bi	otechnol	ogy
			Semest	er VI						
Course C) o d o			Hou	Hours / Week Cred		Credit	Maximum Ma		Marks
Course C	Jode	Course Name		L	Т	Р	С	CA	ES	Total
0723060)1S	PROFESSIONAL ETHICS		3	0	0	3	50	50	100
Objectiv	/es	To create an awareness or Students.	h Ethics and	Human	Value	es and	instill Mo	oral and	d Social	Values in
1 INTF	RODU	CTION				То	tal Hrs		9	
Ethics de action – Gilligan th	Ethics defined – Engineering as a profession – Core qualities of professional practitioners – Theories of right action – Major ethical issues – Three types of inquiry – Kohlberg's stages of moral development – Carol Gilligan theory – Moral dilemmas – Moral autonomy – Value based ethics									
2 ENG	INEEF	RING AS SOCIAL EXPERIME	ENTATION			То	tal Hrs		9	
Comparis managers introduction	on wit s, con on, rule	th standard experiments – sultants and leaders – Act es of practice and profession	Relevant info countability - al obligations	ormatio – Role – The	n – L of co space	earnin des - shuttle	g from th - Code o e challeng	ne pas of ethi ger cas	t – Eng cs for e e study.	ineers as engineers;
3 ENG	INEEF	RS RESPONSIBILITY FOR	SAFETY AND	D RISK		То	tal hrs		9	
Safety an Accidents	d Risk - The	 Types of risks – Safety a three mile Island disaster ca 	and the engir ise study – T	neer – he Che	Desigr rnobyl	ning fo disast	or safety - ter case s	- Risk tudy.	Benefit a	analysis –
4 RES	PONS	IBILITIES AND RIGHTS				То	tal Hrs		9	
Collegialit Bargainin	y – Tv g – Co	vo senses of loyalty – Profes onfidentiality – Acceptance of	ssional rights bribes / gifts	and re – Occu	sponsi pation	bilities al crim	s – Conflio nes – Whi	ct of In stle Blo	terest – owing	Collective
5 GLO	BAL IS	SSUES				Tota	l Hrs		9	
Globalizat developm	tion – ent – l	Cross Cultural Issues – The Intellectual property rights (IP	e Bhopal gas R)	s trageo	dy cas	e stud	ly – Com	puter e	ethics -	Weapons
Total hou	rs to b	e taught							45	
Text book	Text book :									
1. Govindarajan M, Natarajan S, Senthil Kumar V.S, "Engineering Ethics", Prentice Hall of India (P) Ltd, New Delhi, 2005.										
Reference	References:									
1. Mike Limit	1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw-Hill Publishing Company Limited, New Delhi, 2007.									
2. Govi Cher	2. Govindan K.R., and Sendhil Kumar S., "Professional Ethics and Human Values", Anuradha Publications, Chennai, 2007.									

K.S.Ran	gasamy College of T	echnology -	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007								
Department	Biotechnology	Programm	ne Code	e & Na	ame	23:	B.Tech.	Biotech	nology		
		S	Semeste	er VI							
Course Code	Course Na	mo	Hour	s/W	eek	Credit		Maximur	n Marks		
Course Code	Course Na	IIIe	L	Т	Р	С	CA	ES	Total		
07230602C	IMMUNOLOGY		3	1	0	4	50	50	100		
Objective(s)	To introduce the co significance in innov humans, to orient th	ncept of imm ation in deve e students to	une res eloping t the biol	ponso thera ogy c	e in a peutic of the i	mammalian modalities fo	host the or immu em	ereby en inologica	nphasize their al disorders of		
1 THE CELLS OF IMMUNE SYSTEM Total Hrs 09											
An overview of the immunology-Introduction to Immunology, Cells and tissues of the immune system. Haematopoiesis: Origin and differentiation of Lymphocytes and phagocytic cells- receptors and signals that control lymphocyte lineage comment. Immunogens and antigens- Classification of the immune response; Lymphoid organ.											
2 HUMOR	AL IMMUNITY				To	otal Hrs		09			
Elements of H signaling and diversity- Clona	Elements of Humoral immunity- B lymphocytes: - role of surface immunoglobulin receptor in intracellular signaling and transcription to produce antibodies. Immunoglobulins- Classes and subclasses; antibody diversity- Clonal proliferation theory. Hybridoma technology for production of monoclonal.										
3 CELLUI		•			Tc	otal Hrs		09			
Thymus derived rearrangement, lymphocytes- n molecular struc	d (T) Lymphocytes: C and antigen prese nechanism of phagocy ture and assembly of I	lassification a nting cells. ytosis- the ce MHC molecul	and stag Macrop ell biolog es.	ges o hage gy of	f deve s, La antig	elopment- ap angerhan's c en processin	optosis ells, d g and j	, T cell i endritic presenta	receptor gene cells and B tion including		
4 IMMUN HYPER	ITY TO SENSITIVITY REACT	INFECTION IONS	A	ND	Tc	otal Hrs		09			
An overview of remedial measu formation. Imm B cells in oral to	immune responses t ures; cytokines, Mech unological tolerance- r lerance- T cell toleran	o infections, anism of T ly ole of cytokir ce- idiotype.	Hypers mphocy nes and	ensiti /te ac regu	vity re tivatio latory	eactions: Cla on- macropha and immuno	ssificati age acti suppres	on, case vation a ssive T o	e studies with nd granuloma cells-m role of		
5 IMMUN TRANS	OLOGY OF TUMORS	, AUTOIMMU	JNITY A	ND	Тс	otal Hrs		09			
Transplantation rejection- role overview of the response to tun	: types, immunologica of immuno-suppress immuno-pathogenic i nors- type of tumor and	I mechanism ive drugs. A nechanisms igens.	s of gra luto-imn of auto-	ft reje nunity immu	ection /: HL/ unity-	- immunologi A alleles an therapeutic a	cal stra d disea pproact	tegies to ase sus hes. Tur	prevent graft ceptibility- an nors: Immune		
Total hours to b	e taught							45			
Text book (s) :											
1. Kuby, J.	H. "Immunology", 5 th	Edn., W. H. F	reemar	ו Pub	licatio	n, New York,	USA, 2	2002			
 Abbas, K. A., Litchman, A. H. and Pober, J. S. 2005. "Cellular and Molecular Immunology", 4th Edn., W. B. Saunders Co., Pennsylvania, USA. 											
Reference(s) :											
1. Roitt, I., USA.	Brostoff, J. and Davi	d, M. 2001.	"Immur	nolog	y", 6 ^{tr}	Edn., Mosb	y publis	shers Lto	d., New York,		
2. Tizard, F Chennai	2. Tizard, R.I. 2004. "Immunology", 4 ^m Edn, Saunders college publishing, Chennai Microprint Pvt. Ltd., Chennai.										

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
Depa	artment	Biotechnology	Programm	ne Code	& Name	•	23:B	.Tech.	Biotech	nology	
			S	Semeste	r VI						
Course		Course No.	~ ~	Ho	urs / We	ek	Credit		Maximum Marks		
Cours	se Code	Course Na	ne	L	Т	Р	С	CA	ES	Total	
0723	30603C	MOLECULAR MOD	ELING NING	3	0	0	3	50	50	100	
Obje	ctive(s)	At the end of the c Drug Designing. This	At the end of the course, the student would have gained knowledge in various aspects of Drug Designing. This will facilitate the student to take up higher studies in the area.								
1	1 CONCEPTS IN MOLECULAR MODELING Total Hrs 8										
Introdu Graphi mecha	Introduction; Coordinate System; potential energy surfaces molecular graphics; Components of Molecular Graphics hardware and software; Mathematical concepts – introduction of molecular mechanics and quantum mechanics.										
2	MOLECULAR MECHANICS Total Hrs 10										
Waals Waals mecha param energy	exatures of molecular mechanics, force fields; Bond structure and bending angles – electrostatic, van der aals and non-bonded interactions, hydrogen bonding in molecular mechanics; Derivatives of molecular echanics energy function; Calculating thermodynamic properties using force field; Transferability of force field arameters, treatment of delocaliised <i>pi</i> system; Force field for metals and inorganic systems – Application of hergy minimization										
3	MOLEC	JLAR DYNAMICS SI	MULATION N	1ETHO	DS	Total	Hrs		10		
Molecu tempe change	ular Dyna rature anc es from M	mics using simple m I pressure; Time-depe olecular Dynamics sin	odels; Molec endent prope nulation.	cular Dy rties; So	namics olvent eff	with co ects in	ontinuous Molecula	poter ar Dyna	ntials and amics; C	d at constant onformational	
4	MOLEC	JLAR MODELING IN	DRUG DISC	OVERY	,	Total	Hrs		8		
Derivir compo Dockir	ng and u bunds, Me ng	ising 3D pharmacop chanism of their action	phore; Molec on ; <i>de novo</i>	ular Do ligand	ocking; design; /	Structu Applica	ire-based itions of 3	meth 3D Dat	iods to tabase S	identify lead Searching and	
5	STRUCT	TURE ACTIVITY REL	ATIONSHIP			Total	Hrs		9		
QSAR Chemi in the 0	s and QS ical based QSAR equ	PRs, QSAR Methodol Descriptors. Use of (uations.	ogy, Various Genetic Algo	Descrip rithms, I	otors use Neural N	d in QS etwork	SARs: Ele s and Pri	ectroni nciple	c; Topolo Compon	ogy; Quantum ents Analysis	
Total h	nours to be	e taught							45		
Text b	ook (s) :										
1.	1. Andrew R. Leach "Molecular Modeling – Principles and Applications"; Second Edition, Prentice Hall, USA										
Refere	Reference(s) :										
1. Fenniri, H. (2000) "Combinatorial Chemistry – A practical approach", Oxford University Press, UK.											
2. Lednicer, D. (1998) "Strategies for Organic Drug Discovery Synthesis and Design"; Wiley International											
3.	3. Gordon, E.M. and Kerwin, J.F. (1998) "Combinatorial chemistry and molecular diversity in drug discovery"; Wiley-Liss Publishers.										
4.	4. Swatz, M.E. (2000) "Analytical techniques in Combinatorial Chemistry"; Marcel Dekker Publishers.										

K.	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Depa	rtment	Biotechnology	Programme C	ode & N	lame		23 : E	3.Tech. I	Biotechn	ology
			Ser	nester '	VI					
Course	e Code	Course	Name	Hou	rs / We	ek	Credit	N	laximum	Marks
000130	0000	00013		L	Т	Р	С	CA	ES	Total
07230	0604C	PROTEIN ENGI	NEERING	3	1	0	4	50	50	100
Objec	tive(s)	At the end of the particular important how to engineer	e course the stude ance; the student w protein to be used	nt wou vill knov as thera	ld have v the pr apeutic	learn oducti s.	t structure on of reco	and fu mbinan	nction of t insulin a	proteins of & in general
1	BONDS	AND ENGINEERS	S IN PROTEIN MA	KE-UP			Total	Hrs		05
Differe interact spectro	Different bonds in protein formation: Covalent, Ionic, Hydrogen, Coordinate, hydrophobic and Vander walls interactions. Elucidation of protein structure by X-ray Crystallography, NMR, ESR and MALDI-TOF of Mass spectrometry.									
2	AMINO A	CIDS AND PRO	TEINS				Total	Hrs		05
Amino relation classific	Amino acids classification and their molecular properties (size, solubility, charge, pKa), Chemical relativity in elation to post-translational modification (involving amino, carboxyl, hydroxyl, thiol, imidazole groups), Protein classification and their molecular properties.									
3	PROTEI	N ARCHITECTUR	E				Total	Hrs		12
through determi diagran structur	nput prote ine super ns. Tertia res. Supe	ein sequencing se secondary structures Dor rficial structures.	etup. Secondary st ure: topology diagra nains, protein fold Quaternary structur	ructure: ams, P ing, der e: Mole	: Alpha redictio naturati cular na	, beta n of s on, ov ature,	and loop ubstrate b verview of formation	structu inding s metho of comp	res and ites, Rar ds to de plexes.	methods to nachandren termine 3D
4	STRUCT	URE-FUNCTION	RELATIONSHIP				Total	Hrs		15
DNA-bi Eukaryo proteins bacterio architeo	nding pro otic trans s, Mem orhodops cture.	oteins: prokaryotic cription factors, 2 brane proteins: in and photosynt	c transcription facto Zinc finger proteins General chara hetic reaction cen	ors, He , helix- acteristic ter, Im	lix-turn- turn he cs, Tr nunogl	Helix lix mo ans obulin	motif in E otifs in ho membrar s: IgG Lig	DNA bin meodom ne seg ght chai	ding, Trp nain, Leu iments, in and h	o repressor, icine zipper prediction, eavy chain
5	PROTEI	N ENGINEERING					Total H	S		08
Recom primary	binant ins /, seconda	sulin to reduce age ary, tertiary and co	gregation and inact omposite. Structura	ivation, Il simila	<i>de nov</i> rities. N	o prot lolecu	ein desigr <u>lar modeli</u>	i, Proteii ng.	n databa	ses such as
	Total H	lours to be taught								45
Text Bo	ook(s) :									
1.	1. Voet, D. and Voet, G. "Biochemistry", Third Edition. John Wiley and Sons, Singapore, 2001.									
 Branden, C. and Tooze, J., "Introduction to protein structure" Second Edition, Garland Publishing, New York, USA, 1999. 										
Referer	nce(s) :									
1.	Creighto	n T.E. "Proteins",	Second Edition, Fre	eeman	WH, US	SA, 19	93.			
2.	2. Moody, P.C.E. and Wilkinson, A.J. "Protein Engineering", IRL Press, Oxford, UK, 1990.									

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Depa	artment	Biotechnology	Programme C	ode & Na	me		23:B.Tech	n Biote	chnology	
				Semeste	r VI					
Cours		Courses	Nomo	Hou	rs / W	eek	Credit	N	/laximum ma	arks
Cours	se code	Course	name	L	Т	Р	С	CA	ES	Total
0723	30607P	IMMUNOLOGY	LABORATORY	0	0	3	2	50	50	100
Objec	ctive (s)	ve (s) To develop skills of the students in the area of Immunology, At the end of the course the students would have learnt about the Immunology Techniques. This knowledge will be very useful for students to study specialized subjects in Biotechnology.								
			(Ang	y 10 expe	riment	is)				
1	Bloc	d Grouping					Total Hrs		3	
2	Sep	aration of Blood se	rum				Total Hrs	3		
3	Sing	le Radial Immunoc	liffusion				Total Hrs		3	
4	Imm	unoelectrophoresis	6		Total Hrs				3	
5	Vine	ral Disease Resea	rch Laboratory(\	DRL)Test Total Hrs				3		
6	Rap	id Plasma Reagin ((RPR)Test				Total Hrs		3	
7	Preg	nancy Slide Test					Total Hrs		3	
8	ASC	(Anti Strepto Lysin	ie-O)test				Total Hrs		3	
9	Rhe	umatoid Arthritis (F	RA) test				Total Hrs		3	
10	Wid	al Tube agglutinatio	on				Total Hrs		3	
11	ELIS	A-Sandwich					Total Hrs		3	
Total	Total hours to be taught 33									
Refer	Reference (s) :									
1.	 Talwar, G.P. and Gupta, S.K. 2004. A Handbook of Practical and Immunology. CBS Publishers & Distributors, New Delhi. 									

