

Syllabus

AFFILIATED COLLEGES

Program Code: 22L

2021 – 2022 onwards



BHARATHIAR UNIVERSITY

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

Coimbatore - 641 046, Tamil Nadu, India

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

The B.Sc., Microbiology program describe accomplishments that graduates are expected to attain within five to seven years after graduation

PEO1	Active and Principal investigator
PEO2	Resourceful educator
PEO3	Administrative / Executive official
PEO4	Leadership excellence
PEO5	Intellectual adeptness in various perceptions
PEO6	Entrepreneur
PEO7	Chief microbiologist in clinical diagnostic and quality control sector



PROGR	RAMME SPECIFIC OUTCOMES (PSOs)
After th	ne successful completion of B.Sc., Microbiology, the students are expected to
PSO1	isolate and identify the microorganisms including bacteria, fungi and algae.
PSO2	to get acquainted knowledge about the taxonomical classification of microorganisms.
PSO3	acquire knowledge about modern microbiological techniques and bioinstrumentation which make them competent to be placed in various Microbiological / Biotechnological industries.
PSO4	attain practical exposure during the institutional training.
PSO5	gain the knowledge of clinical investigation and diagnosis of various infectious diseases.
PSO6	acquire knowledge on health care, prevention and control of various pathogenic microbes which cause seasonal outbreaks, epidemics and pandemics etc.
PSO7	understand theoretical and practical knowledge in the allied subjects Biostatistics andComputer Applications, Biochemistry in addition to the core subjects in Microbiology.

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cessful completion of the B.Sc., Microbiology programme
Acquire eligibility for higher studies / technical and administrative placement in government and private sectors.
Attain competency to be placed in various Microbiological / Biotechnological industries.
Obtain technical experience to become an entrepreneur by institutional training / internship.
Understand the integral role of science in life.
Acquaint and establish equilibrium of nature and in fact create a fit biosphere with the knowledge of Microbiology.
Acquire skills necessary to fulfill the personal, civil and social responsibilities.
Develop knowledge in ethical thinking, quantitative analytical skills and its application to the issues in society.
Acquire knowledge on harmful and beneficial role played by microbes in human health.
Understand the impact of gene technology in microbiology for human welfare.
Comprehend the role of recent technologies in microbiological applications & research data management.

BHARATHIAR UNIVERSITY, COIMBATORE - 641 046

B.Sc., MICROBIOLOGY (For the students admitted from the Academic Year 2021 – 2022 onwards)

Eligibility:

Pass in higher secondary (academic stream) examination conducted by the Government of Tamil Nadu with Biology / Botany / Zoology/ Microbiology / Nursing / Biochemistry as subjects or DMLT or Diploma in Pharmacy / Pharmacology or other examinations accepted as equivalent there to by the Syndicate, subject to such other conditions as may be prescribed therefor.

Medium of Instruction and examinations:

The medium of instruction and examinations for the papers of Part I and II shall be the language concerned. For part III subjects and part IV subjects other than Foundation, Value education and Non – Major Elective – II, the medium of instruction as well as the medium of examinations shall be English. For Foundation course, Value education and Non – Major Elective – II the medium of instruction shall be English and the medium of examinations is in English / Tamil irrespective of the medium of instructions. For modern languages, the medium of instruction and examination will be in the languages concerned.

Passing Minimum:

A candidate shall be declared to have passed in a paper if he / she should obtain not less than 40% of marks in the external examination. A candidate failing to secure the minimummarks prescribed shall be required to reappear for the examination in that paper.

Qualification of the Faculty:

M.Sc. degree in Microbiology or equivalent recognized by Bharathiar University / TamilNadu State Council for Higher Education (TANSHE) along with qualifications prescribed by University / University Grants Commission (UGC) time to time.

Conferment of the Degree:

No candidate shall be eligible for conferment of the Degree unless he / she,

- has undergone the prescribed course of study for a period of not less than six semesters in an institution approved by / affiliated to the University or has been exempted from in the manner prescribed and has passed the examinations as have been prescribed therefor.
- has successfully completed the prescribed Institutional Training / internship as evidenced by certificate issued by the Principal of the College.

The successful candidates will be conferred with Bachelor Degree in Microbiology.

BHARATHIAR UNIVERSITY, COIMBATORE – 641 046 B.Sc., MICROBIOLOGY DEGREE COURSE CBCS - OBE PATTERN : (AFFILIATED COLLEGES) (For the students admitted from the academic year 2021 – 2022 onwards)