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
Departi	ment	Bioteo	chnology	Programme Co	ode & Na	ame		23:B.Tech	n Biote	echnology	/
				Se	mester V	/					
Course	Cada		Course		Hou	rs / We	ek	Credit N		Maximum marks	
Course	Code		Course r	vame	L	Т	Р	С	CA	ES	Total
072306	608P	BIOINF LABOR	ORMATIC: ATORY	S	0	0	3	2	50	50	100
Objec	At the end of the course, the student would have gained knowledge about the various aspects Bioinformatics.										
				(Any 10) experin	nents)					
1.	Office	Office Automation a. Newspaper Printing. b. Course Details – Power Point Presentation. c. Chat handling. Total Hrs 3									
2.	Basic	Unix Cor	nmands					Total Hr	s	3	3
3.	Biolog	gical data	base.					Total Hr	S	3	}
4.	Seque	ence Alig a. b.	nment. Pairwise / - Global & Multiple s - Clustal ≯	Alignment Local Alignmen equences Alignr	t. nent.			Total Hrs	S	3	3
5.	Phylo	genetic A	nalysis - Phylip.					Total Hr	s	3	3
6.	Struct	ure Visua	alization To	ols. SPDB Deep Viev	wer.			Total Hr	s	3	3
7.	Struct	ural Aligr	iment.					Total Hrs	S	3	}
8.	Homology Modeling - SPDB Deep Viewer. Total Hrs 3								3		
9.	Structure Prediction. - Modeller 7v7 Total Hrs 3								3		
10.	Docki	ng - H	lex Tool.					Total Hr	S	3	3
Total hou	otal hours to be taught 33										

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Depar	tment	Biotechnology	Prog	ramme C	ode & I	Name	23: B	.Tech. E	liotechr	nology
				Semeste	r VI					
0	Oada	O avera a Nama		Но	urs / W	eek	Credit	Ma	ximum	marks
Course	Code	Course Name	•	L	Т	Р	С	CA	ES	Total
07230)609P	INDUSTRIAL BIOTECHNOLOGY LABORATORY	3	2	50	50	100			
Object	ive (s)	Educate the theoretical concepts of Bioseparation experimentally to the students.								
			(Any	/ 10 expe	riments	5)				
1	Product	tion of Citric acid					Total H	rs		3
2	Product	uction of ethanol from yeast Total Hrs 3								3
3	Product	tion of wine from black	grapes				Total H	rs		3
4	Product	tion of Bear from cerea	ls				Total H	rs		3
5	Product	tion of Protease					Total H	rs		3
6	Product	tion of Antibiotics using	Strepton	nycin spe	ecies		Total H	rs		3
7	Product	tion of Vitamins					Total H	rs		3
8	Product	tion of growth regulator	S				Total H	rs		3
9	Product	tion of Biofertilizers(N -	- Fixers 8	k P - Solu	bilizers)	Total H	rs		3
10	Product	tion of Biocontrol Agent	ts				Total H	rs		3
11	Product	tion of Single cell Prote	in (Spirul	linea)			Total H	rs		3
12	Production of Vermicompost Total Hrs 3									
Total hou	Total hours to be taught 36									
Reference	Reference (s)									
1. (. Cruger, W.,Cruger, A., "Biotechnology :A textbook of Industrial Microbiology", Prnima Publishing Corporation, New Delhi, 2000									

	K.S.Ran	angasamy College of Technology - Autonomous Regulation R 2007								
Depa	artment	Biot	echnology	Prog	ramme	Code a	& Name	23: B.	Tech. Biot	echnology
			S	Semester	r VI					
Cours		Cal	uraa Nama	Hou	ırs / We	ek	Credit	N	1aximum N	/larks
Cours			irse marrie	L	Т	Р	С	CA	ES	Total
0723	80610P	COMPREH	ENSION V	0	0	3	0	100	00	100
Obje	ctive(s)	i. To improv ii. To improv	e the skill level of Er	ngineerin of studer	ng, Tech nts in pl	inology aceme	/ and Appli nt interview	ed Scie vs.	nce studer	nts.
1	For eacl using th	n subject 200 e students.	Keywords/important	words o	r terms	(5 unit	s x 40 wor	ds) are t	o be prep	ared
2	These 2 handled	hese 200 Keywords are to be printed in double column (2 x 50 words) and in 2 pages and is to be andled over each student for all the subjects.								
3	The staf	f who handled / semester) as	who handled the subject in the previous semester will handle their discussion period (3 semester) as given below.							
4	The staf	f will question	will question the students using 'W' and 'H' type questions linking the keywords.							
5	In a sim	similar way the students have to prepare themselves for all the keywords.								
6	Each test	st will carry 10 type questions	0 questions and two by attaching with ke	hours d eywords	luration.	The q	uestions w	rill be of	objective	type: 'W'
7	Based o	n Test-I and T	est-II, sessional ma	rks (max	kimum 5	i0 marl	<s) a<="" be="" td="" will=""><td>awardeo</td><td>l.</td><td></td></s)>	awardeo	l.	
8	Test-III v subjects	will be held for (i.e. minimum	all the units and all 50/100 marks)	the subj	ects. Th	ne pass	sing norms	will be	similar as	other
			Schedule for Condu	uct of Co	mprehe	ension	Subject			
Total N	o of week	s planned:10	Total No of sub	jects: 5 t	o 7	-	Total durat	ion per v	veek: 3 pe	eriods
Wee	ek No	Duration: 1 ¹ / ₂ (No of units)	period Subject No		Durat (No d	ion: 1½ of units	⁄₂ period Sા)	ubject N	0	
V	V1	``````````````````````````````````````	S1(3)				•	S2(3)		
V	V2		S3(3)					S4(3)		
V	V3		S5(3)					S6(3)		
V	V4		Test-	l (Portior	n: 3 unit	s in ea	ch subject))		
V	V5	S1(2) S2(2)								
V	V6		S3(2)					S4(2)		
V	V7		S5(2)					S6(2)		
V	V8		Test-I	I (Portio	n: 2 unit	ts in ea	ach subject)		
V	V9				Discuss	sion				
W	W10 Test-III (All 5 units and all the subjects)									

K.S.Ra	ngasamy College	of Technology -	Autono	mous F	Regula	tion		R 20	07
Department	Biotechnology	Programme C	ode & N	lame		23: B.	Tech. Bi	otechnol	ogy
		Ser	nester V	/					
			Hou	rs / We	ek	Credit	M	aximum I	Marks
Course Code	Course	Name	L	Т	Р	С	CA	ES	Total
07230611P			0	0	2	0	100	00	100
	i. To improve the s	skill level of Engin	eerina.	Techno	logy ar	l nd Applied	Science	students	3.
Objective(s)	ii. To improve the	employability of s	tudents	in place	ement i	interviews			
Skills sets to	a. Aptitude skills								
be improved	 Arithmetic 	ability							
	 Verbal Re 	asoning							
	Non verba	al Reasoning							
	b. Programming s	KIIIS							
		je poents and C++ (I		ECE		-)			
	Data Strue	ctures (BT FFF F	CF CSF	, LOL, = IT)	00L,II)			
	c. Written Commu	nication Skills		_,,					
	Comprehe	ension							
	Grammar								
	 Essay Wr 	iting							
	 Technical 	Report Writing							
	Technical	paper Writing							
	d. Oral Communic	ation Skills							
		a News item							
	Self introc	luction							
	 2 minutes 	talk - Informed							
	 2 minutes 	talk - Extempore							
	e. Technical Pape	r Presentation							
	Presenting	g a paper on rece	nt topics	;					
	f. Group Interactio	n							
	Debate Croup Dia	auguion Informa	d Tonio						
	Group Dis Group Dis		a the er	ot					
	a Technical Interv	/iew Skills	in the sp	01					
	Basic MP	C knowledge							
	 Broad Know 	owledge of the bra	anch						
	 Indepth kr 	nowledge on spec	ific subj	ects of	interes	st			
	h. HR Interview S	kills							
	Adoptabili	ty							
	Creativity								
	Flexibility Achiever	ant ariantation							
	Achieven Continuou	is learning							
	 Hardwork 	ing nature							
	Decisiven	ess							
	Self devel	opment							
	Questioni	ng							
_		المعامية ملامة	الد ما					and rainf	
FOCUS	in another two ser	nesters (CCD IV a	and V).	e sem	esters		anu III) (anu reinto	nce mem
Execution	Total No. of weeks : 12								
	3 Hrs/week and 2 credits								
	Only Continuous Assessment and No End Semester examination.								
	Evaluation	 Evaluation based on written test, oral test and technical paper presentation. 							
	Every 20	students should b	e engag	ed by a	a staff r	member du	iring cor	nmunicat	ion hour
	and oral to	estudente ek subt h	o oc ''	- الم م	0 -1-11		I	64	teat
		students should b	e monito	brea by	a staff	memper t	u condu	ct written	iest.

Schedule	Week	Activity								
	1	Training								
	2	Training								
	3	Evaluation I - Written								
	4	Evaluation I - Oral								
	5	Training								
	6	Evaluation II - Written								
	7	Evaluation II - Oral								
	8	Training								
	9	Evaluation III - Written								
	10 - 12	Evaluation III - Oral								
Evaluation	Evaluation I	60 marks(average of 3 tests)								
	Evaluation II	20 marks								
	Evaluation III	20 marks								
	Total	100 marks								
	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
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Departr	ment	Biotechnology	Pro	gramme	Code &	Name		23 : E	.Tech. Bio	echnology
				Semeste	r VII					
Course	Codo		m 0	Hou	rs / We	ek	Credit		Maximum I	Marks
Course	Code	Course Na	me	L	Т	Р	С	CA	ES	Total
072307	701G	TOTAL QUALITY MANAGEMENT		3	0	0	3	50	50	100
Objectiv	ve(s)	To understand the available to achieve QS certification proc	Total Quality Total Quality cess and its ne	Manage Manage eed for th	ement c ment, s ie indus	concept tatistica tries.	t and prin al approac	ciples h for qu	and the va uality contro	rious tools ol, ISO and
1 INT	FRODU	ICTION				То	tal Hrs		9	
Definitio Costs, E Quality S	on of Q Basic c Statem	uality, Dimensions of concepts of Total Qu ents, Deming Philos	Quality, Qua ality Manager ophy, Barriers	lity Plan ment, His to TQM	ning, Qu storical Implem	uality c Reviev entatio	osts - Ana v, Principl n.	alysis T es of T	echniques QM, Quali	for Quality ty Council,
2 TQ	2 TQM PRINCIPLES 70									
Retentio Benefits Partnerii Basic Co	Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement, Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures-									
3 ST/	ATISTI	CAL PROCESS CON	NTROL (SPC)			To	tal Hrs		9	
The tool Sample, New Ma	ls of qu , Norm anagem	uality, Statistical Func al Curve, Control Ch nent tools.	lamentals – M arts for variat	leasures bles and	of cent attribute	ral Ter es, Pro	ndency and ocess capa	d Dispe ability,	ersion, Pop Concept of	ulation and six sigma,
4 TQ	M TOC	DLS				To	tal Hrs		9	
Benchm of Quali Concept	narking ity, QF t, Impro	 Reasons to Bench D Process, Benefits ovement Needs, FME 	mark, Benchm , Taguchi Qu A – Stages, T	narking P ality Los ypes.	rocess, s Func	Qualit tion, T	y Function otal Produ	Deplo uctive N	yment (QFI /laintenanc) – House e(TPM)–
5 QU	JALITY	SYSTEMS				To	tal Hrs		9	
Need for Implement	or ISO entatior	9000 Quality System, Documentation, Qu	ns, ISO 9000 ality Auditing,	2000 IS: Requ –	SO 140 irement	00 Q s and I	uality Syst Benefits, N	tems – Non Co	Elements nformance	Concepts, report.
Total ho	ours to	be taught							45	
Text boo	ok (s) :									
1. Dale H.Besterfiled, et al., "Total Quality Management", Pearson Education Asia, 1999. (Indian reprint 2002).								lian reprint		
Referen	ce(s) :									
1. Jan We	nes R. estern (Evans & William M. Thomson Learning),	Lidsay, "The 2002 (ISBN 0-	Manage -324-066	ment a 80-5).	nd Co	ntrol of Q	uality",	(5th Editio	on), South-
2. Fei	igenba	um.A.V. "Total Quality	/ Managemen	t", McGra	aw Hill,	1991.				
3. Jay	/akuma	ar.V, Total Quality Ma	nagement-La	kshmi Pu	blicatio	ns, 200)6.			
4. Sub	buraj, F	Ramasamy-TMH, 200	5.							

K. S	K. S. Rangasamy College of Technology - Autonomous Regulation R 2007										
Dep	artment	Biotechnology	Proç	gramme Nam	e code e	&		23 : E	3.Tech	n. Biotech	nology
				Se	mestei	· VII					
Cour	raa Cada	Course Nom		Hou	rs/We	ek	Credit		Ν	laximum	Marks
Cour	se coue	Course Main	le	L	Т	Р	С	C	4	ES	Total
072	30702C	DOWN STREAM PROCESSING		3	1	0	4	50)	50	100
Obje	ective(s)	At the end of the proteins, enzymes projects of Industrie	e course, and in ູ es.	the st general	udent about	would produ	d have le uct develo	earnt a opment	bout, R &	methods D. This v	to obtain pure vill be handy for
1	DOWNST	REAM PROCESSIN	١G						-	Fotal Hrs	08
Introd disrup chem Diges	Introduction to downstream processing principles characteristics of bimolecular and bioprocesses. Cell disruption for product release – mechanical, Bead Mill Disruption, High Pressure Homogenizer, enzymatic and chemical methods – Alkali Treatment, Detergent Solibilization, Cell Wall Permeabilization, and Enzyme Digestion. Pretreatment and stabilization of bioproducts.										
2	PHYSICA	L METHODS OF SE	EPERAT	ION					-	Fotal Hrs	10
Theor absor Centr	ry of batc ption filter ifuges – T	h filtration, Pretrea aids: filter media; e ubular Bowl centrifug	tment of equipmer ge; DISC	Ferme nt – Pla Bowl c	entatio ate ano centrifu	n bro d fran ge.	oths – he ne filter p	eating, press, L	coag eaf fi	ulation a lter; cont	nd flocculation, inuous filtration.
3	ISOLATIO	ON OF PRODUCTS							-	Total Hrs	10
Adsor filtrati	rption, liqui on and rev ess : Adsor	d - liquid extraction, erse osmosis, dialys ption Isotherms: bate	aqueous is and ec ch Adsor	two-ph quipmer	ase ex nt, pree Adsorp	ktracti cipitat	on and ed ion of pro h CSTR: A	quipme teins b Adsorpt	nt, me y diffe ion in	embrane s rent meth fixed bec	separation – ultra ods – Adsorption I
4	PRODUC	T PURIFICATION							-	Total Hrs	09
Chror exclus metho	natography sion, hydro ods of sepa	y – principles, inst phobic interaction, l aration.	truments bioaffinity	and p and p	oractice seudo	e, ad affinit	sorption, ty chroma	revers atograp	e pha hic te	ase, ion- chniques;	exchange, size Electrokinetic's
5	FINAL PF	RODUCT FORMULA	ATION AN	ND FINI	SHING	g ope	ERATION	S	-	Fotal Hrs	08
Cryst Consi	allization, c	crystallization theory nd drying equipment	, crystalli and diffe	zation erent ty	practic pes of	e; equ formu	uipment fo	or crys	alliza	tion. Dryiı	ng – Theoretical
Total	hours to be	e taught									45
Text b	oook (s) :										
1.	P.A. Bel Biotechno	ter, E.L. Cussler blogy, Wiley Interscie	And Wence Pub	/ei-Hou . (1988	hu –).	Bios	eparation	IS —	Down	stream I	Processing For
2.	R.O. Jenl Series, Br	kins, (Ed.) – Produc	t Recove	ery In E	Sioproc	ess T	echnolog	y – Bio	otechr	ology By	Open Learning
3.	B. Sivasa Delhi. (20	nkar, BioSeparation	– Princi	ples ar	nd Tec	hniqu	es, Prent	ice Hal	l of In	idia Priva	te Limited, New
Refer	ence(s) :	,									
1.	J.C. Jans Applicatio	son And L. Ryden, ons, VCH Pub. 1989.	(Ed.) –	Protein	Purifi	catior	n – Princ	iples, l	ligh	Resolutio	n Methods And
2.	R.K. Scop	oes – Protein Purifica	ation – P	rinciple	s And	Practi	ce, Naros	sa Pub.	(1994	4).	

	K. S. Rangasamy College of Technology - Autonomous Regulation R 2007									
Depa	artment	Biotechnology	Programme C	Code &	Name		2	23 : B.Tec	h. Biotechno	logy
				Sen	nester	VII				
0		0.000	Nama	Hou	rs / We	ek	Credit		Maximum N	larks
Cour	se Code	Course	e Name	L	Т	Р	С	CA	ES	Total
072	30703C	PLANT BIOTECHNOI	_OGY	3	0	0	3	50	50	100
Obje	At the end of the course the student would have learnt about the applications of Genetic Objective(s) Engineering in Plant and how to develop Transgenic plants. This will facilitate the student to take up project work in this area.									
1	1 ORGANIZATION OF GENETIC MATERIAL Total Hrs 08									
Gene	tic mate	rial of plant cel	ls – nucleosor	me str	ucture	and	its biolo	gical sig	nificance; jui	nk and repeat
seque	ences; ou	tline of transcript	tion and translat	tion						40
2	2 CHLOROPLAST & MITOCHONDRIA Total Hrs 10									
Struc of pro	ture, func oteins. Mi	tion and genetic tochondria: Geno	material; rubiscome, cytoplasmi	o synt ic male	hesis a sterilit	ind as y and	ssembly, of I import of	coordinati f proteins.	on, regulatioi	n and transport
3	NITRO	GEN FIXATION							Total Hrs	10
Nitrog	genase a	ctivity, nod genes	s, nif genes, bac	cteroids	S.					
4	AGROE	BACTERIUM & V	IRAL VECTORS	S					Total Hrs	09
Patho gene	genesis, tic engine	crown gall dise ering. Viral Vecto	ase, genes inv ors: Gemini viru	volved s, caul	in the iflower	path mosa	ogenesis, aic virus, v	Ti plasm viral vecto	nid – t-DNA, ors and its be	importance in nefits.
5	APPLIC	ATION OF PLAN	NT BIOTECHNO	DLOG	(Total Hrs	08
Outlir thera	ne of pla	nt tissue culture oducts.	, transgenic pl	ants, ł	nerbicio	de an	d pest re	esistant p	lants, molec	ular pharming,
Total	hours to	be taught								45
Text	book (s) :									-
1.	1. Gamburg OL, Philips GC, Plant Tissue & Organ Culture fundamental Methods, Narosa Publications. 1995.									
2.	Singh B	D. Text Book of I	Biotechnology, I	Kalyan	i Publi	shers	. 199.			
Refer	ence(s) :									
1.	Heldt H	W. Plant Biocher	nistry & Molecu	lar Biol	ogy, O	xford	Universit	y Press. 1	1997.	
2.	Ignacimuthu .S, Applied Plant Biotechnology, Tata McGraw-Hill. 1996.									

	K. S. Rangasamy College of Technology - Autonomous Regulation R 2007									
Dep	artment	Biotechnology	Progra	mme C	Code	& Name	23 : B	Tech. Bio	technology	
			Ser	nester	VII					
Cour	raa Cada		Hou	rs / We	ek	Credit	N	laximum N	/larks	
Coul	se code	Course Name	L	Т	Р	С	CA	ES	Total	
072	30704C	ANIMAL BIOTECHNOLOGY	3	0	0	3	50	50	100	
Obje	ective(s)	At the end of the course, diagnostic of animal dise student to undertake project	the stude ases an ct work ir	ent wo nd Tra n this a	uld h nsger irea.	ave learn nic anima	t about anim al productior	nal cell cu n. This wi	ture, molecular Il facilitate the	
1	ANIMAL (CELL CULTURE					-	Fotal Hrs	08	
Introc their immo	luction to b maintenan bilized cult	pasic tissue culture techniqu ce and preservation; various ures; somatic cell fusion; ce	es; chen s types o I cultures	nically of cultu s as a	defin ures- sourc	ed and se suspensi e of valua	erum free me on cultures, able products	edia; anim continuou s; organ cu	al cell cultures, s flow cultures, ıltures.	
2	2 ANIMAL DISEASES AND THEIR DIAGNOSIS Total Hrs 10									
Bacte techn	erial and vir iques like f	al diseases in animals; mor PCR, <i>in-situ</i> hybridization; no	oclonal a	antiboo nd sou	dies a ithern	nd their u blotting;	use in diagno RFLP.	osis; moleo	cular diagnostic	
3	THERAP	Y OF ANIMAL DISEASES					-	Fotal Hrs	10	
Reco vacci	mbinant cy nes and the	tokines and their use in the t eir applications in animal infe	treatmen ections; g	t of an gene th	imal i erap	nfections / for anim	; monoclonal al diseases.	antibodie	s in therapy;	
4	MICROM	ANIPULATION OF EMBRY	D'S				-	Fotal Hrs	09	
What spern and e	is microm ns from sei mbryo tran	anipulation technology; equi men samples of animals; art sfer; micromanipulation tech	ipments ificial ins	used i semina and bre	n mic tion a eeding	romanipu Ind germ g of farm	lation; enrich cell manipula animals.	nment of > ations; in v	and y bearing vitro fertilization	
5	TRANSG	ENIC ANIMALS					-	Fotal Hrs	08	
Conc impor	epts of tra tance in bi	ansgenic animal technology otechnology; stem cell cultur	/; strategres in the	gies fo produ	or the	 product of transg 	ion of trans enic animals	genic ani	mals and their	
Total	hours to be	e taught							45	
Text	ext book (s) :									
1.	Ranga M.	M. Animal Biotechnology. A	grobios I	ndia L	imited	l, 2002.				
2.	Ramadas	s P, Meera Rani S. Text Boo	ok Of An	imal Bi	iotech	nology. A	kshara Print	ers, 1997.		
Refer	ence(s) :									
1.	Masters J.R.W. Animal Cell Culture: Practical Approach. Oxford University Press, 2000.									

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
De	par	tment	Biotechnology	Programme	Code	& Nam	ie	23: B.	Tech.,	Biotechr	ology
				Se	mester	· VII					
Cou	raa	Codo	Course	Nama	Ho	ours / V	Veek	Credit	Ν	laximum	marks
Cou	rse	Code	Course	name	L	Т	Р	С	CA	ES	Total
072	2307	707P	DOWN STREAM I LABORATORY	PROCESSING	0	0	3	2	50	50	100
Obje	Dbjective (s)At the end of the course, the student has gained the knowledge to perform various techniques used in Down Stream Processing and how to make a finished project.										
				Any Fiv	e expe	eriment	s				
	1	Studie	s on Cell Disruptior	and Cell Separa	ation by	/ using	Sonicat	ion method	Т	otal Hrs	3
	2	Separ	ation of solid and lic	luid using Centrif	ugatior	n meth	od		Т	otal Hrs	3
	3	Studie	s on Sedimentation	(sand type)					Т	otal Hrs	3
	4	Studie	s on Filtration using	plate and frame	filter p	ress			Т	otal Hrs	3
	5	Aqueo	ous two phase Extra	ction by using ac	etic ac	id and	benzen	e	Т	otal Hrs	3
6		Studie	s on simple Leachir	ng					Т	otal Hrs	3
	7	Studie	s on Column Chron	natography					Т	otal Hrs	3
	8	Studie	s on ammonium su	Iphite precipitatio	n				Т	otal Hrs	3
Total	hοι	urs to b	e taught								24
Refe	renc	ce (s) :									
1.	 R.O. Jenkins, (Ed.) – Product Recovery In Bioprocess Technology – Biotechnology By Open Learning Series, Butterworth-Heinemann (1992). 										
2.	P.A Wil	P.A. Belter, E.L. Cussler And Wei-Houhu – Bioseparations – Downstream Processing For Biotechnology, Viley Interscience Pub. (1988).									

K.S	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Department	Biotechnology Programme	Code & N	ame		23: B.Te	ch., Biot	echnology	/		
	Sem	nester VII								
Course Code		Hou	rs/Wee	ek	Credit	Max	kimum ma	irks		
Course Coue	Course Name	L	Т	Р	С	CA	ES	Total		
07230708P	PLANT AND ANIMAL BIOTECHNOLOGY LABORATORY	0	0	3	2	50	50	100		
Objective (s)	The student would have learnt abou to develop Transgenic plants. The molecular diagnostic of animal disea	t the appl student ses and tr	ications would ansgen	of gen have ic anim	etic engin learnt abo nal produc	eering in out anin tion.	n plant an nal cell c	d how ulture,		
	Any 10	experime	nts							
	PLANT BIC	TECHNO	LOGY							
1	Preparation of Media				Total H	lours	3			
2	Surface sterilization				Total H	lours	3			
3	In vitro seed germination				Total H	lours	4			
4	Organ culture				Total H	lours	4			
5	Haploid plant Production (Ovary and	Pollen cu	lture)		Total H	lours	4			
6	Multiplication of plant through Microp	ropagatio	n		Total H	lours	4			
7	Callus culture				Total H	lours	4			
8	Agrobacterium mediated gene transf	ormation			Total H	lours	4			
9	Preparation of synthetic Seed				Total H	lours	4			
10	Somatic Embryogenesis				Total H	lours	4			
	ANIMAL BIOTECHN	OLOGY								
11	Preparation of tissue culture medium	and Mem	nbrane f	ilters	Total H	lours	4			
12	Trypsinization of Monolayer and sub	culturing			Total H	lours	3			
Total hours to b	be taught						45			
Reference(s) :	Reference(s) :									
1. Rama Delhi	a Dass, P.and MeeraRani, S.Text .1997.	Book of	Animal	Bioteo	chnology,	Akshara	a Printers	s, New		
2. Maste	ers, J.R.w.Animal Cell culture. Practica	al Approac	ch, Oxfo	rd Univ	ersity Pre	ess, UK,	2000.			

K.S.Rangasamy College of Technology - Autonomous Regulation									
Department	Biotechnology	Programm	ne Code 8	Name		23 : B.	Tech B	liotechr	nology
		ç	Semester	VII	•				
Course Code		m.a.	Hou	rs/Wee	ek	Credit	М	aximun	n Marks
Course Code	Course Na	me	L	Т	Р	С	CA	ES	TOTAL
08230709P	PROJECT WORK-F	PHASE I	0	0	4	2	100	00	100
Objective(s)	To make the studer industry.	nt understand	d the prac	ctical pr	oblem	solving pro	ocess in	the Bi	otechnology
	Each student has t technology or critica can undertake the students. The works i. Identify ii. Selectir iii. Identify iv. Collecti v. Framing vi. Making vii. Appear	to select a project work project work to be undert ing the area of a suitable ing the proble ng relevant ling the methode all the above ring for Viva-v	roject fror lated to B c individua taken duri of propose name for em areas terature fo ology for t e works inf voce exan	n any i liotechn ally or ng this ed proje the abo in Biote or the al the expe- to boun- nination	ndustri ology in a b phase ct worl ve wor ch indu pove w erimen d book	ial related during the atch consi- is given be k sk ustry for the vork tal design a form e end of ser	problem VII sem sting a low: propos	s or in nester. maxim ed wor	novations in The student um of three k

K.S.Ra	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Department	Biotechnology	Programme Cod	e & N	lame		23: B.	Tech. Bi	otechnol	ogy	
		Semes	ster V	'II						
			Ho	ours / W	/eek	Credit	Ma	aximum I	/larks	
Course Code	Course	Name		Т	P	C	CA	FS	Total	
072307010P	CAREER COMPET	ENCY	0	0	2	0	100	00	100	
	i To improve the sk		ing -	Fochnol		ad Applied	Scionco	etudonte	、	
Objective(s)	ii. To improve the er	nployability of stude	ents	in place	ement	interviews	Science	siudenta	.	
Skills sets to be improved	a. Aptitude skills i. Arithmeti ii. Verbal R	c ability easoning								
	III. Non verb	al Reasoning								
	i Clangua	ae (All Branches)								
	ii. OOPS concepts and C++ (Circuit Branches - EEE, ECE,CSE,IT)									
	iii. Data Structures (Circuit Branches - EEE,ECE,CSE,IT)									
	c. Written Communication Skills									
	i. Compreh	i. Comprehension								
	II. Gramma	ii. Grammar iii Essay Writing								
	iv Technica	iii. Essay Writing iv. Technical Report Writing								
	v. Technica	v. Technical paper Writing								
	d. Oral Communicat	I. Oral Communication Skills								
	i. News Re	ading								
	ii. Informing	a News item								
	iii. Self intro	duction								
	v 2 minutes	s talk - Informed								
	e. Technical Paper	Presentation								
	i. Presentir	ig a paper on recei	nt top	oics						
	f. Group Interaction	5 1 1 1 1								
	i. Debate									
	ii. Group Di	scussion – Informe	ed To	pic						
	iii. Group Di	scussion – Topic o	n the	e spot						
	g. Lechnical Intervie	W SKIIIS								
	i. Basic Mr	owledge of the bra	nch							
	iii. Indepth k	nowledge on spec	ific si	ubiects	of inte	rest				
	h. HR Interview Skil	S								
	i. Adoptabi	lity	viii.	Self de	velopr	ment				
	ii. Creativity	,	ix.	Questic	oning					
	iii. Flexibility									
	iv. Achiever	nent orientation								
	v. Continuo vi Hardworl	us learning								
	vi. Hardworr	ness								
Focus	The focus of CCD is in another two seme	to develop these i sters (CCD IV and	n thre V).	ee sem	esters	(CCD-I, II	and III) a	and reinfo	orce them	
Execution	Total No. of wee	eks : 12								
	3 Hrs/week and 2 credits									
	Univ Continuous Assessment and No End Semester examination.									
	Evaluation base	u on written test, o	ial te hor	si and i	ff mor	ber during	commu	.iun. nication I	har nor	
	oral test	ita anoulu pe enga	yeu t	y a sia	n men	iner annig	commu	nication		
	Everv 30 studer	ts should be monit	ored	by a st	aff me	mber to co	nduct w	ritten test		
Schedule	Week	Activity	5.00						-	
	1	Training								
	2	Training								
	Ζ	rraining								

81

	3	Evaluation I - Written
	4	Evaluation I - Oral
	5	Training
	6	Evaluation II - Written
	7	Evaluation II - Oral
	8	Training
	9	Evaluation III - Written
	10 - 12	Evaluation III - Oral
Evaluation	Evaluation I	60 marks(average of 3 tests)
	Evaluation II	20 marks
	Evaluation III	20 marks
	Total	100 marks

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
De	partment	Biotechnology	Programme	e Code &	& Name	1	23: B.Te	ech. Biote	echnol	ogy
			Sei	mester V	/111					
Cour	na Cada			Hou	rs / We	ek	Credit	Max	kimum	Marks
Cours	se coue	Course Na	inte	L	Т	Р	С	CA	ES	Total
0723	30801C	BIOPHARMACEUTI TECHNOLOGY	CAL	3	0	0	3	50	50	100
Obje	ective(s)	At the end of the co Drug metabolism, a to take up projects ir	urse, the stude nd various doe n this area of F	ents wou sage for Pharmac	uld have ms of E eutical	e learr Biopha <u>Biotec</u>	it about Wha rmaceuticals hnology.	t are Dru to facilit	ugs, Dr tate the	ug action, e students
1	INTROD	UCTION TO PHARM	ACOLOGY			Тс	otal Hrs		10	
Histori admin plant,	Historical outlines of drugs, classification of drugs, Physico-chemical properties of drugs, Routes of administration of drugs, drug metabolism, controlled release drug delivery system, drug stability, Sources: blant, marine and microorganisms.									
2	DRUG D	ISCOVERY				Tc	otal Hrs		08	
Drug o qualita granul	discovery a ative assay ation, dire	an introduction, basic y of drugs by biologi ct compression, tablet	clinical evolutical testing, particular presses and contents of the second seco	tion of n acking to coating.	ew drug echniqu	gs, bio ies lik	availability o e compressi	of drugs, on of ta	quanti blets,	tative and wet & dry
3	PHARMA	ACOKINETICS AND E	BIOTRANSFO	RMATIC	N	To	tal Hrs		10	
Pharm drugs, metab	acokinetic sites of a olism.	s, Pharmacokinetics: ction, Phase I and Pha	introduction, ase II reaction	absorp s, prodru	tion, d ugs, adv	istribu verse	tion, elimina drug effects,	tion and Role of I	l meta Enzym	bolism of es in drug
4	PHARMA APPLICA	ACEUTICAL DOSAGE	E FORMS AND	C		To	tal Hrs		08	
Oral solutions	olid dosag and extra	e forms, compressed cts. Applications of va	tablets, types arious drugs in	, pills, so human	olutions body ar	, syru nd site	os, juices, na of action	asal solut	tions, e	emulsions,
5	BIOPHA	RMACEUTICALS				Tota	l Hrs		09	
Variou are ab metho	is categori oused, Anti ds.	es of therapeutics lik ibiotics, human insulir	e vitamins, la n, interferon, s	xatives, comatost	analge alim, so	sics, c omatol	contraceptive ropin - its pr	s. Comn eservatio	non dr on and	ugs which analytical
Tota	al Hours to	o be Taught							45	
Text b	ook (s) :									
1.	Remingto 2001.	on, "The Science and	d Practice of	Pharma	cy". Lip	opinco	tt Williams a	and Wilk	ins, 20) th edition,
2.	Gareth T	homas, "Medicinal Ch	emistry an Int	roductio	n". Johr	ו Wile	, New Delhi	, 2000		
Refere	ence(s) :									
1.	Katzung,	B.G. "Basic and Clini	ical Pharmaco	logy", Pr	entice I	Hall of	India, New I	Delhi. 199	95.	
2.	Tripathi, Edition,	K.D. "Essentials of N John Wiley, New Delh	/ledical Pharm i, 2000.	acology	", Jaypo	ee Bro	others Medic	al Publis	hers (P) Ltd. 6 th

K.S.Ra	ngasamy College o	f Technology	· - Autono	omous	Regul	ation		R 2007		
Department	Biotechnology	Programm	ne Code &	Name		23 : B.	Tech B	iotechnol	ogy	
		S	Semester '	VIII						
Course Code	Course No	mo	Hour	s/Wee	ek	Credit	M	aximum N	/larks	
Course Code	Course Na	ime	L	Т	Р	С	CA	ES	Total	
07230803P	PROJECT WORK	- PHASE II	0	0	30	20	50	50	100	
Objective(s)	To make the stude	nt understand	the pract	ical pro	blem s	olving proc	ess in th	e Biotech	industry.	
	The student can ur	The student can undertake the project work individually or in a batch consisting a maximum of								
	three students. The	project work	should th	e contir	nuation	of the proj	ect work	phase-I.		
	i. After co	ompletion of \	/II sem ex	ams thi	is phas	e has to be	e comme	enced		
	ii. The wo	ork has to be o	carried ou	t in the	industr	у				
	iii. All the	observations	have to be	e noted	down					
	iv. Testing	and analysis	has to be	e done						
	v. Conclu	sions has to b	be maid							
	vi. The phase I work has to be consolidated with phase II work									
	vii. The pro	oject work mu	st be mad	le in to	a boun	d book forr	n			
	viii. Appear	ing for viva-v	oce exam	s at the	end se	emester				

к	.S.Rang	asamy College of Tech	nology - A	Autonomo	ous R	legu	Iatio	on		R 200)7
Depart	ment	Biotechnology	Progran	nme Code Name	&			23: B.Tecl	h. Biote	chnolog	ĴУ
			E	lective I							
_	<u> </u>	a 11		Hours	s / W	eek		Credit	Ma	aximum	Marks
Course	Code	Course Name		L	Т		Ρ	С	CA	ES	Total
07230	541E	ENVIRONMENTAL BIOTECHNOLOGY		3	0)	0	3	50	50	100
Object	ive(s)	To develop skills of t prerequisite for PG stud	he studer dies in Biot	nts in the echnology	area /.	a of	En	vironmenta	I Biote	chnolog	y and its
1	ENVIRO	ONMENTAL POLLUTION	١				Tota	al Hrs		09	
Sources Pollution- Demand-	of Pollu waste w Chemica	tion-Air Pollution-Acid r rater treatment—Contro I Oxygen Demand.	ain-Effect I measure	of Air po s of wate	llutio er po	n-Co Ilutio	ontro on-D	ol measure Dissolved ox	s of a xygen-l	ir pollut Biologic	ion-Water al oxygen
2	2 SOIL FORMATION Total Hrs 09										
Ecosyste soil forma matter-H	Ecosystem-Formation of Soil-Physical and Chemical process of Soil Formation –Pedogenesis-Factors affecting soil formation-Active factors for soil formation-Soil Classification—Soil complex and its properties-Soil organic matter-Humus formation-Importance of Humic Acid.										
3	SOIL M	ICROBIOLOGY					Tota	al Hrs		09	
Microbial enzymes	Flora Phospha) importan	a of Soil-Microbial atase,Cellulase,Urease a	Growt and Dehyd	h-Ecologic lrogenase)	al and:	Ad thei	lapta rrole	ations of in nature-	Mi Soil mi	croorgna crobial	aisms-Soil population
4	BIODE	GRADATION					Tota	al Hrs		09	
Pesticide DDT-Sim	s-Effects	of Pesticides-Pesticide atics-Chlorinated Polyar	degradation	on-Fungici roleum Pr	des- oduc	effec ts-S	cts c urfa	of fungicides ctants.	s-Fungi	cide de	gradation-
5	BIORE	MEDIATION					Tota	al Hrs		09	
Bioremed indicators manager	diation of s in Bioro nent-Biof	oil spilled and salt aff emediation-Solid Waste ertilizers for poor soil ma	ected Soil managem nagement	s by using ent-dairy,	g mia Pulp	crooi b, D	rgan ye,	iisms and F Leather and	Plants-l d Phar	Role of maceut	Biological cal waste
Total hou	irs to be t	aught								45	
Text Boo	k(s)										
1.	Stainer, Publicat	R.Y.,Ingraham J.L.,Wr ions.	neelis ,M.	L.,painter	.,R.R	.198	89.G	eneral Mi	crobiolo	ogy, N	lc Millan
2.	Foster,	C.f.,John Ware.,d.A.198	7.Environn	nental Biot	echn	olog	ју, Е	Ilis Hon wo	od Ltd.	,	
Reference	e(s) :										
1.	Subba I	Rao,N.S.2004.Soil Micro	biology, O	xford & IB	H Pu	blish	ners	Pvt.Ltd, Nev	v Delhi		
2.	Karnely Biotech	,D.,Charbarty., K.,Omen nology Series,Vol2,Golf	.,G.S.,198 Publishers	39.Biotech Co, Lond	nolog on	gy ar	nd E	Biodegradati	ion, Ad	vances	in Applied