Scheme of Examination

SEMESTER - I Image - 1 Image - 1 <thimage -="" 1<="" th=""> <thimage -="" 1<="" th=""> <</thimage></thimage>			Scheme of Exam		k		Exan	ninatio	ns	
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II English - 1 12E 6 3 50 100 4 III Core Paper - I: Fundamentals of Microbiology 13A 6 3 50 50 100 4 III Core Practical - I 23P 4 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - <		SEMESTER -	[
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III Core Practical – I 23P 4 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -	II	English – I	ക്കെക്കു	12E	6	3	50	50	100	4
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I Language – II 21T/M/H/F 6 3 50 50 100 4 II English – II 22E 6 3 50 50 100 4 III Core Paper – II : Analytical Microbiology 23A 4 3 50 50 100 4 III Core Paper – II : General Biology 23B 3 3 50 50 100 4 III Core Paper – III : Biostatistics and Computer Applications – II 23P 3 6 30 45 75 3 III Allied Practical – I (Biostatistics and Computer Applications) 2AB 4 3 30 45 75 3 III Allied Practical – I (Biostatistics and Computer Applications) 2FB 2 3 - 50 50 2 IV Value Education – Human Rights # 2FB 2 3 - 50 50 2 Semester – III 31T/M/H/F 6 3 50 50 100 4 II Language – III 31T/M/H/F 6 <td< td=""><td>IV</td><td>Environmental S</td><td>tudies #</td><td>1FA</td><td>2</td><td>3</td><td>-</td><td>50</td><td>50</td><td>2</td></td<>	IV	Environmental S	tudies #	1FA	2	3	-	50	50	2
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III Core Paper – III : General Biology 23B 3 3 50 50 100 4 III Core Practical – I 23P 3 6 30 45 75 3 III Allied – A : Paper – II: Biostatistics and Computer Applications – II 2AB 4 3 30 45 75 3 III Allied Practical – I (Biostatistics and Computer Applications) 2PB 2 3 25 25 50 2 IV Value Education – Human Rights # 2FB 2 3 - 50 50 2 Swatch Bharath Summer Internship 2FB 2 3 - 50 50 100 4 II Language – III 31T/M/H/F 6 3 50 50 100 4 II English – III 32E 6 3 50 50 100 4 III Core Paper – IV : Microbial Diversity 33A 4 3 50 50 100 4 III Core Practical – II 43P 3 -	II	English – II	1.1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	22E	6	3	50	50	100	4
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III Allied – A : Paper – II: Biostatistics and Computer Applications – II 2AB 4 3 30 45 75 3 III Allied Practical – I (Biostatistics and Computer Applications) 2PB 2 3 25 25 50 2 IV Value Education – Human Rights # 2FB 2 3 - 50 50 2 Semester Semester III 31T/M/H/F 6 3 50 50 100 4 I Language – III 31T/M/H/F 6 3 50 50 100 4 II English – III 32E 6 3 50 50 100 4 III Core Paper – IV : Microbial Diversity 33A 4 3 50 50 100 4 III Core Paper – IV : Microbial Diversity 33A 4 3 30 45 75 3 III Allied – B : Paper – I: Biochemistry – I/ 3AC 4 3 30 45 75 3 IIII Allied Practical – II 43Q <td>III</td> <td>Core Paper – III</td> <td>: General Biology</td> <td>23B</td> <td>3</td> <td>3</td> <td>50</td> <td>50</td> <td>100</td> <td>4</td>	III	Core Paper – III	: General Biology	23B	3	3	50	50	100	4
III Computer Applications – II 2AB 4 3 30 43 75 3 III Allied Practical – I (Biostatistics and Computer Applications) 2PB 2 3 25 25 50 2 IV Value Education – Human Rights # 2FB 2 3 - 50 50 2 Swatch Bharath Summer Internship - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -	III	Core Practical – I		23P	3	6	30	45	75	3
IIIApplications)2PB232525502IVValue Education – Human Rights #2FB23-50502Swatch Bharath Summer InternshipIIIIIIIIIIIIIIIIIIILanguage – III31T/M/H/F6350501004IIEnglish – III32E6350501004IIICore Paper – IV : Microbial Diversity33A4350501004IIICore Paper – IV : Microbial Diversity33A4350501004IIICore Paper – I: Biochemistry – I /3AC433045753IIIAllied – B : Paper – I: Biochemistry – I /3AC433045753IIIAllied Practical – II43Q2IVSkill based Subject – I:3ZA333045753IVMajorElective – I (Yoga for Human Excellence # / Women's Rights #)3FD23-50502	III			2AB	4	63	30	45	75	3
Swatch Bharath Summer Internship ATE TO E MARE I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I I	III		I (Biostatistics and Computer	2PB	2	3	25	25	50	2
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III Core Paper – IV : Microbial Diversity 33A 4 3 50 50 100 4 III Core Practical – II 43P 3 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -	Ι	Language – III		31T/M/H/F	6	3	50	50	100	4
IIICore Practical – II43P3IIIAllied – B : Paper – I: Biochemistry – I/ Zoology – I3AC433045753IIIAllied Practical – II43Q2IVSkill based Subject – I: Diagnostic Microbiology – I3ZA333045753IVMajorElective – I (Yoga for Human Excellence # / Women's Rights #)3FD23-50502	II	English – III		32E	6	3	50	50	100	4
IIIAllied – B : Paper – I: Biochemistry – I / Zoology – I3AC433045753IIIAllied Practical – II43Q2IVSkill based Subject – I: Diagnostic Microbiology – I3ZA333045753IVMajorElective – I (Yoga for Human Excellence # / Women's Rights #)3FD23-50502	III	Core Paper – IV	: Microbial Diversity	33A	4	3	50	50	100	4
IIIZoology – ISAC455045755IIIAllied Practical – II43Q2IVSkill based Subject – I: Diagnostic Microbiology – I3ZA333045753IVMajorElective – I (Yoga for Human Excellence # / Women's Rights #)3FD23-50502	III	Core Practical – I	I	43P	3	-	-	-	-	-
IVSkill based Subject – I: Diagnostic Microbiology – I3ZA333045753IVTamil @ / Advanced Tamil # (OR) Non – MajorElective – I (Yoga for Human Excellence # / Women's Rights #)3FD23-50502	III	Zoology – I	-			3	30	45	75	3
IVDiagnostic Microbiology – I3ZA333045753Tamil @ / Advanced Tamil # (OR) Non –Tamil @ / Advanced Tamil # (OR) Non –3FD23-50502IVMajorElective – I (Yoga for Human Excellence # / Women's Rights #)3FD23-50502	III			43Q	2	-	-	-	-	-
IVMajorElective – I (Yoga for Human Excellence # / Women's Rights #)3FD23-5020	IV	Diagnostic Micro	biology – I	3ZA	3	3	30	45	75	3
Page 5 of 81	IV	MajorElective –	I (Yoga for Human Vomen's Rights #)		2	3	-	50	50	2

	SEMESTER – IV							
Ι	Language – IV	41T/M/H/F	6	3	50	50	100	4
I	English – IV	411/M/11/1 42E	6	3	50	50	100	4
III	Core Paper – V : Microbial Physiology	42E 43A	4	3	50	50	100	4
III	Core Practical – II	43A 43P	3	6	30	45	75	4
111	Allied – B : Paper – II: Biochemistry – II /	43P	3	0	30	43	75	3
III	Zoology –II	4AC	4	3	30	45	75	3
III	Allied Practical – II	43Q	2	3	25	25	50	2
IV	Skill based Subject – II: Diagnostic Microbiology – II	4ZB	3	3	30	45	75	3
I V	Tamil @ / Advanced Tamil # (OR) Non – Major Elective – II (General Awareness #)	4FA	2	3	-	50	50	2
	SEMESTER – V	50						
III	Core Paper – VI : Microbial Genetics	53A	5	3	50	50	100	4
III	Core Paper – VII : Principles of Immunology	53B	5	3	50	50	100	4
III	Core Paper – VIII : Food Microbiology	53C	4	3	50	50	100	4
III	Core Paper – IX : Medical Microbiology	53D	4	3	50	50	100	4
III	Elective – I	5EA	4	3	50	50	100	4
III	Core Practical – III	63P	5	-	-	-	-	-
IV	Skill based Subject – III: Infectious diseases and their management	5ZC	3	3	30	45	75	3
	SEMESTER – VI	1 /	130					
III	Core Paper – X: Industrial Microbiology	63A	5	3	50	50	100	4
III	Core Paper – XI : Environmental and Agricultural Microbiology	63B	5	3	50	50	100	4
III	Core Paper – XII : Virology	63C	4	3	50	50	100	4
III	Elective – II	6EA	4	3	50	50	100	4
III	Elective – III	6ED	4.0	3	50	50	100	4
III	Core Practical – III	63P	5	9	50	50	100	4
IV	Skill based Subject – Practical	6ZP	3	6	30	45	75	3
IV	Extension activities @	EVA 67A	-	-	-		50	2

Institutional training / Internship: Students should undergo an institutional training / Internship for a continuous period of 15days before semester VI. It is evidenced by certificate issued by the Principal of the College.

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

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

* Swatch Bharath Summer Internship is mandatory – Extra 2 credit points would be given.

List of Electiv	e papers (Col	leges can choose any ONE GROUP of the p	oaper as electives)
S. No.	Group	Title of the subject	Sub. Code
	Α	Recombinant DNA Technology - I	5EA
Elective – I	В	Plant Therapeutics	5EB
	С	Medical coding	5EC
	Α	Recombinant DNA Technology – II	6EA
Elective – II	В	Entrepreneurial Microbiology	6EB
	С	Medical Biochemistry	6EC
	Α	Dairy Microbiology	6ED
Elective - III	В	Bionanotechnology	6EE
	C	Bioinformatics	6EF





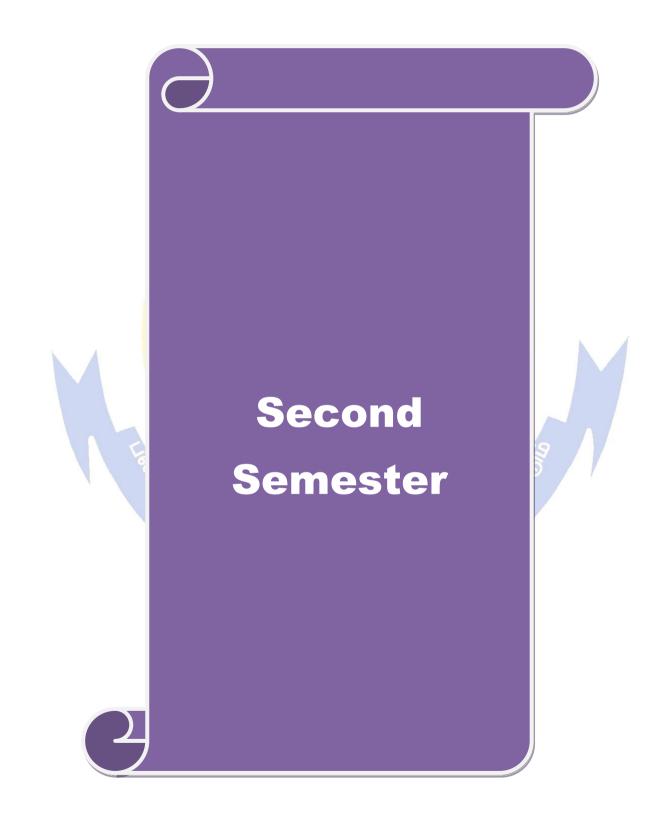
Co	urse code	13A	FUNDAMENTALS OF	L	Т	Р	С
	Core	-I	MICROBIOLOGY	4	2	-	4
]	Pre- requis	ite Bas	ic knowledge on Microbiology gained during	•	abus sion		21 - 022
Cou	rse Objecti	ves:					
The			s course are to:				
•			discovery, development and scope of Microbiology.				
•			niques used to observe microorganisms.	c			
• •			cept of asepsis and techniques used for the cultivation	on of r	nicroor	ganisn	18.
-	ected Cours he successfu		ion of the course, student will be able to:				
		1	ontributions of various scientists.				K 1
	*		t microscopy.				K 2
		0	ng techniques to observe microorganisms.				K 3
			iples and methods of sterilization.				K 4
		1	microbes in the laboratory.				K 5
			Understand; K3 - Apply; K4 - Analyze; K5 - Evalua	ate: K	6 – Cre		
	nit – I			,			Iours
		cope of N	ficrobiology – Spontaneous generation theory – C	onflic	t – Co		
			teur, Robert Koch, Edward Jenner, Joseph Lister,				
			ch, Watson & Crick and Miescher.				
Ur	nit —II					18 F	Iours
	. •	-	s and applications – Bright field, Dark field, Phase – Specimen preparation for Electron microscopy.	e con	trast, F	luores	cence,
Un	nit – III					18 H	Hours
Sta	ining – Prir	nciples – T	on of bacterial cell wall: Gram positive and Gram Ne ypes of staining – Simple, Differential (Gram, Sport ning, LPCB, KOH Mount.	-			
	nit – IV	(P)	A Thomas and the second	R Contraction	/ /	18 H	Iours
Mo	oist heat, Fi	ltration (N	ction – Principles – Methods of Sterilization – Phys Membrane & HEPA), Radiation – Chemical Steriliz – Phenol coefficient test – Sterility testing.			•	
I	U nit–V		Sturmon 2-MIPP			18 Ho	ours
En typ	riched, Enri be). Anaerol	chment, S bic culture	paration – Solid and Liquid – Types of Media – elective, Differential media and Special Purpose Me e techniques – Wright's tube, Roll tube, McIntosh al dilution, Pour plate, Spread plate and Streak plate.	dia (or filde	ne exan	nple fo	r each
			Total Lecture H	ours	9	0 Ноі	irs
Te	kt Books					o th-	<u> </u>
1	Longman		R and CK Jayaram Panicker, (2017). Textbook of mi				Orient
2		.C. & D.K	Maheshwari, (2010). A text Book of Microbiology.	S. Ch	and &	Co.	
Refe	erences				• 1•	1 1	1 thr 1
1	Mc Graw	Hill Book				logy 1	I Ed.
2	Michael J GrawHill		r. E.C.S. Chan, Noel R.Krieg, (1993). Microbiology ppany.	5 th Ed	. Mc		