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007											
De	Department Biotechnology Programme Code & Name 23 : B.Tech. Biotechnology											
				Ele	ective I		•					
0	ouroo Codo	Ca			Hou	rs / We	ek	Credit	Ma	ximum N	larks	
		0	uise na	ame	L	Т	Р	С	CA	ES	Total	
C	7230542E	GENOMIC PROTEON	S AND		3	0	0	3	50	50	100	
c	bjective(s)	At the end sequence,	d of the Function	e course the	e studei ics, prote	nts sho eomics	ould hand a	ave the bout the	knowledg tools for	e of the proteomic	Genome cs.	
1	STRUCTUR	RAL GENOMIC	S				Tot	al Hrs		9		
Overv chang mappi sites(\$	changes; SNPs; Genetic analysis: Linkage mapping and analysis; High resolution chromosome maps; Physical mapping, YAC, BAC, Hybrid mapping strategies, microarrays; Sequence specific tags (SST), Sequence-tagged sites(STS), ISH, FISH, RFLP, RAPD											
2 DNA SEQUENCING Total Hrs 9												
Variat etc); A seque	Variations in sequencing methods: Ladder, Fluorescent, Mass Spectrometry, Shotgun, Transposon-mediated, etc); Automation Sequencing; Finding genes and mutations; Implications of DNA sequencing; Implications of sequencing genomes.											
3	FUNCTION	AL GENOMICS	5				Tot	al Hrs		9		
Const Yeast (SADE	ruction and s two-hybrid s E); application	screening of cD ystem, serial an ns of DNA array	NA libr alysis c s, Phar	aries; PCR: of gene expre macogenom	variatio ession (iics.	ns in P SAGE)	PCR; c , SAG	DNA mie E Adapta	croarrays ation for D	gene di Iownsize	sruptions, d Extracts	
4	PROTEOM	ICS		0			Tot	al Hrs		9		
Overv Applic modifi	iew of sequ ations of Pro cations; auto	ence analysis: oteomics: proteo mation.	Databa ome mi	ases, datan ning, protein	nining, S expres	Sequen sion pr	nce all ofiling	ignment; , protein·	Algorithi protein ir	ns in pr nteraction	oteomics, is, protein	
5	TOOLS FO	R PROTEOMIC	S				Tot	al Hrs		9		
2D El analyz	ectrophoresis zers, Peptide	s, IEF, HPLC, Mass Fingerpri	Protein nting; p	digestion te rotein arrays	echnique	s; Mas	ss Spe	ectrophot	ometry: I	MALDI-T	OF, Mass	
Total	hours to be ta	aught								45		
Text b	Text book (s) :											
1. Liebler DC, "Introduction to Proteomics, Tools for the new biology", Humana Press, 2002.												
2.	2. Hunt SP, Livesey FJ, "Functional Genomics", Oxford University Press, 2000.											
Refere	ence(s) :											
1.	Cantor CR,	"Genomics", Jo	hn Wile	ey, 1999.								
2.	Westermier Wiley-VCH,	R, Naven T, 2002.	"Proteo	mics in pra	ctice, A	labora	tory n	nanual o	f proteon	ne analys	sis", John	

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Dep	partment	Biotechnology	Programme	Code 8	Name		23 : B	.Tech. Bi	otechnolo	ogy
			E	ective I						
Cou	rea Cada	Course Nr	mo	Hou	rs/We	ek	Credit	Ma	ximum N	larks
Cou	ise Code	Course Na	ame	L	Т	Р	С	CA	ES	Total
072	230543E	VIROLOGY		3	0	0	3	50	50	100
Obj	ective(s)	At the end of the c classifications and	ourse the stud nfections caus	dents sh sed by v	iould ha riruses.	ave th	e complet	te knowle	dge of V	iruses, its
1	INTRODU	CTION				То	tal Hrs		9	
Gener Molec	al properties ular diagnos	 s – classification – c is of viral infection. 	ultivation - Is	olation	and Ide	entifica	ation of vi	iruses – S	Serodiag	nosis and
2	2 VIRAL VACCINES Total Hrs 9									
Pox vi virus.	Pox viruses – Variola, vaccines. Herpus viruses – Herpus simplex, Varicella zoster, Cytogalovirus, Epstein Barr virus. Adeno viruses – Hepatitis viruses, Papova viruses – Papiloma, Polyoma – Parvo virus.									
3	VIRUSES [DIFFERENT TYPES				То	tal Hrs		9	
Picorn measle	a viruses, F es. Rhabdo	Polio, Rhino virus.Ort virus – Reo virus – R	homyxo virus oto virus.	 Influe 	nza. P	aramy	xo viruse	s – Para	influenza	, mumps,
4	PATHOGE	NIC VIRUSES				То	tal Hrs		9	
Alpha B ence	viruses – Ea ephalitis viru	astern Equine Encep is, KFD – Rubella – F	halitis virus. F tetro viruses –	lavi viru HIV, H	ises – ` TLV.	Yellow	fever viru	us, Dengu	ie virus,	Japanese
5	MODERN	METHODS OF ANIM	AL CARE			To	tal Hrs		9	
Moder pigs. I Dispos	n methods Laboratory u sal of animal	of care, managemen uses of animals with I house wastes.	t, breeding an reference to	d maint Microbi	enance iology,	e of la anyib	b animals ody produ	 rabbits uction. Gr 	, mic, rat notobiotic	ts, guinea animals.
Total h	nours to be t	aught							45	
Text b	Text book (s) :									
1.	1. Chakraborthy P. "A Text book of microbiology", New central book agency Pvt, Ltd, 2003.									
Refere	Reference(s) :									
1.	1. Dimmok N.J, Prmrose S.B, "Introduction to Modern Virology", Blackwell Scientific publications, 1994.									
2.	Partric R. N	A, "Medical Microbiol	ogy", Mosby p	ublicatio	ons, 199	90.				

K.S.Rai	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
Department	Department Biotechnology Programme Code & Name 23 : B.Tech. Biotechnology										
			Elective	e I							
Course Code	Courso No	mo	Hou	rs/We	ek	Credit	М	aximum N	/larks		
Course Coue	Course Na		L	Т	Р	С	CA	ES	Total		
07230544E	MOLECULAR BIO	PHYSICS	3	0	0	3	50	50	100		
Objective(s)	At the end of the biological systems, facilitates the stude	course, the cell permeab ents to take sp	student student student student	t would conforn ion in c	have nation omputa	learnt abo of protein a ational biolo	out mole nd nucle ogy.	ecular stru eic acid. T	uctures of his course		
1 MOLECUL	AR STRUCTURE O	F BIOLOGIC	AL SYST	EM	To	otal Hrs		9			
Intra molecular structure – hyd membranes.	ntra molecular bonds – covalent – ionic and hydrogen bonds – biological structures – general features – water structure – hydration – interfacial phenomena and membranes – self assembly and molecular structure of nembranes.										
2 CONFORM	2 CONFORMATION OF NUCLEIC ACID Total Hrs 9										
Primary structur forms – properti acids – hydratio	re – the bases – suga ies of circular DNA – n of nucleic acids.	ars and phosp topology – po	hodieste blymorph	er bonds ism and	s – dou I flexib	ible helical ility of DNA	structure – struct	e – the a, l ure of ribo	o and z onucleic		
3 CONFORM	MATION OF PROTEI	NS			To	tal Hrs		9			
Conformation or tertiary structure	f the Petide bond – s e – folding – hydratio	secondary str	uctures - – hydropa	 Rama athy ind 	achand lex.	ran plots –	use of p	potential f	unctions –		
4 CELLULA	R PERMEABILITY A	ND ION TRAI	NSPORT	-	To	tal Hrs		9			
Ionic conductiv conduction – tee	ity – transport acros chniques of studying	ss ion chanr ion transport	nels – m and mod	iechani: Iels.	sm –	ion pumps	– proto	on transfe	r – nerve		
5 ENERGET	TICS & DYNAMICS C	F BIOLOGIC	AL SYS	TEMS	To	tal Hrs		9			
Concepts in Th potential – basis	nermodynamics – fo s properties of fluids a	rce and moti and biomateri	on – en als – lan	tropy a ninar an	nd sta d turbu	bility – ana ulent flows.	alysis if	fluxes -	diffusional		
Total hours to be taught 45											
Text book(s):	ext book(s):										
1. Springer, V	1. Springer, V., Glaser, R. "Biophysics", 2000.										
Reference(s) :	eference(s) :										
1. Duane,R. '	Biophysics : Molecul	es in motion"	, Acaden	nic pres	s,1999).					

K.S.Rang	jasamy College of Tec	hnology, Auto	onomo	us Reg	julatio	on		R 20	07	
Department	Biotechnology	Programme	Code 8	k Name	;	23: B.	Fech. B	iotechno	logy	
		Electiv	e II							
			Hou	rs / We	ek	Credit	Ma	aximum l	Marks	
Course Code	Course Na	ime	L	Т	Р	С	CA	ES	Total	
07230651E	FOOD SCIENCE AN TECHNOLOGY	D	3	0	0	3	50	50	100	
Objective(s)	At the end of the cour Food processing & its to take up higher stud	irse, the studer s importance fo dies in the area	nt would or indus	d have strial ap	gaine plicat	d knowled ions. This	dge in v will fac	arious a ilitate the	spects of e student	
1 PRINCIPLE	S OF FOOD PROCESS	SING		Т	otal ⊦	Irs		9		
Scope and import Sterilization, Paste irradiation	ance of food process urization, Canning, an	sing - Principle d blanching -	es and Freezii	methong, Re	ods c frigera	of food p ation, deh	reserva lydratio	tion – n, additi	Types of ves, and	
2 TYPES OF FOOD PROCESSING AND PRESERVATION 9										
Fruit and vegetable Technology – Preservation of fruits and vegetables by heat, chemicals, sugar, salt, fermentation, drying etc.; Technology of milk and milk products - processing of market milk, Milk product processing - cheese, butter, ice cream - Processing of meat and meat product. cereal and legume technology – rice, wheat - products – bread making etc.,										
3 FOOD BIOT	ECHNOLOGY	,		Т	otal ⊦	Irs		9		
Current status of modified foods; mid beer and wine, App	food processing indus roorganisms as food - lications of enzymes in	tries- applicati Single cell prot food processin	on of E tein - Te ig indus	Biotech echnolo stry.	nolog ogical	y to food aspects c	produo of indus	ction. Ge trial proc	enetically luction of	
4 FOOD MICE	ROBIOLOGY			Т	otal ⊢	Irs		9		
Microbial growth pa associated with for infections and food	attern, Factors influenci od, mold, yeast and ba intoxication	ng the growth acteria. Food s	of micr spoilage	oorgan e -Fact	isms. ors re	Types of sponsible	microo for foc	rganism od spoila	normally age; food	
5 FOOD QUA	LITY ASSURANCE			T	otal F	lrs		9		
Food safety - Age food safety. Senso	encies that control food ry analysis in quality co	supply; Nation ntrol, Food law	al and s and s	Interna tandar	tional ds, Sa	guideline afety meas	s. Food sures.	l adultera	ation and	
Total Hours to be	Taught							45		
Text book (s) :										
1. Frazier, W.C. and Westhoff, D.C., "Food Microbiology", Tata McGraw-Hill Publishing Company Ltd., New Delhi. 1995.										
2. Sivasankar, Delhi, 2005.	B., "Food Processing a	nd Preservatio	n". Thir	d Editi	on, Pı	entice Ha	II of Inc	lia Pvt. I	_td., New	
Reference(s) :										
1. James M Delhi,2005.	lay, Modern Food Mi	crobiology. Fo	ourth E	dition,	CBS	Publishir	ng Com	npany L	td., New	
2. Prescott and 1987.	Dunn, Industrial Micro	biology, Fourth	h Editio	n, CBS	S Pub	lishing Co	ompany	Ltd., Ne	ew Delhi,	

K.S.	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007											
Departmen	Department Biotechnology Programme Code & Name 23: B.Tech. Biotechnology											
	Elective II											
Course Cod		ame	Hou	irs / We	ek	Credit		Maximum	Marks			
		anie	L	Т	Р	С	CA	ES	Total			
07230652E	MARINE BIOTECH	NOLOGY	3	0	0	3	50	50	100			
Objective(s	At the end of the	course the stu	dents s	hould I	nave	enough	knowle	dge about	the Marine			
	UCTION TO MARINE N	AICROBES IN 1	nedical THF OC	importa FAN		r marine	organis	sms. 9				
1 INTRODUCTION TO MARINE MICROBES IN THE OCEAN Total Hrs 9 Marine microbial diversity - Criterion Habitats -Presence of other organisms: Symbiotic, Free-living, Biofilm, Proximity to the ocean surface or sediments :Euphotic -Mesopelagic - Bathopelagic - Benthos (sediments)- Concentration of nutrients and required growth substrates: Oligotrophic, Mesotrophic , Eutrophic - interactions between marine microbes: symbiosis and pathogenesis: the abundance and distribution of bacterial and viral pathogens - Metabolic capabilities of marine microbes: adapting to extreme environments - Algal blooms- marine bacteria. Applying marine microbes using biotechnology: industrial applications, energy production, medical applications, using marine microbes to meliorate environmental deterioration. 9 2 BIOTECHNOLOGY OF AQUATIC ANIMALS Total Hrs 9 Shellfish and Crustacean Culture; Aquaculture- shrimps, edible mussels, pearl oyster, crabs; Fish Physiology - reproductive genetics: gynogenesis, androgensis, polyploidy, control of sex, artificial insemination, eye stalk ablation - Development of Healthy Fish Diets, Disease Prevention in Fish, and .GM fish and shellfish- Disease resistance in marine animals and DNA Vaccine development for aqua cultured fish - gene banks, cryopreservation. Isolation and characterization of biosynthetic gene clusters, the cloning and expression of the genes in recombinant systems, mariculture and aquaculture of marine invertebrates such as bryozoans, sponges, and tunicates. Isolation, cultivation and fermentation of microorganisms from their invertebrate hosts. 9 3 BIOMEDICAL IMPORTANCE OF MARINE ORGANISMS Total Hrs 9												
4 BIOMA	TERIALS AND BIOPRO	:s CESSING			Tot	al Hrs		9				
Polymers & flavourants - halophilic ba	biomaterials: agarose, environmentally friendly steria and artemia in salt	agar, alginates antifouling con	s, carra	igeaas, s Biopo	chitin tential	, chitosa uses of	an, cai haloph	rotene, hej nilic organis	parin,marine sms. Role of			
5 ENVIR BIOTE	ONMENTAL IMPACTS (CHNOLOGY	OF AQUATIC			Tot	al Hrs		9				
Control of oil	spills and bioremediatio	n - viral therapy and Benefits	Gene	tically E	Engine	ered Ma	rine Or	ganisms :				
Total hours to be taught 45												
Text book (s	Text book (s) :											
D. H. A 1. Bioactiv	ttaway and 0. R. Zab e Natural Products. New	oorsky. (eds). ' v York: Plenum.	'Marine 1993.	Biotec	hnolo	gy": Volu	ume I,	Pharmace	euticals and			
Reference(s)	:											
1. P. Web	er. "Abandoned seas: Re	eversing the dec	cline" W	orld Wa	atch. F	aper 116	6, Nove	ember, 199	3, p.5			
2. D. A. F Biotech SIDA. S	1. D. A. Powers "New frontiers in marine biotechnology: Opportunities for the 21st century." In: Marine Biotechnology in the Asian Pacific Region (eds). C. G. Lundin and R. A. Zilinskas. The World Bank and SIDA. Stockholm. 1995, p. 17											

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
De	partment	Biotechnology	Programme	Code &	Name		23 : I	B.Tech.	Biotechnol	оду
			E	lective II		•				
Cour	aa Cada			Hou	rs / We	ek	Credit	Ν	Maximum M	larks
Cours	se Code	Course Na	ame	L	Т	Р	С	CA	ES	Total
0723	30653E	METABOLIC ENGI	NEERING	3	0	0	3	50	50	100
Obje	ective(s)	At the end of the of secondary metabolic	course, the stutes, Bioconvers	ident wo	ould ha	ve lea releva	arnt abou nce to Ind	it Biosy dustrial	nthesis of applications	primary & 3.
1	INTROD	JCTION				Tot	al Hrs		9	
Induct regula cumul regula group	ion-jacob ition in br ative feed ition of rna transporta	monod model, catab anched pathways, c back regulation, amn synthesis, energy c tion.	olite regulatior lifferential regu io acid regulati harge, regulati	n, gluco ulation t ion of rn on, perr	se effe by isoe a synth neabilit	ct, ca nzyme iesis, e y cont	mp defic es, conce energy ch rol passi	iency, f erted fe narge, r ve diffu	eed back r eed back r egulation, a sion, active	egulation, egulation, mino acid transport
2	2 SYNTHESIS OF PRIMARY METABOLITES Total Hrs 9									
Alterat of peri	tion of feed meability, r	back regulation, limi metabolites.	ting accumulat	ion of er	nd prod	ucts, f	eedback,	, resista	int mutants,	alteration
3	BIOSYN	THESIS OF SECOND	ARY METABC	LITES		Tot	al Hrs		9	
Precu regula	rsor effect ition by pas	s, prophophase, idio ssing control of secon	phase relatior dary metabolis	nship, e m, prod	nzyme ucers o	induc f seco	tion, fee ndary me	dback etabolite	regulation, es	catabolite
4	BIOCON	VERSIONS				Tot	al Hrs		9	
Advan synthe biocor	itages of lesis, mutanversions,	bioconversions, spec tion, permeability, c conversion of insolub	ificity, yields, f co-metabolism, le substances	factors i avoida	mporta ince of	nt to proc	bioconve luct inhit	rsion, r pition, 1	regulation o mixed or s	of enzyme sequential
5	REGULA	TION OF ENZYME P	RODUCTION			Tot	al Hrs		9	
Strain catabo	n selection olite repres	, improving fermenta	ation, recognis nt to repressior	ing grow n, gene d	wth cyc dosage.	le pe	ak, induc	ction, fe	ed back re	epression,
Total hours to be taught 45										
Text b	Text book (s) :									
1.	Wang D. Enzyme	I.C., Cooney C.L., I Technology", John W	Demain A.L., I iley And Sons.	Dunnil.P 1980.	, Hum	phery	A.E., Lil	ly M.D.	., "Ferment	ation And
2.	Stanbury	P.F., And Whitaker A	., "Principles C	of Ferme	entation	Techr	nology", F	Pergamo	on Press, 19	984.
Refere	Reference(s) :									
1.	Zubay G.	, "Biochemistry ", Ma	cmillan Publish	ers, 198	9.					