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3	Stai	ner R.Y. l	Ingraham	J.L. Wheo	lis H.H a	nd Painter	r P.R, (19	86). The	Microbial	l world, 5 th	Ed.
5	Eag	le Works	Cliffs N.J	. Prentica	Hall.						
	Tau	ro P., Kar	oor. K.K	. Yadav, K	.S. An in	troductior	n to Micro	biology	1 st Ed Ne	w Age	
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4	grov	wth/micro	bial-cultiv	vation							
5	http	s://www.s	swayam.g	ov.in							
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Cour	se u	csigned D		urKumaran						gy	
			Thupp	ai Kuinai ai	reonege		ien, mup	pui			
						Ver	ified by:]	Dr.Gand	himathi.	R., Chairp	person
Map	ping	with Pro	gramme	Outcomes	1		YA	121			
							Ves	18			PO1
CO	s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	0
CO	1	S	S	S	S	S	М	М	L	L	L
CO		S	S	S	S	S	М	М	S	L	S
CO	3	S	S	S	S	S	М	М	S	L	S
CO		S	S	S	S	S	М	М	S	L	S
CO	5	S	S	S	S	S	S	М	S	L	S

*S – Strong; M – Medium; L – Low

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Cour	se code 23A	ANALYTICAL MICROBIOLOGY	L	T	Р	C
	Core-II		3	1	-	4
I	Pre- requisite	Basic knowledge on Microbiology gained in Semester I of this programme.	•	abus rsion		21 - 022
Cour	rse Objectives:					
		f this course are to:				
•	gain insights or	n the concepts in chemistry for the preparation of se	olution	s.		
•	get acquainted	with the different instruments used in microbiology	y labor	atory.		
•	impart knowled	lge to identify the physical and chemical properties	of bio	omolec	ules.	
•	facilitate the st	udents with the concept of property of light absorpt	tion to	study		
	biomolecules.					
	ected Course Out					
On th		pletion of the course, student will be able to:				
1	-	vith properties of bio molecules.				K 2
	Ũ	about different instruments in microbiological				K 2
	laboratory	60,000 50,0010				
		narvesting and preserving microbes.				K 3
		molecules and microbial growth.				K 4
	-	ntify the bio molecules using chromatographic tech	-			K 5
ł	K1 - Remember; I	K2 - Un derstand; K3 - Apply; K4 - Analyze; K5 - 	Evalua	te; K6	– Crea	te
	iit – I			1		Hours
		Normal solutions, pH meter, pH electrodes – Colom	iel and	glass e		
	uit —II					Iours
		plications of Autoclave, Hot air oven, Incub cabinets, BOD incubator, Metabolic shaker, Incine		Lamina	r air	flow
	it – III	a landa la			12 I	Hours
		ciple – Types of Centrifuges – Low speed, High rifuge. Lyophilization.	speed	, Ultra	centri	ifuge.
Un	it – IV	14 Days and Party	AN CONTRACT		12 H	Hours
	lorimetry, Turbio otometry, AAS.	dometry, Spectrometry – UV and Visible Sp	ectrop	hotome	eter. I	Flame
	nit – V	No.			12 H	Iours
Chr	romatography – P	aper, Thin layer, Column, Ion-exchange, Gas and Agarose gel electrophoresis, PFG.	HPLC	. Electr		
		COUCATE TO ELEVALE				
		Total Le	cture F	Iours	60 H	ours
Tex	t Books				~ ~ **	
1.		padhyay. Biophysical Chemistry, (2010). Himalaya	a Publi	shing F	Iouse.	
2.	1 1 1	Maheshwari, (2010). Text book of Microbiology,		<u> </u>		
	erences					-
1		L. E. Balser, John Wiley and Sons, Principles of	f appli	ed Bio	medica	al
2		nd Merrit, Instrumental Methods of analysis Asian	Ed.			
3	New York.	nd L. W. Gay, Springer, Verlag, Environmental Ins				,
4	Boyer, Rodney,	F. Benjamin and Cummins, Modern Experimental	Bioche	mistry.	$2^{nd}Ed$	Ι.
		chemical Calculations and Biostatistics, (2007). 1 st				

Rel	ated On	line	Contents	5							
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3	https://e	en.m	.wikipedi	a.org/wik	ci/Chrom	atography	y				
4	https://e	en.m	.wikipedi	a.org/wik	i/Spectro	ometry					
5	https://i	micr	obenotes.	com/instr	uments-u	used-in-m	icrobiolo	gy-lab/			
6	https://	www	.swayam	.gov.in							
Cou	rse desig	gned	by: Mrs.		•	•			f Microb	oiology	
			Tiru	ppur Kun	naran Co	llege For	Women,	Tiruppur			
						Verifi	ed by: D	r.Gandhi	imathi.R	., Chairp	erson
Map	ping wi	th Pi	rogramm	e Outcor	nes						
CC)s P	01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CC	01	S	S	S	S	S	M	M	L	L	М
CC)2	S	S	М	S	S	M	М	S	L	М
CC	03	S	S	S	M	S	M	М	L	L	М
CC)4	S	M	M	S	S	M	М	S	L	М
CC)5	S	S	S	S	S	S	M	L	L	М