	K.S.Rangasamy College of Technology, Autonomous Regulation R 2007										
Depa	rtment Biotechnology Programme Code & Name 23 : B.Tech. Biotechnology										
			Elect	ive II							
Course		Course	Nome	Hou	rs / W	eek	Cred	it	Max	kimum I	Marks
Cours	se Code	Course	ename	L	Т	Р	С		CA	ES	Total
0723	30654E	CHROMATOGRAF SEPARATIONS	PHIC	3	0	0	3		50	50	100
Obje	ctive(s)	At the end of the chromatography. T fields in Biotechnol	course the studen he student will knov ogy.	ts wou v about	ld hav the a	e lear pplicat	rnt abo tions of	ut t chr	he differ omatogr	rent me aphy in	ethods of different
1	INTROD	UCTION						Т	otal Hrs		12
Class retent shape	Classification of techniques, distribution coefficients, retention chromatography, sorption mechanisms, retention parameters, factors affecting retention, qualitative and quantitative aspects of chromatography, peak shape sorption isotherms, column efficiency, band broadening processes, selectivity and resolution.										
2	2 CLASSICAL CHROMATOGRAPHY Total Hrs 07										
Statio High p	nary and performan	mobile phases, applice thin layer chroma	lications of ion excha atography (HPLC) ar	ange siz nd HPT	ze excl LC	usion,	Thin la	ayer	chroma	atograpl	ny (TLC),
3	HIGH PI	ERFORMANCE LIQ	JID CHROMATOGR	APHY				Т	otal Hrs		10
Introd	uction – c	lesign – design of a t	typical HPLC machin	e – typ	e of co	lumns	- manu	ufac	cturing a	oplicatio	ons.
4	GAS CH	ROMATOGRAPHY						Т	otal Hrs		10
Introd quant	uction – itative ana	instrumentation – c alysis of GC.	olumns – qualitativo	e and	quanti	ative	aspects	s of	f gas ch	romato	graphy –
5	TYPES	OF CHROMATOGR	APHY				-	Tota	al Hrs		12
Princi	ples – typ	es of chromatograph	ny – scopes and limit	ations -	- appli	cations	s – capi	illar	y electro	phoresi	S.
Total	Hours to	be taught									45
Text b	ooks :										
1.	1. Swell, P.A. and Clarke, B., "Chromatographic separations", John Wiley & Sons, Singapore, 1991.										
2.	2. Lindsay, B., "High Performance Liquid Chromatography", John Wiley & Sons, Singapore, 1991.										
Refer	References :										
1.	1. Wilhard, F. and Meritt, F., Instrumental methods of chemical analysis. Fifth Edition, D. Vannostrand, New York, USA. 1994.										
2.	Wilson,	K. and Walker, J. Pr	actical Biochemistry,	Cambr	idge U	nivers	ity Pres	ss, l	JSA. 200)3.	

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007											
D	epartment	Biotechnology	Programr	ne Cod	e & Na	me	23	B.Tech.	Biotech	nology		
				Elective	e III							
6	ureo Codo	Course Nor	20	Hou	rs / We	ek	Credit		Maximur	n Marks		
CO		Course har	ne	L	Т	Р	С	CA	ES	Total		
07	7230661E	IMMUNOTECHNOL	OGY	3	0	0	3	50	50	100		
O	bjective(s)	To develop the skills studies in biotechno learnt various techn purification of antige	s of the stude logy and rela iques like d ns, antibody	ents in t ated fiel evelopir enginee	he are ds. At ng diag ering et	a of ir the e gnosti c.	mmunotech nd of the co c tests, cha	nology p ourse th iracteriz	ore- requ e studer ation of	esting for PG it would have lymphocytes,		
1 INTRODUCTION Total Hrs 09												
lmr imn	nmunogens and antigens- Classification of the immune response: Innate: Role of inflammatory cells, acquired nmunity and its components. Adjuvants and their mode of action.											
2	IMMUNOD	IAGNOSIS				Tota	l Hrs		09			
We	stern blot a	nalysis, immuno elect	rophorosis,	SDS-P	AGE,	purific	ation and s	synthesis	s of anti	gens. ELISA-		
3		PATHOLOGY	and application			Tota	I Hrs	A), IIIIII	09	matography.		
Pre	paration and	d storage of tissues,	identification	of vari	ous ce	ll type	es and antio	aens in	tissues.	Isolation and		
cha	racterization	of cell types from	inflammatory	/ site a	nd inf	ected	tissues. In	munocy	/tochemi	stry- immuno		
fluc	prescence, in	nmuno enzymatic and	immuno ferr	tin tech	niques	and in	mmunoelect	ron mici	roscopy.			
4	MOLECU	LAR IMMUNOLOGY				Tota	al Hrs		09			
Vac imn pro	/accine Types, Preparation of vaccines, application of recombinant DNA technology for the study of the mmune system, production of antidiotypic antibodies, catalytic antibodies, application of PCR technology to voduce antibodies and other immunological reagents, immuno therapy with genetically engineered antibodies											
5	5 TECHNIQUES IN IMMUNOTECHNOLOGY Total Hrs 09											
Tre ant	nds in immu ibody, assay	unology of infectious s of circulating immun	diseases an e complexes	d tumo . Isolati	urs. Ai on of ly	ntigen /mphc	 antibody cyte popula 	interactions.	ons, Isol	ation of pure		
Tot	al hours to b	e taught			-				45			
Тех	ext book (s) :											

Roitt, I. Brostoff, J. and David, M. Immunology, 6th Edn. Mosby publishers Ltd., USA. 2001. 1.

Talwar G. P. and Gupta S. K. A hand book of practical and clinical immunology, Vol. I &II. CSB 2. Publications, New Delhi, 1992.

Reference(s) :

1. Kuby, J.H. Immunology, 5th Edn. W. H. Freeman Publication USA. 2002.

Tizard, R.I. Immunology, 4 th Edn. Saunders college Publishing, USA. 2004. 2.

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
De	partment	Biotechnology	Programme	Code &	Name		23 : B.	Tech. Bi	otechnolo	gy	
				Elective							
Cou	uraa Cada	Course	Nama	Hou	rs/We	ek	Credit	Ma	aximum N	larks	
00	lise Code	Course	Name	L	Т	Р	С	CA	ES	Total	
072	230662E	DAIRY AND BAK TECHNOLOGY	ERY	3	0	0	3	50	50	100	
Obj	jective(s)	At the end of the processing partic strength among the	course the studularly in Bakery nem.	ents wou and Da	ild have iry tech	e learni nology	about Scie which cou	ence of T Ild deve	Fechnolog lop entrep	y of food preneurial	
1	INTRODU TECHNOL	CTION TO BAKEF	RY AND DAIRY			Тс	otal Hrs		09		
Curr Equi Tech	ent status, ipments us nnology- De	growth rate, and sed, product quali efining and assessi	economic impor ty characteristic ng quality of ingr	tance of s, faults edients &	Bakery and c produce	and [correcticts	Dairy Industive measur	try in Ind es for	dia. Produ Bakery a	uct types, ind Dairy	
2	2 TECHNOLOGY OF BREAD MAKING Total Hrs 09										
Plan treat Cha	Plant layout of a bakery. Ingredients & processes for bread making -Characteristics of yeast; Wheat flour - treatments – Grade and ageing of flour – Tests for flour quality; Method and Steps involved in Processing – Characteristics of good bread; Defects, causes and remedies.										
3	BAKERY	PRODUCTS				To	tal Hrs		09		
Cak Mod Bisc and	es-Different ified sugar uits -Ferme remedies ir	t types of cake mak batter method; W ented dough biscui n Cakes .Biscuits a	king processes; S hipping and Ble ts, Cookies, Cre nd Pastry produc	Sugar ba nding m am biscu cts	tter met ethod. I iits, Pas	hod; F mporta stry-Sh	lour batter r ance of bak ort crust ; F	nethod; king time Puff Flak	e and tem sy, Defects	perature; s, causes	
4	MILK PRC	CESSING TECHN	IOLOGY			To	tal Hrs		09		
Phys proc of ac	sicochemica essing, coo dulteration.	al characteristics of bling, storage, trans determination of p	of milk and fact sportation, of liqu rice of the milk	ors affeo uid milks.	cting the quality	em. P asses	roduction, o sing of milk	collection in dairy	n, Standa / industry-	rdization, detection	
5	TYPES O	F MILK PRODUCT	S			То	tal Hrs		09		
Meth shel and	nods of pre f-life of crea other milk p	paration/productio am, butter; evapora products	n, quality gradin ated ,condensed	g param and skir	eters, p nmed, i	ackag nstant	ing, storage s milk powo	e charac ders, Ice	teristics, -Creams,	uses and cheeses,	
Total Hours Taught 45											
Text	Text book (s) :										
1.	1. Cereals in Bread making: A molecular colloidal Approach by Ann-Charlotte Eliasson and Kare Larsson, CBS Publishers and Distributed, New Delhi.										
2.	2. Milk and Dairy product Technology by Edgar Spreer; 2005, CBS Publishers and Distributed, New Delhi.										
Refe	Reference(s):										
1.	Milk and M	lilk Products by Ec	kles, Combs; and	d Macy,	Tata Mo	Graw	Hill.				

	K.S.Rangasamy College of Technology - Autonomous Regulation R2007										
Depa	epartment Biotechnology Programme Code & Name 23 : B.Tech. Biotechnology										
			Ele	ctive III							
Cours	so Codo	Course N	mo	Hou	rs/We	ek	Credit	Ma	aximum N	/larks	
Cours	se Code	Course Na	ame	L	Т	Р	С	CA	ES	Total	
0723	30663E	NANOSCIENCE ANI TECHNOLOGY	D	3	0	0	3	50	50	100	
Obje	ective(s)	At the end of the Nanobiotechnology, delivery, cancer treat	course, the sinvolvement mathematic course, the second sec	students acromole	would ecules	d hav in Na	e gained nobiotechr	extens iology, a	ive knov applicatio	vledge in n in drug	
1	INTROD	UCTION TO NANOBI	OTECHNOLOG	θY			Total	Hrs		9	
Introdu techni and bo	Introduction to nanobiotechnology-micro and nanosystems and technologies; overview of nanodevices and techniques. Synthesis and characterization of nanoscale materials- stratergies for nanoarchitecture (topdown and bottom up approaches) - fabrication technologies and characterization – self assembly systems.										
2	2 SYNTHESIS OF NANOPARTICLES Total Hrs 9										
Inorga charao gold, s	Inorganic nanoscale systems for biosystems-nanostructure materials –fullerness: properties and characterization – carbon nano tubes: characterization and application-quantum dots and wires. Synthesis of gold, silver and silica nanoparticles – nanopores.										
3	NANOM	OLECULES IN BIOSY	′STEMS				Total	Hrs		9	
Nanor cells- nanod	nolecules peptide c levices, lip	in biosystems-protein coupled nanoparticles ids in self assembly st	s, lipids,RNA ar – DNA basec ructures.	nd DNA- d artificia	nanoso al nano	cale e ostruct	lements fo tures – pr	r deliver oteins a	ry of mate as comp	erials into onents in	
4	USE OF	MICROORGANISMS	IN NANOBIOT	ECHNO	LOGY		Total	Hrs		9	
Nanot	piotechnol	ogy and Microorganis	ms -PHA in Na	nobiotec	hnolog	у –суа	aophycin ir	nclusion	s- magne	tosomes-	
aligna	APPLIC	riophages-bacterial sp ATION OF NANOBIOT	ores-bacterial p	orotein co	omplex	es-s-la	ayer proteii Total I	ns-bacte Hrs	eriorhodo	psin. 9	
Nanot		av in drug delivery-	nanoscale devi	ces for	drua d	eliver	-micelles	for druc	ı delivery	<u> </u>	
targeti	ing: sma	Il molecules-protein anotechnology for car	interactions-m	icroarra	/ and ment. N	gen Janobi	ome chip	s- nar gy for ce	obiosens Il destruc	sors and tion.	
Total	Hours Ta	ught								45	
Text b	Text book (s) :										
1.	 K.K.Jain(2006), Taylor - Nanobiotechnology in molecular diagnostics –current techniques and applications. 										
2	Bernard	H.A Relim - Microbial I	Bionanotechnolo	ogy							
Refere	Reference(s):										
1.	1. O.V.Salata.Journal of nanobiotechnology(2004),2:3. Applications of nanoparticles in biology and medicine										
2.	CM.Nier	neyer and CA Mirkin.N	lanobiotechnolo	gy – coi	ncepts	, appli	cations and	d perspe	ectives.		

K.S	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
Departm	nent	Biotechnology	Programme	Code &	Name		23 :	B.Tech. E	Biotechnolo	ogy	
				Elective	III						
Course Co	da		200	Hou	rs / We	ek	Credit	M	laximum M	arks	
	ue	Course na	ame	L	Т	Р	С	CA	ES	Total	
07230664	ŧΕ	BIOTECHNOLOGY CELLS	OF STEM	3	0	0	3	50	50	100	
Objective((s)	At the end of the research methodolo	course the s ogies.	tudents	will ha	ve en	ough kno	wledge	about the	stem cell	
1 ORIGI	IN O	F HUMAN STEM CE	LLS			Tot	al Hrs		9		
Origin and characteris therpies,sc stem cell ba	chai ation ientif ased	acterisation of huma of human stem ce ic and technical odst theraphy.cord blood	an stem cells a lls,plasticity of acles to overco ,stem cell mar	and pote human ome befo ker	ntial ap somati pre reali	plication c sten ising th	ons for st n cell res ne potenti	tem cell search.nc al clinica	research. ovel stem luse of no	Origin and cell based vel human	
2 HUMA	2 HUMAN EMBROYONIC STEM CELL RESEARCH Total Hrs 9										
regulation	Possible sources for human embryonic stem cell, Growing human ESC in laboratory, Current advantages and limitations of hESC and human somatic cells, Examination the need for new cell lines, Developments regarding establishment of human stem cell banks and registries. Government of hESC research, Ethical issues at stake, regulation in European member states regarding human ESC research, Regulation in some Non European countries regarding hESC research.										
3 PRO OF S	TEM	CELLS	N AND IDEN I	IFICATIO	JN	lot	al Hrs		9		
Preparatior from huma	n of o n, ne	exomplete neurocultu aurospheres into neuro	ire, culturing a ons, astocytes	nd subc and olig	ulturing godentre	humai ocytes	n neurosp ; Immuno	oheres, D labeling)ifferentiati procedure	on of cells	
4 GENE	E TH	ERAPY				Total	Hrs		9		
Possibilities new therap Stem cells therapy, he	s to by for in tro erm -	overcome immuno-r autoimmune disease eatment for major di line therapy.	ejection in ste e, Prenatal dia sease and rep	em cell t gnosis o arative r	herapy, f geneti nedicin	Haem c abno e, ESC	natopoieti ormalities C a promi	c stem c using fet ising tool	cell transpl al CD34+ s for cell re	antation-A stem cells. placement	
					matab			to of oo	9	truction of	
connective material, c hollow fibre	tissi ultur sys	and consideration- ues, reconstruction c e on a single surfact tems, Microcarrier ba	f epithelial or te and sandw ased systems,	endothe ich conf tissue er	, metab lial surf iguratio ngineeri	aces- n, bioi ng of t	cells emb cells emb reactor d he liver	bedded ir esign on	n extracelli tissue en	ular matrix gineering-	
Total hours to be taught45											
Text book (Text book (s) :										
1. Anima	al cell	culture - A practical	approach by J	ohn R.W	/. Maste	er - Ox	ford Univ	ersity Pre	ess, 2004.		
Reference((s) :										
1. Rober	Tissue engineering, Principles and applications in engineering by Bernhard palsson, Jeffery A.Hubble, Robert P.Lonsey, Joseph D. Bronzino- CRC press, 2005.										