*S – Strong; M – Medium; L – Low



Course code 23B	GENERAL BIOLOGY	L	Т	P	С
Core – III	GENERAL BIOLOGI	3	-	-	4
Pre- requisite	Basic knowledge on biology gained during HSc.	Sylla Vers		202 20	
Course Objectives:					
The main objectives of thi					
	ra structure of prokaryotic and eukaryotic cell	s.			
• learn about cell div					
	sics of plant kingdom.				
	portant systems of human physiology.				
Expected Course Outcor					
	tion of the course, student will be able to:				
	about the structure and function of Prokaryotic				2
Ŭ	about the structure and function or Eukaryote	s.			2
	n cell division in Prokaryotes and Eukaryotes.				3
4 Understand basis of					4
	about human physiology.				4
	Understand; K3 - Apply; K4 - Analyze; K5 - E	Evaluate	e; K6 -		
Unit – I				9 Ho	
	cteria – Cell membrane – Extra mural laye			-	
	– Mesosomes – Nuclear material – Reserve	materia	als – F	Pigmer	nts –
Cell appendages – Flage	ella – Pili.			0.11	
Unit –II		11 (7 11	9 Ho	
	ctions of Eukaryotic cell organelles – Cell w				
	oplast – Endoplasmic reticulum – Golgi o	comple	x - f	Nucleu	ıs –
Ribosomes – Other cell	inclusions and Flagella.			0.11	
Unit – III		N.C.		9 Ho	
	- Binary fission - Cell division in Eukaryotes	- M1tc	osis and		
Unit – IV		11 65		9 Ho	
	of plant cell. General characters of Tha				
Pinus.	Pteridophyta – Fern, Angiosperms – Tulips	and G	ymnos	perms	-
Unit – V	Coimbatore			9 Ho	urc
	ructure and functions of Digestive system and e	ov oroti	on Dog		
	lar system.	excient	JII, Kes	spirato	чy
		ure Ho	ure	45 H	Iours
Text Books	COUCATE TO ELEVATE TOtal Lect	ui e 110	415	чу 1	10413
	Maheshwari,(2010). Text book of Microbiolog	v. S Ch	and P	ublica	tions
References	interestiviting 2010). Text book of Microbiolog	, s .en	1	u	
	Kathleen Sandman and Dorothy Wood,	(2020)	Prec	cott"e	
¹ Microbiology 11 th Ed.	Mc Graw Hill Book.				
2 Michael J. Pelczar, J. Graw Hill Book Com	r. E.C.S. Chan, Noel R.Krieg, (1993). Mic pany.	robiolc	ogy 5 ^{tt}	'Ed.M	С
3 Stainer R.Y. Ingrahar	n J.L. Wheolis H.H and Painter P.R, (1986). T Sliffs N.J. PrenticeHall.	he Mic	robial	world	••
A Reddy, S.M, (2010).	University Botany – 2. Gymnosperms, Plant A ternational Publishers, New Delhi.	natomy	, Gene	etics,	
	and K. MadhavanKutty, Human Physiology	. S. Cł	nand a	nd Co	,
	atomy and Physiology, 8 th Ed, Churchill Living	ston			
	atomy and r nystology, or Ed, Churchini Elvillg	51011.			

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	elated Onl	ine Conte	nts							
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3	https://en	m.wikiped	lia.org/w	iki/Cell_	division					
4	www.swa	yam.gov.i	n							
5	https://m. 14534453	jagranjosh 59-1	.com/gen	eral-kno	wledge/a	mp/classi	fication-	of-plant-	kingdom-	
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М

Μ

Μ

*S – Strong<mark>; M – Med</mark>ium; L – Low

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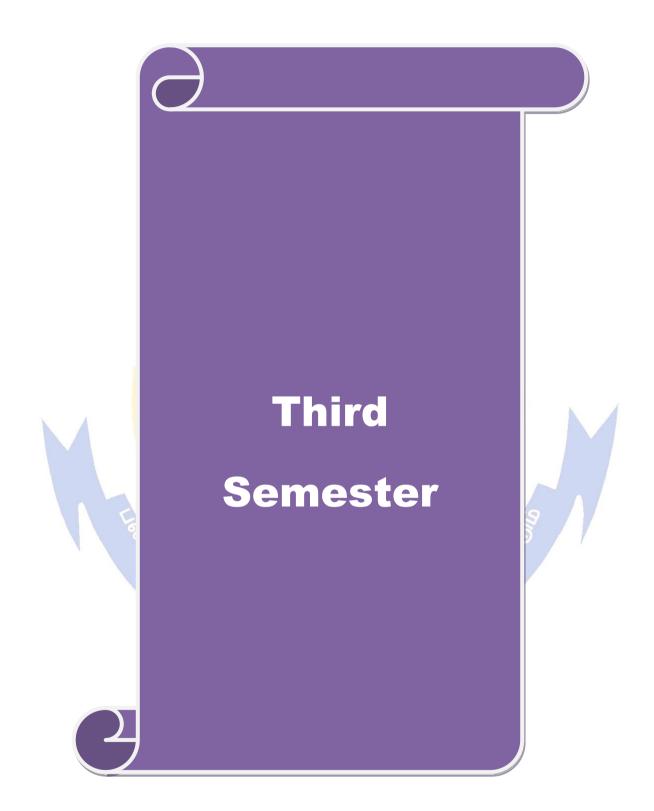
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	rse code 33A	MICDODIAL DIVEDSITY	L	Т	P	С				
	Core -IV	MICROBIAL DIVERSITY	4	-	-	4				
	Pre-requisite	Basic knowledge on taxonomy gained during HSc. and basics of microorganisms during the first year of this programme.	Syllab Versio)21 - 022				
Cou	rse Objectives:									
The	main objectives of th	nis course are to:								
•	 impart knowledge 	e about the taxonomical classification of microorg	anisms	with r	repres	sentative				
	types.									
-	ected Course Outco									
On t		etion of the course, student will be able to:	1							
1 Know about basics of microbial classification, taxonomy and their modern approaches. K 2										
2	Gain knowledge ab Bacteriology.	out major divisions of Bergey's Manual of System	atic]	X 4				
3	Explore the taxonor	my, characters, life cycle and economic importance	e of Fun	gi.		K 3				
4	Know about the mo importance of Alga	orphology, characters, reproduction and economic e.]	X 3				
5	Understand the basi	ic structural characterization of Protozoa and its cla	assificat	ion]	K 3				
	K1 - Remember; K2	<mark>2 - Unde</mark> rstand; K3 - Apply; K4 - Analyze; K5 - Ev	valuate;	K6 –	Crea	ite				
Uni	it–I			1	2 Ho	ours				
Tax	onomy – Pri <mark>nciple</mark>	s – Modern approaches – Numerical, Molecu	lar, Se	rotax	onom	iy and				
		luction to Microbial Classification and Taxonomy								
Uni	it–II 👔		n. d	1	2 Ho	urs				
II F	Edition of Bergey's N	Manual of Systematic Bacteriology (Volume I -)	V) - Cc	ncise	acco	ount of				
		tion - General characteristics - Vol. I: The A								
Bra	nching and Phototro		1 TTL 7	The I						
		opic Bacteria – Vol. II: The Proteobacteria – Vo		I IIC I	JOW	G + C				
Gra	-	a – Vol. IV: The High G + C Gram-positi	ve Bac							
Gra Pla	nctomycetes. Spiroch		ve Bac	teria	–Vo	l. V:				
Gra Plai Un i	nctomycetes. Spiroch it-III	a – Vol. IV: The High G + C Gram-positi netes, Fibrobacteres, Bacteriodetes and Fusobacter	ve Bac ia.	teria	–Vo 2 Ho	l. V: urs				
Gra Plan Un i Fun	nctomycetes. Spiroch it-III ngi –Taxonomy and (A – Vol. IV: The High G + C Gram-positi netes, Fibrobacteres, Bacteriodetes and Fusobacter General Characteristics – Life cycle of Aspergillus	ve Bac ia. <i>, Mucor</i>	teria 1 ; <i>Rhi</i> z	–Vo 2 Ho zopus	l. V: urs				
Gra Plan Uni Fun and	nctomycetes. Spiroch it-III ngi –Taxonomy and G <i>Penicillium</i> – Mode	General Characteristics – Life cycle of Aspergillus es of reproduction – Economic importance (Brief	ve Bac ia. <i>f, Mucor</i> note wi	teria 1 , <i>Rhiz</i> th an	–Vo 2 Ho zopus	l. V: urs				
Gra Plan Uni Fun and the	nctomycetes. Spiroch it-III ngi –Taxonomy and O <i>Penicillium</i> – Moder role of fungi in indu	A – Vol. IV: The High G + C Gram-positi netes, Fibrobacteres, Bacteriodetes and Fusobacter General Characteristics – Life cycle of Aspergillus	ve Bac ia. <i>f, Mucor</i> note wi	teria 1 ; <i>Rhiz</i> th an ese).	–Vo 2 Ho zopus exan	l. V: urs nple on				
Gra Plan Uni Fun and the	nctomycetes. Spiroch it-III ngi –Taxonomy and G <i>Penicillium</i> – Moder role of fungi in indus Unit–IV	General Characteristics – Life cycle of Aspergillus es of reproduction – Economic importance (Brief strial production of antibiotics, enzymes, alcohol	ve Bac ia. <i>Mucor</i> note wi and che	teria 1 ; <i>Rhiz</i> th an ese). 1	-Vo 2 Ho <i>zopus</i> exan 2 Ho	I. V: urs nple on urs				
Gra Plan Uni Fun and the Alg	nctomycetes. Spiroch it-III ngi –Taxonomy and O <i>Penicillium</i> – Moder role of fungi in indus Unit–IV gae – Outline class	General Characteristics – Life cycle of Aspergillus es of reproduction – Economic importance (Brief strial production of antibiotics, enzymes, alcohol ification (Class level) by F. E. Fritsch – M	ve Bac ia. , <i>Mucor</i> note wi and che orpholo	teria 1 <i>; Rhiz</i> th an ese). 1 gy au	-Vo 2 Ho zopus exan 2 Ho nd C	l. V: urs physical urs General				
Gra Plan Uni Fun and the Alg Cha	nctomycetes. Spiroch it-III ngi –Taxonomy and G <i>Penicillium</i> – Moder role of fungi in indus Unit–IV gae – Outline class aracteristics – Represent	General Characteristics – Life cycle of Aspergillus es of reproduction – Economic importance (Brief strial production of antibiotics, enzymes, alcohol ification (Class level) by F. E. Fritsch – M esentative form – Chlamydomonas sp., Volvox	ve Bac ia. , <i>Mucor</i> note wi and che orpholo	teria 1 <i>; Rhiz</i> th an ese). 1 gy au	-Vo 2 Ho zopus exan 2 Ho nd C	l. V: urs physical urs General				
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Gra Plan Uni Fun and the Alg Cha (Fo Vro IV. 0 Pro IV. 0 1 Refe	nctomycetes. Spiroch it-III ngi –Taxonomy and G <i>Penicillium</i> – Moder role of fungi in indust Unit–IV gae – Outline class aracteristics – Represent od, Fodder and Ferti Unit–V tozoa – General C tistologists) – Su Ciliophora. t books Joanne Willey and Microbiology 11 th Ec erences Madigan, Michael Brock's Biology of M	A – Vol. IV: The High G + C Gram-positi netes, Fibrobacteres, Bacteriodetes and Fusobacter General Characteristics – Life cycle of Aspergillus es of reproduction – Economic importance (Brief strial production of antibiotics, enzymes, alcohol ification (Class level) by F. E. Fritsch – M esentative form – Chlamydomonas sp., Volvox ilizers). characteristics – Classification (proposed by In bphyla : I. Sarcomastigophora – II. Sporozoa Total Lecture H d Kathleen Sandman and Dorothy Wood, (ve Bac ia. , <i>Mucor</i> note wi and che orpholo – Econo nternati – II Hours	teria 1 7, <i>Rhiz</i> th an ese). 1 gy au omic 1 omal I. Cn Presco avid	-Vo 2 Ho 2 Ho exan 2 Ho nd C impo 2 Ho 5 Soci idos idos 60 H ott's	I. V: urs onple on urs General ortance ours ety of oora - Hours (2015).				

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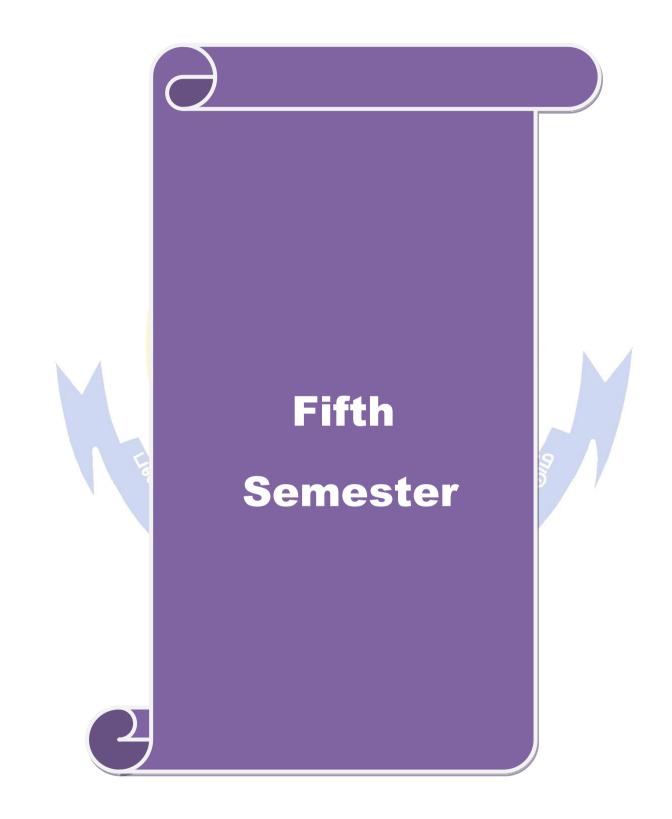
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Version 2022 Course Objectives: The main objectives of this course are to: • understand the nutritional requirements of microorganisms and their uptake. • elucidate the growth and growth factors of microorganisms. • provide knowledge about the metabolism, aerobic and anaerobic respiration of microorganisms. • facilitate the understanding on photosynthesis, anabolism and bioluminescence. Expected Course Outcomes: On the successful completion of the course, student will be able to: K 2 On the successful completion of the course, student will be able to: K 3 In Distinguish the Microorganisms based on their nutritional requirements and transport mechanisms of nutrients uptake. K 3 3 Understand about key metabolic and biosynthetic pathways carried out in microorganisms. K 4 4 Acquire the knowledge about aerobic and anaerobic respiration of microorganisms. K 4 5 Be acquainted with anabolism and bioluminescence. K 4 5 Be acquainted with anabolism and bioluminescence. K 4 6 Be acquainted with anabolism and bioluminescence. K 4 7 Conterstand about key metabolic and anaerobic respiration of microorganisms. K 4 8 Coulanter the knowledge about aerobic and anaerobic respiration of microorganisms. <		Core	-V	MICROBIAL PHYSIOLOGY	4	-	-	4
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*S – Strong; M – Medium; L – Low