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
De	partment	Biotechnology	Programme	Code &	Name		23 : B.	Tech. B	otechnol	ogy
			Ele	ctive IV						
Col	uraa Cada	Course N	200	Hou	rs / We	ek	Credit	M	aximum I	Marks
COL		Course Na	ame	L	Т	Р	С	CA	ES	Total
072	230771E	TISSUE ENGINEE	RING	3	0	0	3	50	50	100
Ob	jective(s)	At the end of the co	ourse the stude	ents will	have er	nough	knowledge	e of tiss	ue engine	eering.
1	INTRODUC	TION TO TISSUE E	NGINEERING			Tot	al Hrs		9	
Basic	definition; cu	rrent scope of develo	pment; use in	therape	utics ar	nd in v	ritro testing	I		
2	STRUCTUR	RE AND ORGANIZA	TION OF TISS	UES:		Tot	al Hrs		9	
Epithe	elial, connecti	ve; vascularity, lymp	h. Basic develo	opmenta	al biolog	ју				
3	3 TRANSPORT PROPERTIES OF TISSUES Total Hrs 9									
Introd	ntroduction to mass transfer, Diffusion of simple metabolites, Diffusion & reaction of proteins									
4	GENERAL	ASPECTS OF CELL	S IN CULTUR	E		Tot	al Hrs		9	
Trans Differe tissue Quant	port limits on ential cell adl engineering titative analys	3D cultures, Cell-Ma nesion & tissue organ , Scaffolds & tissue sis of receptor-ligand	atrix & Cell-Ce nization, Horm e engineering binding, Applic	II Intera one & C - Basic cations c	ctions, Growth C prope of growt	cell m Factor erties, th fact	igration an Signaling Basic tra ors: VEGF	d contro , Growt nsplanta /angiog	ol of cell h factor c ation imr enesis	migration, delivery in munology,
5	STEM CEL	LS				Tot	al Hrs		9	
Introd marke liver ti	uction, Hema ers, FACS ar ssue enginee	topoiesis, Stem cells alysis, Basic wound ering. In vitro organoc	& bone, ES o healing, Intro genesis, Physic	ells, Ce duction	ll surfac to live models	ce r path	ophysiolog	y, Cell	transplar	ntation for
Total	hours to be ta	aught	• • •						45	
Text b	ook (s) :									
1.	1. Samuel E. Lynch, Be Roberts J. Geng, "Tissue Engineering".									
2.	2. Bernard Prish, "Tissue-Engineering'.									
Refere	Reference(s) :									
1.	Lanza And	Langer, "Principle Of	Tissue Engine	ering".						
2.	2. Atala And Lanza (Elsevier), "Methods Of Tissue Engineering".									

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
De	partment	Biotechnology	Programme	Code &	Name		23 : E	B.Tech. B	iotechnol	ogy
		·	EI	ective IV	/	•				
0		Ocurre N		Hou	rs/We	ek	Credit	М	aximum I	Marks
Cours	se Code	Course Na	ame	L	Т	Р	С	CA	ES	Total
0723	30772E	MOLECULAR PHY	LOGENY	3	0	0	3	50	50	100
Obje	ctive(s)	At the end of the c	ourse the stude	ents will	have e	enough	h knowled	lge of mo	lecular p	athogeny,
- 1		pathogenic interacti	ons and moder	n metho	ds to co	ontrol	pathogen	s.	0	
lliotori						Tota	HIS Hone Deb		9	tee eerbu
discov	eries of m	nicrobial toxins vacc	ines antibiotic	s and b	irth of	molec	ular dene	tics and	s posiula morden	molecular
pathog	genesis stu	idies, various pathog	ens types and i	modes o	f entry.	molee	ului gene		moracii	molecular
2	HOST - I	DEFENSE AGAINST	PATHOGENE	SIS AND)	Tot	al Hrs		9	
A	PATHOG	ENIC STRUCTURE	<u>S.</u>							<u> </u>
Attribu	ites and co	omponents of microt	bial pathogene	sis, host	defens	SE, SKI	in mucosi	a, cilia, s ing by bi		s, physical
defens	se mechan	isms. complements.	inflammation p	process.	denera	disea	ase sympt	toms. pat	hogenic a	adaptation
to ove	rcome the	above defenses.	•		0		5 1	<i>,</i> 1	0	•
3	MOLECU	LAR PATHOGENES	IS(WITH SPEC	CIFIC		Total	Hrs		9	
Vinula	EXAMPL	ES)		factore	م ام ما		life et de	factors	malaaula	* *****
and a	nce, virulei ene regula	ation in virulence of	pathogens V	ibrio ch	and vin olera (choler	a toxin c	oregulate	noiecula d pili fil	amentous
phage	, survival E	E.Coli, Pathogens: Er	nterotoxigenic E	E.Coli (E	TEC) la	abile a	nd stable	toxins, E	ntero – p	athogenic
E.Coli	(EPEC),	type III secretion, c	ytoskeletal cha	anges, i	ntimáte	attac	hment: E	Enterohae	merroho	gic E.Coli
(EHEC	C), mechai	nism of bloody Diarr	hoea and hem	nolytic u	remic s	syndro	me, Ente	roagrigat	ve E.Col	i (EAEC).
Shige	la, entri, n	nacrophage, apoptos	is, induction o	f macrop	pinocyto	osis, u	ptake by	epithelia	I cells, in	tracellular
spread	d, inflamm	latory responses, ti	ssue damage	plasmo	odium:	Life	cycle, ery	ythrocyte	stages,	transport
transp	ort antima	l processes to support	n ine rapidiy gi	owing St De Influe	onizoni 2072 vi	, para:	intracellul	vacuoles		be protein
haema	adlutinin i	n entry.M1 & M2 prot	eins in assemb	lv and d	isasser	nblv. a	intracental	mantidine	, neuran -	
4	EXPERIN	IENTAL STUDIES O	N HOST – PAT	HOGEN	IIC	Total	Hrs		9	
	INTERAC	TIONS								
Virula	nce assay	s: adherence invasion	on, cytopathic,	cytotox	ic effe	cts. C	riteria &	testsin ic	lentifying	virulence
factors	s, attenua	ted mutants, molect	ular characteri	zation o	of virul	ence	factors, s	signal tra	ansductio	n & host
respor	MODERN			THOGE	NS	Tota	Hrs		Q	
Classi		ches based on ser			nie ha			CONSORVO		o factors
immur	10 & DNA	based techniques.	New therape	eutic stra	ategies	base	d on rea	cent find	inas on	molecular
patho	genesis of	variety of pathogens,	vaccines – DN	IA, subu	nit and	cockta	ail vaccine	es.	inge en	
Total I	nours to be	taught							45	
Text b	ook (s) :									
1.	Iglewski,	B.H. and Clark V.L. "	Molecular basis	s of bact	erial pa	thoge	nesis", Ac	ademic p	oress, 199	90.
2.	Peter, W 1998.	. Julian, K. & George	e, S. "Methods	in micro	biology	: Bact	erial path	ogenesis	", Acadei	mic press,
Refere	ence(s) :									
1.	Recent re	views in infection.Im	munology.,Mol	.Microbio	ol,Bioch	nem.J.	,EMBO			
2.	Nester,A	nderson,Roberts,Pea	rsiall,Nester, "N	Aicrobiol	ogy: A	Huma	n perspec	ctive", Mc	Graw-Hill	, 2001

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Depa	rtment	Biotechnology	Programme C	Code & N	lame		23 : B	Tech. B	otechnol	ogy
			Ele	ective IV						
Cours	o Codo	Course	Jamo	Hou	rs / We	ek	Credit	M	aximum I	Marks
Cours		Course i	Name	L	Т	Р	С	CA	ES	Total
0723	0773E	CANCER BIOTECH	INOLOGY	3	0	0	3	50	50	100
Obje	ctive(s)	At the end of the identifications of casynthesized for can Cancer Biology.	course, the stu ancer through to cer therapy. This	dent wo ools dev will be v	uld ha eloped ery ber	ive lea by b neficia	arnt abou iotechnolc I for the st	t pathog ogy rese udent to	enesis o arch & take up j	of cancer, molecules projects in
1	FUNDA	MENTALS OF CANC	CER BIOLOGY			Т	otal Hrs		09	
Regula tumou Cance early o	ation of c r suppre r screen diagnosis	ell cycle, mutations the sor genes, modulating and early detection of cancer.	hat cause change tion of cell cycle on, Detection usir	s in sigr in cano ng biocho	al mole cer, difi emical	ecules ferent assay	, effects o forms of s, tumor n	n recepte cancers narkers,	or, signal , diet an molecula	switches, d cancer. r tools for
2	PRINCI	PLES OF CARCINO	GENESIS				Total Hrs		09	
Theor carcin	y of care ogenesis	cinogenesis, Chemic , x-ray radiation-mec	al carcinogenesi hanisms of radiat	s, meta ion carci	bolism nogene	of ca esis.	ircinogene	sis, prir	ciples o	f physical
3	PRINCI CANCE	PLES OF MOLECUL	AR CELL BIOLO	GY OF		Tota	Hrs		09	
Signal oncog transfo	l targets enes, de ormation.	and cancer, activati etection of oncoge Telomerases.	on of kinases; C nes. Oncogenes	ncogen s/proto	es, ide oncoge	ntifica ene a	tion of on activity. G	cogenes rowth f	, retrovir actors r	uses and elated to
4	PRINCI	PLES OF CANCER N	/IETASTASIS			Tota	Hrs		09	
Clinica memb	al signific rane disr	cances of invasion, uption, three step the	heterogeneity o ory of invasion, p	f metas roteinas	tatic pl es and	henoty tumo	/pe, meta ur cell inva	static ca ision.	ascade,	basement
5	NEW M	OLECULES FOR CA	NCER THERAPY	/	Г	Total H	lrs		09	
Differe of can	ent forms cer, adva	of therapy, chemother	erapy, radiation th tion. Use of signa	nerapy, o al targets	detections toward	on of c ds the	ancers, pi rapy of ca	rediction ncer; Ge	of aggre	ssiveness)y.
Total I	nours to b	be taught							45	
Text b	ook (s) :									
1.	Maly B.	W.J, "Virology A Prac	ctical Approach", I	RLI Pres	ss, Oxf	ord, 19	987			
2.	Dunmo Oxford,	ck N.J And Primrose 1988.	S.B., "Introduction	n to Mod	ern Vir	ology"	, Blackwe	Il Scienti	fic Public	ations,
Refere	ence(s):									
1.	"An Introduction Top Cellular And Molecular Biology of Cancer", j Oxford Medical Publications, 1991.									

	K.S.Ra	ngasamy College of T	echnology	- Auton	omous	Regu	lation		R 20	07
Dep	artment	Biotechnology	Program	ne Code	& Nam	e	23:B.	TechBi	otechnolo	gy
				Elective	IV					
Cour	aa Cada	Course Nom		Hou	rs / We	ek	Credit	N	aximum N	Marks
Cour	se Code	Course Name	3	L	Т	Р	С	CA	ES	Total
072	30774E	SYSTEMS BIOLOGY		3	0	0	3	50	50	100
Obje	ective(s)	To provide basic and the students about the	advanced i methods a	nformation ind comp	on abor arative	ut phyl analys	ogenetics a sis.	and its a	nalysis, T	o educate
1	PHYLOG ANALYS	GENETIC ANALYSIS AN	ND PARSIN	IONY		Тс	otal Hrs		9	
Phylo weigł legac	genetics a nting, the sy of Willi F	analysis - Introduction, tree, multiple trees, tre lennig, methods, searcl	Methods- t e statistics ning, parsin	he matriz ; models nony ana	k, home of cau lysis us	ology, usation sing No	character c -Parsimony	coding, o / analys	choosing is -Introd	outgroups, uction, the
2	2 OPTIMIZATION ALIGNMENT Total Hrs 9									
Introc impro Ratch	Introduction, going down to get the tree length, going up to get ancestral states, short cuts and errors, improvements; Techniques for analyzing large data sets - Traditional techniques, Composite Optima, Ratchet.Sectorial searches, tree-fusing, tree-drifting, combined methods, minimum length, TNT									
3	PARTITI PHYLOG	ONING OF MULTIPLE GENETIC ANALYSIS	DATASETS	SIN		Tc	otal Hrs		9	
. Mea datas incon	asures of sets in phy nbined and	support -The bootstrap /logenetic analysis - S alysis, congruence, inco	o, Jackknife atistical tes ngruence a	e, Noise, sts of da ind phylo	Direct ta inco genetic	measungruer ngruer infere	ures of sup nce, Measu nce	port-Pa ires of c	rtitioning haracter	of multiple interaction
4	COMPA	RATIVE PHYLOGENON	/ICS			To	otal Hrs		9	
Comp geno and I comp	blex mode me databa ibrary con parative ma	el organism genome d ases; Comparative phyl struction, megabase D aps and syntheny, Prim	atabases - ogenomics NA isolatio er batteries	Databas - Genom n, physio and mult	se four lics and cal map tiplexing	idation d syste oping, g.	s, genome matics, ger shortgun s	databa nomics t equenci	ses, hom echniques ng; Subg	ology and 3 – cloning enomics –
5	COMPA	RATIVE METHODS AN	D ANALYS	IS		To	otal Hrs		9	
Corre evolu	elated evo tionary ch	lution and independent ange. Analyzing data at	contrasts, the popula	importar tion leve	nce of t I -Sequ	topolog ence a	gy, examini nd Allele fr	ng the t equency	empo an data	d mode of
Total	hours to b	e taught							45	
Text	Text book (s) :									
1.	1. <i>Techr</i> Springer.	niques in molecular sys	tematics a	nd evolu	<i>tion</i> , R	ob De	salle, Gonz	alo Giri	bet, Ward	ł Wheeler,
Refe	rence(s) :									
1.	Gusfield	,Dan. "Algorithms on st	rings Trees	and Seq	uences	s",1 st eo	d., Cambrid	ge Univ	ersity Pre	ss,2005.
2.	Baldi, P., Brunak, S Bioinformatics: The Learning Approach, 2 nd ed., MIT Press 2001.									

K.S.R	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Department	Biotechnology Programme	e Code &	Name		23 :	B.Tech. B	Biotechnolo	ogy		
		Elective	V							
Course Code	Course Name	Hou	rs / We	ek	Credit	Μ	aximum M	arks		
Course Code	Course Name	L	Т	Р	С	CA	ES	Total		
07230781E	DEVELOPMENTAL BIOLOGY	3	0	0	3	50	50	100		
Objective(s)	At the end of the course the will practical embryology.	have er	nough k	nowle	dge abou	ut theoret	ical embry	ology and		
1 PRINCIP	LES OF DEVELOPMENTAL BIOLO	GY		Tot	al Hrs		9			
Life cycles and development: development.	nd evolution of developmental pa techniques and ethical issues,	tterns, p different	rinciple: ial ger	s of e ne exp	xperimer pression,	ntal emb cell-cel	ryology, G I commun	enes and ication in		
2 EARLY E	2 EARLY EMBRYONIC DEVELOPMENT Total Hrs 9									
Fertilization; e	Fertilization; early development in invertebrates and vertebrates; case study : Drosophila, frog.									
3 LATER EMBRYONIC DEVELOPMENT Total Hrs 9										
Ectoderm, M	Ectoderm, Mesoderm, Endoderm, development of tetrapod limb, sex determination, metamorphosis,									
4 RAMIFIC	ATIONS OF DEVELOPMENTAL BI	OLOGY		Tot	al Hrs		9			
Overview of p developmenta developmenta	lant development, environmental re mechanisms of evolutionary cha correlation, developmental constra	egulation nge : 'He nts.	of anir ox' gen	nal de es, ho	velopme mologou	nt : terate is pathwa	ology, abn ays of dev	ormalities; elopment,		
5 PRACTIO	CAL EMBRYOLOGY			Tota	l Hrs		9			
Immunologica of cells in artif embryos, cell	aspects of development, Mechanis cial conditions, fate maps and cell ransplantation in Xenopus; nuclear	ms of ge ineage a transplar	nomic i nalysis itation.	imprint from e	ing, Expe embryos,	erimental microinje	embryolog ection into	iy: Growth drosophila		
Total hours to	be taught						9			
Text book (s) :										
1. Vasudeva 1998.	a Rao K. "Developmental Biology: A	modern	synthes	sis", O	xford and	I IBH Put	lishing Co	. Pvt. Ltd.,		
2. Parasher	YK." Developmental Biology", Cam	ous Book	Intl., 20	000.						
Reference(s) :										
1. Wolpert L Oxford U	., Beddington R, Brockes J., Jesse niversity Press, 1998.	T., Lawı	ence P	., Mey	erowitz E	e "Princip	es of Deve	elopment",		
2. Gilbert SI	"Developmental Biology", Sinauer	Associate	es, Inc,	Sunde	rland, Ma	assachus	etts, 2000.			