Course code 53A	MICDODIAL CENERICS	L	Т	P	С
Core -VI	MICROBIAL GENETICS	5	-	-	4
Pre- requisite	Basic knowledge on Genetics gained during HSc. and this programme.	Sylla Versi		202 202	
Course Objectives:					
The main objectives of th	nis course are to:				
• gain knowledge o	on the structure and characters of Genetic materials.				
 understand replication 	ation, transcription and translation process in prokary	yotes and	l euka	aryotes	•
• perceive genetic a	lterations and their repair mechanisms.				
• understand the me	ethods of genetic exchange.				
Expected Course Outco	mes:				
	etion of the course, student will be able to:				
Know about basics	structure of DNA and RNA, and Organization of ge	nes in			
1 prokaryotes & Euk				K	2
Gain knowledge ab	out replication in Prokaryotes & Eukaryotes and role	e of		17	
2 enzymes in replicat	-			K	4
Understand the gen	ne expression by Translation and Transcription proce	ss and		T 7	
3 regulation of gene				K	4
5	utation, their types and repair mechanism			K2 &	K3
	netics exchanges in microbes			K2	2
	- Understand; K3 - Apply; K4 - Analyze; K5 - Eval	uate; Ke	6 - Cr	eate	
Unit–I		,		15 Ho	ours
DNA as genetic materia	al – Characters of a genetic material – Chemistry and	d Moleci	ular s	tructur	e of
	NA – Bacterial chromosome – Organization of ge				
	enetic material – Structure and types of RNA.	r			
Unit–II	Non the second sec			1 <i>5</i> II.	
01110 11				15 HO	urs
Replication of DNA -	Replication in prokaryotes and eukaryotes – Mech	anism ar		15 Ho	
	Replication in prokaryotes and eukaryotes – Mecha	anism ar			
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of replication – Theta repl <mark>i</mark>	Replication in prokaryotes and eukaryotes – Mecha	anism ar	nd er	nzymol	ogy
of replication – Theta repl <mark>i</mark> Unit–III	cation and Rolling circle replication.	97	nd er	nzymol 15 Ho	ogy urs
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CO3		S	S	S	S	S	М	S	M	S	Μ
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Course and	52D		т	T	р	C
Course code Core - VII	53B	PRINCIPLES OF IMMUNOLOGY	L 5	Т	Р	<u>C</u> 4
Pre- requ	isite	Basic knowledge on Immunology gained during HSc. and basics learned during the first year of this programme.	Sylla Vers			1 -
of immu • categori	tives of thi e developr noglobulin ze mechan	nents in immunology and learn immunity types, s				ns
Expected Cour	rse Outcor	mes:				
-		tion of the course, student will be able to:				
		cs of Immunology and defense mechanisms.			K 2	
		out immunity types and function of immunoglobul	lins.		K 2	
		out hypersensitivity and immunodeficiency diseas		K	3 & K	4
		pimmune diseases and monoclonal antibodies.		K	2 & K	3
5 Gain know	wledg <mark>e abo</mark>	out application of Immunohaematology.		K	3 & K	4
K1 - Reme	mber; K2 -	• <mark>Un</mark> derstand; K3 - Apply; K4 - Analyze; K5 - Ev	aluate; 1	K6 – (Create	
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-	-	mmunology – The basis of defence mechanismem – Phagocytosis.	ns - C		d Org	
Alternate – Im Unit – III	munoglob	Antigen – Antibody – types – Complement path ins – structure and functions.		1	.5 Hou	
diseases.	Typersensit	ivity – Classification types and Mechanisms – I	nmunoo			
-		sms and autoimmune response diseases: RA, bodies and its applications (Hybridoma technolog			5 Hou yasthe	
$\frac{\text{Unit} - \mathbf{V}}{\text{Unit} - \mathbf{V}}$		bodies and its applications (Hybridonia technolog	y)	1	5 Hou	irc
Immunohaema		Blood transfusion – ABO grouping – Rh factor – T ism of acceptance and rejection. Total Lecture H		anspla		on
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	ul (2018)	Text Book of Immunology, Books & Allied Pvt.	Ltd			
		K. Maheshwari, (2010). A text Book of Microbio		. Char	nd & C	
References				. Jinul		
Jenni P		A Owen; Sharon A Stranford; Patricia P Jone dW.H.Freeman, NY	es; Janis	Kub	y; (20	19).
		. Immunology An Introduction,10 th Ed. W.B. Saur	ders, Pl	hilade	lphia.	
3 Roitt, I	M (2017).	Essentials of Immunology, 13 th Ed. Blackwell Pu	blicatio	ns.	<u> </u>	
		993). Immunology – Introductory Text Book. Nev			d.	
		ad Andrew H. Lichtman, Saunders (2001). Basic I	-			
	Janeway,	Jr. and Paul Travers. Immunobiology – The immu			health	and
Joanne		Kathleen Sandman and Dorothy Wood (2020). P Hill Book.	rescott	's Mic	robiol	ogy