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
Depa	artment	Biotechnology	Programme	Code &	Name		23 : B.	Tech. B	iotechno	logy	
			Ele	ctive V							
Cours	e Code		ame	Hou	rs / We	ek	Credit	Ma	aximum I	Marks	
Course	e Coue	Course In	ame	L	Т	Р	С	CA	ES	Total	
0723	0782E	FOOD BIOCHEMIST	TRY AND	3	0	0	3	50	50	100	
Objec	ctive(s)	At the end of the c gives an overview Essentials like micro	ourse the stude of the nutritior nutrients and en	ents wou al aspe ergy reg	ild hav ects of julatior	re lear meta n is cov	nt about N bolism alovered.	Nutrition ong wit	al Bioche h diseas	emistry, it se states.	
1	FOOD N	UTRITION AND HEAI	_TH.			To	otal Hrs		09		
Concer differer signific	Concept of food nutrition - Nutritional classification; Basic food groups; dietary allowances -Standards for different age group. Fuel value of carbohydrates, Fats and Protein-Basal energy metabolism. Nutritional significances of Macro Nutrition from different food sources										
2	FOOD C	HEMISTRY				То	tal Hrs		09		
Food of propert	chemistry ties of sug es in food	-definition and impor gars, polysaccharides ls, food contaminants,	tance, water in , protein and fat additives and to	food, v in food oxicants.	vater a s. Food	activity d colou	and shelurs and fla	lf life o vours, b	f food. F prowning	Functional reaction .	
3	METABO	DLISM OF MACRONU	TRIENTS			То	tal Hrs		09		
Carboh Cycle), Lipids metabo	ydrate - Ferment - digesti olism, gluo	digestion, transport, station of carbohydrate on, transport, metab coneogenesis, nitroge	glucose metabo es & Gluconeog olism, ketosis, n removal	lism, gly enesis, choleste	/cogen fructos erol me	stora se/gala etaboli	ge & relea actose, gly ism, Prote	ase (EN colysis, in - di	IP pathw glucone gestion,	vay Krebs ogenesis. transport,	
4	OVERVI	EW OF MICRONUTR	IENTS			То	tal Hrs		09		
Micron B12), a or pro- homeos	utrients - antioxidan oxidants stasis (Na	overview, enzymatic ts (Vit E, C, Se, carote (Cu, Zn), hormones (i a, K, Cl) and those of t	cofactors, (B1- enoids), metals o odine, Vit A & I unique interest (<i>A</i>	6, biotin or pro-ox D), bone Al, Cr, P	, vit Kj tidants forma b)), cont (Fe), i tion (\	tribute to o metals /it D, Ca, I	one carl P, Mg),	oon usag influence	ge (folate, e vascular	
5	NUTRITI	ON & DISEASE				То	otal Hrs		09		
The inf regulat	fluence o ion - starv	f nutrition on disease /ation, diabetes type I	s- Cardiovascula and II; obesity, `	ar disea Vitamin a	se; car and mi	ncer; I nerals	nborn erro deficiency	ors of m disease	etabolisn es associ	n; Energy iated	
Total H	Hours Tau	ught							45		
Text bo	Text book (s) :										
1.	M. Swam	ninathan, "Essentials c	of Food and Nutr	ition Vol	. & "	', Gane	esh and Co	ompany	Madras	•	
2.	N. Shaku	intala Manay, N.Shad	ksharawamis , "I	Food :Fa	acts an	d Prin	ciples".				
Refere	nce(s) :										
1.	Meyer, L	.H. 1973. Food Chem	istry. East-West	Press P	vt. Ltd.	., New	Delhi. Pot	ter, N.			

K.S.Rai	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
Department	Biotechnology	Programme	Code &	Name		23 : B.	Tech. B	iotechnol	logy		
		Ele	ective V								
Course Code	Course N	200	Hou	rs/We	ek	Credit	Ма	aximum N	Marks		
Course Coue	Course N	ame	L	Т	Р	С	CA	ES	Total		
07230783E	BIOINSTRUMENTA	TION	3	0	0	3	50	50	100		
Objective(s)	At the end of the control optical methods, spe	course the stude	ents sho other bio	ould ha instrun	ave lea nentat	arnt about ion techniq	the wo ues.	rking prii	nciples of		
1 EM - WA	VES					Total	Hrs		9		
importance of sp to noise radio, s (atomic and ban Woodward's Rul	mportance of spectroscopy, Region of different spectra, adsorption and emission spectra, Instruments, signal to noise radio, spectral width; signal intensity, Fourier Transformation. UV – VIS: theory of electronic spectra (atomic and band spectra, L – B law, application and expectation), Instrumentation, chromophore, auxochrome, Woodward's Rule, Solvent effect (Bathochromic shift etc), Application to small Biomolecules.										
2 FREQUE	ENCY AND VIBRATIC	DN .				Total H	rs		9		
vibration-rotation electronic factor mutual exclusion	vibration-rotation spectrum of CO ₂ factors influencing vibrational frequency (vibronic coupling, H- bond, electronic factors, bond angles etc).Introduction to Raman: pure rotational and vibrational Raman spectrum, mutual exclusion principles, Application to simple and Biomolecles.										
3 LIGHT V	VAVES					Total	Hrs		9		
Plane polarized rotatory dispersi phosphorescence etc) and mole transfer(FRET),	inght, circular and e ion(ORD) and compa e) Jablonski diagram cules show fluores Application to simple a	Iliptical polarize arative discussio , characteristic o scence, Quence and biomolecule	d light, on, Fluo of fluore ching a s.	Definiti rescen scence nd ste	ion of ce, pi e (stok ern v	circular d rinciple, SC es's shift, l rolmer plo	ichroism)->S1-> ife time t, Fluc	n(CD) an T1(differe , mirror ir prescence	ence with mage rule e energy		
4 CHEMIC	AL SHIFTS					Total I	Hrs		9		
Principle, chemi Spin-spin coupl biomolecules.	cal shift(different unit ing and splitting ar) and factors in nd factors invo	fluencin lve, rel	g chen axation	nical s n(1D s	shift, correl spectra), A	ation da Applicati	ata, solve on to s	ent effect, mall and		
5 VECTO	RS AND SYMMETRY					Total H	Hrs.		9		
Vectors and syr Fourier transform	/ectors and symmetry (application, point group, lattice, elementary ideas of space group), Diffraction and Fourier transformation, Application (steps in solving crystal structures, coordinates etc, PDB database).										
Total Hours Ta	ught	-	-						45		
Text book (s) :											
1. Willard a	nd Merrit, H.,Phi, "Ins	trumental metho	ods of ar	alysis"	,1999						
Reference(s) :											
1. Skoog, D	0." Instrumental metho	ds of analysis".	2000								

К	K.S.Rangasamy College of Technology, Autonomous Regulation R 2007									
Department	Biotechnology	Programme	Code &	Name		23 : B.	Tech. E	Biotechr	nology	
		Ele	ective V							
Course Code	Course N		Hou	rs/We	ek	Credit	N	laximun	n Marks	
Course Code	Course Na	ame	L	Т	Р	С	CA	ES	Total	
07230784E	CLINICAL TRIAL MA	NAGEMENT	3	0	0	3	50	50	100	
Objective(s)	At the end of the co clinical trials and clin	urse the studer ical researches.	nts will h	ave a	compl	ete knowle	edge of	Ethical	guidelines,	
1 ETHICA	L GUIDELINES					Total	Hrs		9	
Ethical Guidelin evaluation – Hu	es for Biomedical Res man Genome project I	search on Huma DNA banking – I	an guide prenatal	lines – diagno	stude sis – p	ent of spectorinciples i	ific prir n trans	ciples f	or chemical	
2 STATIS	TICS AND PROBABII	_ITY				Total	Hrs		9	
Biostatics – pro regression – mu	Biostatics – probability – sampling – estimation – hypothesis – Data analysis and nova – simple linear egression – multiple regression.									
3 CONTA	B CONTACT RESEARCHES Total Hrs 9									
Contact researc	h – delivery model – (CR Business en	vironme	ent – Cl	R Info	rmation res	search	 Conta 	act research	
 – Regulatory aff 	airs and contact resea	rch – schedule	$Y_1 - con$	tact res	search	and clinic	al trial e	environr	nent.	
4 CLINICA	AL TRIALS					Total	Hrs		9	
Clinical trial – committee – typ data manageme	protocol approval – pes of clinical trials – ent – trial subjects – re	Informed conse structure & cont cruiting.	ent – re tents of	espons clinical	ibility repor	of sponso t. Data bli	or – in nding 8	vestigat randor	or – ethics minization –	
5 TECHNI	CAL PRESENTATION	١				Total	Hrs		9	
Technical pres India – present India as a site fr	sentation – clinica status – setting up cl conducting clinical – o	l research, r linical trial comp outsourcing tren	egulatio bany – c ds.	n affa Iinical	airs reseai	 clinical rch educat 	trials ion and	s labo I trainin	ratories in g in India –	
Total Hours Ta	iught								45	
Text book (s) :										
1. ICMR, ' Researc	'Ethical guidelines fo h Press, New Delhi, 2	r biological res 000.	search o	on hun	nan s	ubjects", I	ndian	council	of Medical	
Reference(s):										
1. The drug manufac	g and cosmetic rule. S cture of new drugs for	schedule Y. Req	uiremen take clin	its and ical tria	guide ls. Go	lines for pervernment	ermissio of India	on to im , New D	port and/ or Delhi, 1945.	

Department Biotechnology Programme Code & Name 23:B. TechBiotechnology Course Code Course Name Hours / Week Credit Maximum Marks 07230891E MOLECULAR MEDICINE 3 0 0 3 50 50 100 07230891E MOLECULAR MEDICINE 3 0 0 3 50 50 100 The understanding of health and disease of humans at the cellular and molecular level and to develop tools of molecular biology and gene technology 1 BASIC CONCEPTS IN MOLECULAR MEDICINE Total Hrs 9 An overview of the orgnaisation of the human genome, chromosome and genes; r-DNA and Genetic Engineering techniques used in molecular medicine; transcriptional control of gene expression; transmission of human genetic disease; the human genome, chromosome and genes; r-DNA and Clinical Implications. 2 DEVELOPMENT OF MOLECULAR MEDICINE Total Hrs 9 Molecular Mechanisms of Human Disease. Infectious Agents- Biological Aspects and Clinical Implications. 9 Molecular Mechanisms of Human Disease. Infectious Agents- Biological Aspects and Clinical Implications. 9 Molecular Mechanism in human diseases. p27kip1-connecting oncogenes to cell cycle control "Roles of nicro RNAs in aninmal development and human cancer" "Epigenic programm		K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Elective VI Course Code Course Name Hours / Week Credit Maximum Marks 07230891E MOLECULAR MEDICINE 3 0 0 3 50 100 Objective(s) The understanding of health and disease of humans at the cellular and molecular level and to divelop tools of molecular biology and gene technology tools for the development of novel diagnostics and therapeutics through technology tools for the development of novel diagnostics and therapeutics through technology tools for the development of novel diagnostics and therapeutics through technology and gene expression; transmission of human genetic disease; the human genome, chromosome and genes; r-DNA and Genetic disease; genetic courseling; transgenic mice as models of human diseases. 9 2 DEVELOPMENT OF MOLECULAR MEDICINE Total Hrs 9 Molecular Mechanisms of Human Disease. Infectious Agents- Biological Aspects and Clinical Implications. 9 Molecular Mechanisms of Human Disease. Infectious Agents- Biological Aspects and Clinical Implications. 9 3 MOLECULAR SIGNALING MECHANISM IN HUMAN Total Hrs 9 DISEASES Molecular Signaling mechanism in human diseases. PZKip1-connecting oncogenes to cell cycle control" "Roles of micro RNAs in animal development and human cancer" "Epigenic programming of the genome in embryos and gene cells" Ubiquitin mediated proteolysis in senescence and immune signalling "Nucleeo/toplasnic	Depa	rtment	Biotechnology	Program	ne Code	& Nam	e	23:B.	TechBi	iotechnolo	gy
Course Code Course Name Hours / Week Credit Maximum Marks 07230891E MOLECULAR MEDICINE 3 0 0 3 50 50 100 Objective(s) The understanding of health and disease of humans at the cellular and molecular level and to divelop tools of molecular biology and gene technology tools for the development of novel diagnostics and therapeutics through technology Total Hrs 9 An overview of the orgnaisation of the human genome, chromosome and genes; r-DNA and Genetic Engineering techniques used in molecular medicine; transcriptional control of gene expression; transmission of many genome project; oncogenes and tumor suppressor genes; molecular diagnostic testing; genetic counseling; transgenic mice as models of human diseases. 9 2 DEVELOPMENT OF MOLECULAR MEDICINE Total Hrs 9 Molecular Mechanisms of Human Disease. Infectious Agents- Biological Aspects and Clinical Implications. Molecular Medicine. Molecular Basis of Development of Medicine- Diagnostic and Therapeutic Potential. Human embryonic stem cells: biology and clinical implications. 9 Molecular signaling mechanism in human diseases. p27kip1-connecting oncogenes to cell cycle control" "Roles of micro RNAs in animal development and human cancer" "Epigenic programming of the genome in embryos and gene cells" Ubiquitin mediated proteolysis in senescence and immune signalling" "Nucleocytoplasmic shutting and transcriptional regulation: an analysis of the STAT signaling system" Nuclear Organisation of transcri					Elective	VI					
Course Code Course Name L T P C CA ES Total 07230891E MOLECULAR MEDICINE 3 0 0 3 50 50 100 Dipective(s) The understanding of health and disease of humans at the cellular and molecular level and to develop tools of molecular biology and gene technology 1 BASIC CONCEPTS IN MOLECULAR MEDICINE Total Hrs 9 1 BASIC CONCEPTS IN MOLECULAR MEDICINE Total Hrs 9 An overview of the orgnaisation of the human genome, chromosome and genes; r-DNA and Genetic Engineering techniques used in molecular medicine; transcriptional control of gene expression; transmission of human genetic disease; the human genome project, oncogenes and tumor suppressor genes; molecular diagnostic testing; genetic counseling; transgenic mice as models of human diseases. 2 DEVELOPMENT OF MOLECULAR MEDICINE Total Hrs 9 Molecular Hematology and Oncology. Selection and Evolution: Implications for Molecular Medicine. Molecular Basis of Development of Medicine- Diagnostic and Therapeutic Potential. Human embryonic stem cells: biology and germ cells: Ubiquitin mediated proteolysis in senescence and immune signalling." Nucleocytoplasmic shuttling and transcriptional regulation: an analysis of the STAT signaling system." Nuclear Organisation of transcription." Ubiquitination and disposal of cell surface receptors- Lessons from viruses". 4 </td <td>Course</td> <td>o Codo</td> <td>Course Nom</td> <td>•</td> <td>Hou</td> <td>rs / We</td> <td>ek</td> <td>Credit</td> <td>N</td> <td>laximum N</td> <td>/larks</td>	Course	o Codo	Course Nom	•	Hou	rs / We	ek	Credit	N	laximum N	/larks
07230891E MOLECULAR MEDICINE 3 0 0 3 50 50 100 Colspan="2">The understanding of health and disease of humans at the cellular and molecular loogy and gene technology tools for the development of novel diagnostics and therapeutics through technology 1 BASIC CONCEPTS IN MOLECULAR MEDICINE Total Hrs 9 An overview of the organisation of the human genome, chromosome and genes; r-DNA and Genetic Engineering techniques used in molecular medicine; transcriptional control of gene expression; transmission of human genetic disease; the human genome project; oncogenes and tumor suppressor genes; molecular diagnostic testing; genetic counseling; transgenic mice as models of human diseases. 2 DEVELOPMENT OF MOLECULAR MEDICINE Total Hrs 9 Molecular Mechanisms of Human Disease. Infectious Agents- Biological Aspects and Clinical Implications. Molecular Mechanisms of Medicine- Diagnostic and Therapeutic Potential. Human embryonic stem cells: biology and clinical implications. 3 INCLECULAR SIGNALING MECHANISM IN HUMAN Total Hrs 9 DISEASES. Molecular signaling mechanism in human diseases. p27kip1-connecting oncogenes to cell cycle control "Roles of micro RNAs in animal development and human cancer" "Epigenic programming of the genome in embryos and germ cells" Ubiquitin mediated proteolysis in senescence and immune signaling." "Nuclear Organisation of transcription" Ubiquitination and disposal of cell surface receptors- Lessons from viruses".	Course	e Code	Course Main	е	L	Т	Р	С	CA	ES	Total
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Molecular Mechanisms of Human Disease. Infectious Agents- Biological Aspects and Clinical Implications. Molecular Hematology and Oncology. Selection and Evolution: Implications for Molecular Medicine. Molecular Basis of Development of Medicine- Diagnostic and Therapeutic Potential. Human embryonic stem cells: biology and clinical implications. 3 MOLECULAR SIGNALING MECHANISM IN HUMAN Total Hrs 9 0ISEASES. Molecular signaling mechanism in human diseases. p27kip1-connecting oncogenes to cell cycle control" "Roles of micro RNAs in animal development and human cancer" "Epigenic programming of the genome in embryos and germ cells" Ubiquitin mediated proteolysis in senescence and immune signalling" "Nuclear Organisation of transcription" "Ubiquitination and disposal of cell surface receptors- Lessons from viruses". 4 MOLECULAR DIAGNOSTIC AND THERAPEUTIC Total Hrs 9 APPROACHES FOR HUMAN DISEASES Role of DNA micro array and protein chips; biotherapy; probiotic; phage therapy; virotherapy with (replication-elective or conditionally replicating) lytic viruses; si RNA the rapeutics; concept of personalised medicine and pharmacogenomics, photodynamic therapy. 5 EMERGING TRENDS : INDUSTRIAL APPLICATIONS OF MOLECULAR MEDICINE 9 5 EMERGING TRENDS : INDUSTRIAL APPLICATIONS Interase. 45 45 45 14 145 14 145 14 145 14 145 145 145 14 145 16 16 16 16	2	DEVELO	PMENT OF MOLECUL	AR MEDIC	INE		Tc	otal Hrs		9	
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Molecular signaling mechanism in human diseases. p27kip1-connecting oncogenes to cell cycle control" "Roles of micro RNAs in animal development and human cancer" "Epigenic programming of the genome in embryos and germ cells" Ubiquitin mediated proteolysis in senescence and immune signalling" "Nucleocytoplasmic shuttling and transcriptional regulation: an analysis of the STAT signaling system" "Nuclear Organisation of transcription" "Ubiquitination and disposal of cell surface receptors- Lessons from viruses". 4 MOLECULAR DIAGNOSTIC AND THERAPEUTIC Total Hrs 9 APPROACHES FOR HUMAN DISEASES Role of DNA micro array and protein chips; biotherapy; probiotic; phage therapy; virotherapy with (replication-elective or conditionally replicating) lytic viruses; si RNA the rapeutics; concept of personalised medicine and pharmacogenomics, photodynamic therapy. 5 EMERGING TRENDS : INDUSTRIAL APPLICATIONS Total Hrs 9 5 EMERGING TRENDS : INDUSTRIAL APPLICATIONS Total Hrs 9 45 Total Hrs 9 Atom be taught Total Hrs 9 OF MOLECULAR MEDICINE Total Hrs 9	3	MOLECU DISEASE	JLAR SIGNALING MEC ES.	CHANISM IN	N HUMAI	N	Tc	otal Hrs		9	
4 MOLECULAR DIAGNOSTIC AND THERAPEUTIC APPROACHES FOR HUMAN DISEASES Total Hrs 9 Role of DNA micro array and protein chips; biotherapy; probiotic; phage therapy; virotherapy with (replication- elective or conditionally replicating) lytic viruses; si RNA the rapeutics; concept of personalised medicine and pharmacogenomics, photodynamic therapy. 5 EMERGING TRENDS : INDUSTRIAL APPLICATIONS OF MOLECULAR MEDICINE Total Hrs 9 Emerging trends in molecular medicine- expert reviews on molecular medicine related to vaccine design and systemic diseases-developments as updated from time to time. 45 Total hours to be taught 45 1. John Bradle, David Johnson and David Rubenstein. Lecture notes in molecular biology, Blackwell Publishing, 2001. Planeson Larry J. Principles of Molecular Medicine. Humana Press 1998. John-Wiley & Sons. Inc.	Molecu of micr and ge shuttlin transcr	ular signa ro RNAs erm cells ng and tr ription" "U	aling mechanism in hum in animal development "Ubiquitin mediated anscriptional regulation Jbiquitination and dispo	nan disease t and huma proteolysis n: an analys sal of cell s	s. p27kip n cancer in senes sis of the urface re	o1-conn " "Epige scence e STAT ceptors	ecting enic pr and ir signa - Less	oncogenes ogramming mmune sig aling syster ons from vi	s to cell o g of the nalling" n" "Nucl ruses".	cycle cont genome ii "Nucleoc lear Orga	rol" "Roles n embryos ytoplasmic nisation of
Role of DNA micro array and protein chips; biotherapy; probiotic; phage therapy; virotherapy with (replication- elective or conditionally replicating) lytic viruses; si RNA the rapeutics; concept of personalised medicine and pharmacogenomics, photodynamic therapy. 5 EMERGING TRENDS : INDUSTRIAL APPLICATIONS OF MOLECULAR MEDICINE Total Hrs 9 Emerging trends in molecular medicine- expert reviews on molecular medicine related to vaccine design and systemic diseases-developments as updated from time to time. 45 Total hours to be taught 45 1. John Bradle, David Johnson and David Rubenstein. Lecture notes in molecular biology, Blackwell Publishing, 2001. Reference(s) : Jameson Larry J. Principles of Molecular Medicine. Humana Press 1998. John-Wiley & Sons. Inc.	4	MOLECU APPROA	JLAR DIAGNOSTIC AN CHES FOR HUMAN D	ID THERAF	PEUTIC		Тс	otal Hrs		9	
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Emerging trends in molecular medicine- expert reviews on molecular medicine related to vaccine design and systemic diseases-developments as updated from time to time. Total hours to be taught 45 Text book (s) : 45 1. John Bradle, David Johnson and David Rubenstein. Lecture notes in molecular biology, Blackwell Publishing, 2001. Reference(s) : Jameson Larry J. Principles of Molecular Medicine. Humana Press 1998. John-Wiley & Sons. Inc.	5	EMERGI OF MOL	NG TRENDS : INDUST ECULAR MEDICINE	RIAL APPL	ICATIO	NS	Tc	otal Hrs		9	
Total hours to be taught 45 Text book (s) :	Emergi system	ing trend	ls in molecular medicin ses-developments as u	e- expert re	eviews o time to t	n mole time.	cular n	nedicine re	lated to	vaccine c	lesign and
Text book (s) : 1. John Bradle, David Johnson and David Rubenstein. Lecture notes in molecular biology, Blackwell Publishing, 2001. Reference(s) : Jameson Larry J. Principles of Molecular Medicine. Humana Press 1998. John-Wiley & Sons. Inc.	Total h	nours to b	e taught							45	
1. John Bradle, David Johnson and David Rubenstein. Lecture notes in molecular biology, Blackwell Publishing, 2001. Reference(s) : Jameson Larry J. Principles of Molecular Medicine. Humana Press 1998. John-Wiley & Sons. Inc.	Text bo	ook (s) :									
Reference(s) : Jameson Larry J. Principles of Molecular Medicine. Humana Press 1998. John-Wiley & Sons. Inc.	1.	John Bra Publishin	dle, David Johnson and 1g, 2001.	d David Rub	enstein.	Lecture	e notes	in molecul	ar biolo	gy, Blackw	vell
Jameson Larry J. Principles of Molecular Medicine. Humana Press 1998. John-Wiley & Sons. Inc.	Refere	ence(s) :									
1. (eds.), 2002.	1.										

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007										
Dep	artment	Biotechnology	Program	ne Code	& Nam	е	23:B.	Tech.Bi	otechn	olog	IУ
				Elective	VI						
Cour				Hou	rs/Wee	ek	Credit	N	laximu	тM	larks
Cour	se Code	Course Name	e	L	Т	Р	С	CA	ES	;	Total
072	30892E	BIODIVERSITY AND BIORESOURCE MANAGEMENT		3	0	0	3	50	50		100
Obje	ective(s)	At the end of the cours also useful to go far th	se students e conserva	understa tion of na	and abo atural re	ut the source	natural reso es and biod	ources a iversity.	ind its i	impo	ortance. It
1	INTROD	UCTION TO BIODIVER	SITY					Total	Hrs		9
Biodiv (ecos Gene speci Hot S	versity - De system div stic Variationes spot analystic	efinition-Types, Diversity ersity); Goals and cons on, Measuring Genetic s, abundance, and turn sis; A general account o	y of genes straints of E Variation b nover, spec in Ecosyste	(genetic Biodiversi y Allozyr ies/area m divers	diversity ity Scier ne, Sp relation ity.	y), spe nce. G ecies ships,	cies (specie enetic Dive Diversity – global disti	es divers ersity - I Measur ribution	sity and Nature rement of spee	d ec and , Co cies	osystems l origin of ncepts of richness;
2	LOSS OF	BIODIVERSITY AND	HUMAN IN	FLUENC	E ON E	BIODIV	ERSITY	Total	Hrs		9
-Spe Extine (Extir	cies Extin ction rates nct, Endan	ction- Fundamentals ; methods of estimating gered, Vulnerable, Rare	causes, D g loss of bi e, Intermedi	Determini odiversit ate and I	stic and y- Threa nsufficie	d Stoc atenec ently k	hastic proc I species, ⊺ nown);	esses, The IUC	Currer N thre	nt ar at C	nd Future ategories
3	BIODIVE	RSITY AND HUMAN W	/ELFARE				·	Total	Hrs		9
A ver uses- micro Inher	y general animal us bes. Valui ent or Intri	account on uses of B ses: food animals (terres ng Biodiversity-Instrum nsic values, ethical and	ioresources strial and ac ental (Gooc aesthetic v	s- plant quatic), n ds, Servio ralues-Ar	uses: fo ion food ces, and i outline	ood, tii I uses d Infori e accou	mber, medi of animals, mation and unt on meth	cinal or Domes Psycho ods of v	namen tic lives spiritua aluing	ntal a stocl al va bioc	and other k- uses of lues) and diversity.
4	INFORM	ATION RESOURCES C	of Biodive	ERSITY				Total	Hrs		9
Librat for de ebool	ries, Electi escribed s ks, ejourna	onic Media, Directories pecies, Identification ai als, edatabases, subject	s of biodive ids .Literatu t gateways/	rsity info ure searc subject c	rmation, ch using lirectorie	, Catal g elect es, nev	logues, Ind ronic resea ws feeds.	exes, In arch too	dexes ls - sea	and arch	registers engines,
5	SUSTAIN BIODIVE	ABLE MANAGEME RSITY AND BIORESO	ENT AN URCES	ID CO	ONSER	VATIC	ON OF	Total	Hrs		9
Susta flora treations <i>situ E</i>	ainable ma and fauna es- the rol Ex situ Con	nagement - National p as well as habitats; In e of CBD, IUCN, GEF, servation	olices and ternational IBPGR, N	Instrume policies BPGR, \	ents rela and Ins WWF, F	ating th strume AO, L	ne protectio nts - A gen JNESCO ar	on of the neral acc nd CITE	e wild/ count c S. Cor	dom on m nser	nesticated nultilateral vation <i>In</i>
Total	hours to b	e taught							4	5	
Text	book (s) :										
1.	Groombr Chapmai	idge, B, "Global Biodiv n and Hall, London. 199	/ersity – Sta 92.	atus of tl	he Earth	h's Liv	ing Resour	ces", Gi	oombr	ridge	e, B (ed.).
2.	Virchow,	D, "Conservation and	Genetic Re	sources'	', Spring	ger – ∖	/erlag, Berli	in. 1998			
Refer	ence(s) :										
1.	Gary, K. Massach	M. and Ronald C. C usetts. 1994.	;, "Princ	iples of	Conse	rvatior	n Biology",	Sinaue	er Ass	iocia	tes, Inc.,

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Dep	artment	Biotechnology	Program	ne Code	& Nam	ne	23:B.	Tech.Bi	otechnolo	ду
				Elective	VI					
Cour	rea Cada	Courso Nam	0	Hou	rs / We	ek	Credit	М	aximum N	/larks
Cour	se coue	Course Main	e	L	Т	Р	С	CA	ES	Total
072	30893E	BIOBUSINESS		3	0	0	3	50	50	100
Obje	ective(s)	This inter-disciplinary framework for address priority needs, busin innovation for such agribusiness, environr	course is de sing BioBus ess trends industry s nental tech	esigned tainess re , and the sectors and the sectors and the sectors and sectors and sectors and sectors and sectors and sectors and sectors	to enab lated of ne imp as hea nd othe	le stud pportui licatior lthcare r bio-re	ents to dev nities and c s of life s , pharmac elated emer	elop an hallenge science euticals ging sec	effective des. We wi and biot , medica ctors.	conceptual II examine echnology I devices,
1	UNDERS	STANDING BIOBUSINE	SS	0,		Тс	otal Hrs	0 0	9	
Introc	Introduction to BioBusiness, Fundamentals of Biotech for BioBusiness, New versus Old BioBusiness, Wealth									
Creat	Creation in BioBusiness: The Role of Innovation.									
	2 BIOBUSINESS TRENDS AND OPPORTUNITY AREAS Total Hrs 9									
Biote and C	ncare, the chnology, Global Stre	Industrial Life Sciences angths and Capabilities.	agriculture and Biote	chnology	, Wher	re Thin	gs Stand: /	A Quick	Survey o	f Regional
3	ISSUES	AND CHALLENGES IN	BIOBUSIN	IESS		Тс	tal Hrs		9	
Creat Oppo and Conc	ting Worle ortunities, Regulator erns and 0	d Class Corporations Intellectual Property, To y Concerns and Oppo Opportunities.	and Biot echnology ortunities,	ech Clu Licensino Human	sters, g and E Resour	Moral, Brandir ce Co	Ethical a g Concern ncerns an	and Soo s and C d Oppo	cial Conc Opportunit rtunities,	cerns and ies, Policy Financing
4	MAKING	THINGS HAPPEN				Tc	tal Hrs		9	
Publi Oppo	c Policy ortunities C	Opportunities, Entrepopen Discussion and Co	oreneurial ourse Revie	Opportu w.	nities,	Invest	ment and	Investi	ment Ma	inagement
5	GROUP	PROJECT PRESENTA	TION			Тс	tal Hrs		9	
Case	studies of	different industries and	I their strate	gic plan	ning.	1				
Total	hours to b	e taught							45	
Text	book (s) :									
1.	1. Gurinder Shahi. BioBusiness in Asia: How Asian Countries Can Capitalize on the Life Science Revolution. Pearson Prentice Hall, 2004.									
Refe	rence(s) :									
1.	Cynthia I	Robbins-Roth From Alcl	nemy to IPC	D: The B	usiness	of Bio	technology	Harper	Collins, 20	001.
2.	Gurinder	S Shahi BioBusiness: /	A Strategic	Perspect	tive Glo	bal Bic	Business E	Books, 2	005.	
3.	Newspap York Tim	pers and magazines as es, The Wall Street Jou	The Econor Irnal and sc	mist, Nev on.	vsweek	, Busir	iess Wee <mark>k</mark> ,	Financia	al Times,	the New

	K.S.Rangasamy College of Technology - Autonomous Regulation R 2007									
Dep	artment	Biotechnology	Programme	e Code &	& Name	•	23:B.	TechBi	otechnolo	ogy
			E	lective \	/I					
Cour	co Codo		m 0	Hou	ırs / We	ek	Credit	Ma	aximum N	/larks
Cour	se coue	Course Nai	ne	L	Т	Р	С	CA	ES	Total
072	30894E	PRINCIPLES OF BIO ENGINEERING	MEDICAL	3	0	0	3	50	50	100
Obje	ective(s)	At the end of the cour instruments applied in	se the studen medical phys	ts should sics and	d have l enginee	learnt a ering.	about the w	orking p	rinciples	of various
1	INTROD	UCTION AND BIOINS	TRUMENTAT	ION		Тс	otal Hrs		9	
Mode ethic purpo Elect propo	ern health s, moral ose, inforr rical Pote erties of no	care and its evolutior norms, redefining he ned consent, regulation ntials in the human be erves and muscles, pro-	n. Application alth, terminal on of medicine ody. Neuromu blems and dia	n of Eng Ily ill ar e, device iscular s agnostice	ineering nd euth e innov system: s. Basic	g in M nanasia ation, neuro c bioins	edicine. In a, human ethical issu ns, synaps strumentati	troductic experim ues, safe ses and on syste	on to mo ientation- e medica muscles, ms	rtality and definition, l devices. electrical
2	BIOMAT	ERIALS & BIOMECHA	NICS			To	tal Hrs		9	
Mate mech multi Introd	rials used nanisms, i componer duction to oints. Bior	to mimic/replace body nvitro and invivo testin it materials design in p biomechanics. Responde heology of physiologica	 functions. B g, and consi- rosthetic devic onse of living al fluids. 	asic ma deration ces for ha tissues	terial ty s for lor ard and to prolo	pes ar ng terr soft tis onged	nd possible n usage. ssues. oad applic	functior Integrate ation. D	is, tissue d design ynamics	response issues of of muscle
3	BIOPHO	TONICS				To	tal Hrs		9	
circu ology Lase techr photo and s	its in fiber v, transmi rs in der hiques; p odynamic shock wav	optic communication s ssion of signals, end tistry. Laser Doppler hotochemical, therma therapy; biostimulation e generation; clinical a	system, fiber o oscope, brond flowmetry, C I, photoablat I, coagulation, pplications of	ptics in e choscope ptical p ive inte vaporiz lasers, L	gastroe e, gast ropertie eraction ation, a aser sa	nter El ro sco es of mecl ablatior ifety	NVIRONMI pe; optic biological nanisms a n, photodis	ENTAL E al coher tissues and the truption,	BIOTECH rence tor and mea ir applic plasma	NOLOGY nography. asurement ations in formation,
4	MEDICA	L IMAGING				То	tal Hrs		9	
X-ray moda emis proce samp	vs, desigr alities-CA sion comp esses, sig pling and c	considerations of X , magnetic resonance puted tomography (SF nal processimg, basic quantization, and clinica	-ray tubes, e (MR) imag PECT), compu imaging para al applications	projecti ing, pos uter tom ameters-	ons, 3l sitron e ography resolu	D-2D, missio y (CT) tion, c	slice iden n tomogra , and ultra ontrast, an	tification phy (PE asound-u id noise	, medic T), sing Inderlying Data ac	cal image le photon g physical quisitions,
5	BIOSEN	SORS				To	tal Hrs		9	
Biolo princ	gical com ipal perfo	ponents involved in rmance characteristic od termistor based bios	biosensors, i s, fabrication	mmobiliz and bio	zation omedica	of bio al app	logical cor lications c	nponent of electro	s to tran ochemica	nsdurcers; I, optical,
Total	hours to l	be taught							45	
Text	book (s) :									
1.	Joseph US, 200	D. Bronzino (ed), "The).	Biomedical E	ngineeri	ng Han	dbook'	', volumes	I & II, C	RC Pres	s, Florida,
2.	Enderle. 2000.	J, Blanchard. S & Bro	onzino.J (Eds)	, "Introd	uction to	o Biom	edical Eng	ineering	", Acader	nic Press,
Refe	rence(s) :									
1.	Bushber Lippinco	g JT, Scibert J.A and tt Williams and Wilkins,	Leidholdt E USA, 2002.	M ,Boo	ne J.M,	"The I	Essential p	hysics o	fmedical	Imaging",
2.	Buxton. Cambrid	R. B, "Introduction to ge Univ, Press, UK, 20	Functional M 02.	lagnetic	Reson	ance	magining:	Principle	es & Teo	chniques",
3.	Fung. Y.	C, "Biomechanics", Sp	ringer - Verlag	, New Y	ork, 198	31				