Relat	ed Online	Content	S								
	www.enc	yclopedia	.com/scie	ence/ency	clopedias	s-almanac	s-transcri	pts-and-n	naps/hist	ory-	
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CO4	S	S	S	S	S	S	S	S	L	S	
CO5	S	S	S	S	S	S	S	S S	L	S	

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

Course code 53C	FOOD MICROBOLOGY		Т	Р	<u>C</u>
Core – VIII	Basic knowledge on Microbiology during	4 Sylla	- buc	- 202	4
Pre- requisite	the previous years of this programme.	Vers		202	
Course Objectives:					
The main objectives of	this course are to:				
	elationship between food and microorganisms.				
• understand the p	principles of food preservation.				
• analyze the mec	hanism food spoilage.				
_	dge on fermented foods.				
 understand food 	borne diseases and food quality control measures.				
Expected Course Outo	comes:				
1	pletion of the course, student will be able to:				
	le of Microbes in food.			K 2	
-	eservation techniques in food.			2 & 1	
	about spoilage of food by microbes.			3&1	
	e about fermented foods.		K	3 & I	<u> </u>
<u> </u>	e about food borne diseases and their outbreaks.	<u></u>		K4	
Unit – I	2 - Understand; K3 - Apply; K4 - Analyze; K5 - Eva	aiuate;		2 Hoi	
	nisms – Important microorganisms in food (Bacte				
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potential, Nutrient con Unit –II Principles of food pr Techniques of remove preservatives. Unit – III	ntent and Inhibitory substances and biological structure reservation – General principles and application val – use of temperature (low & high). Drying, 1	re. methoo radiation	ion – ls – n and	2 Hou Aseps chem 2 Hou	irs is - nica
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Course Designed By: Mr.P.Nallasamy, Asst. Professor in Microbiology														
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Course code	53D		L	Т	Р	С
Core – IX		MEDICAL MICROBIOLOGY	4	-	-	4
Pre- req	uisite	Basic knowledge on Microbiology during the	Sylla		202	
Course Ohi		previous years of this programme.	Vers	lon	202	12
Course Obj		this course are to:				
	5	nfection and the epidemiology of infectious diseases	2			
		norphology, pathogenecity and laboratory diagnosis		n nosi	tive	
		nd acid fast bacteria,	, or gran	n pos	uve,	
• acqu	ire basic kn	owledge about the pathogenecity and laboratory dia	gnosis (of		
<u> </u>	<u> </u>	ozoan pathogens.				
Expected C						
		bletion of the course, student will be able to:				
		wledge about infections, outbreaks and control mea	sures.		<u>X 2 &</u>	
	-	thogenicity of Gram positive bacterial pathogens.			<u>X 2 &</u>	
		thogenicity of Gram negative bacterial pathogens.			$\frac{X 2 \&}{X 2 \&}$	
		thogenicity of Acid Fast and miscellaneous bacteria	•		$\frac{X2\&}{X2\&}$	
		wledge about fungal and parasitic infections. 2 - Understand; K3 - Apply; K4 - Analyze; K5 - Example 1	valuata		$\frac{X 2 \&}{Croat}$	
Unit–I		Z - Onderstand, K3 - Appry, K4 - Anaryze, K3 - E	valuale,		12 Ho	
	Sources	of infections – Types of infections – Methods of in	factions			
		Endemic diseases, Nosocomial infections – Epide				
		iseases cycle – Investigation of epidemics – Control				ous
Unit–II	neetious a	seases eyere mitesugation of epidemics control			12 Ho	urs
	u Datho	genicity and Laboratory diagnosis – Gram r	ositivo			
-		cus, Streptococcus pyogenes, Pneumococcus sp		0		
		theriae, Clostridium botulinum and Clostridium teta		ius (ininia	<i>cis</i> ,
Unit–III	ier tanit aip				12H01	ire
	v Pathoge	nicity and Laboratory diagnosis – Gram negative or	oanism	A CONTRACTOR OF A CONTRACTOR A CONTR		
coli, Kle	bsiella sp	p., <mark>Proteus sp., Salmonella typhimurium,</mark>	Shigella			
	nas sp., Vib	prio cholera and Neisseria sp.			10 11	
Unit–IV		0.0			12 Ho	urs
1 0	rium lepr	genicity and Laboratory diagnosis – Mycoba ae, Treponema pallidum, Leptospira, Chlamya				
Unit–V		EDUCATE TO ELEVATE			12 Ho	urs
	•	enicity and Laboratory diagnosis – Fungi – C nans – Parasites – Entamoeba histolytica, Plasmodi				
2. 77100000		Total Lectur			60 Ho	
Text books				<u> </u>		
1 Anantl	nanarayana . Orient Lo	n R and CK Jayaram Panicker, (2017). Textbo	ook of 1	Micro	biolog	У
David		d, Richard C B Slack, Michael R. Barer, Will L I	wing (012	Med	ical
		th Ed.Elsevier Ltd.	vilig, (2	2012)	wicu	Car
References						
	e and Mcca	rtney, (1994). Medical Microbiology, 14 th Ed. Churd	chill Liv	ingst	on.	
	and Scotts	, (1994). Diagnostic Microbiology, 9 th Ed, Baron and				sby
Jawetz		JL and Adelberg EA, (1998). review of Medica ons, USA.	l Micro	biolog	gy Lai	ıge
		d Kathleen Sandman and Dorothy Wood, (2020). Pr	escott''s	Micr	obiolo	ogy

	11th Ed. Mc Graw Hill Book. 5 Medical Microbiology 19th Ed., Michael Barer Will Irving.											
5	Medical	Microbio	logy 19 th	Ed., Mich	ael Barei	Will Irvi	ing.					
							-	tral Book	Agency I	Pvt. Ltd.		
Rela	ted Onli	ine Conte	ents									
1	https:/	/www.yo	utube.com	n/watch?	v=IBX3jj	2uUjo						
2												
3												
4	https://study.com/academy/lesson/what-is-streptococcus-pyogenes											
5	https://www.youtube.com/watch?v=thBZPXcGtmM											
6	https://www.youtube.com/watch?v=thB2rAcOthivi https://www.youtube.com/watch?v=YXxyLlopnLk											
7	-			n/watch?v								
8	-	_		n/watch?v	^							
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11				n/watch?								
12	-			n/watch?								
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14	1			n/watch?v			8					
15	-			n/watch?								
16	÷			n/watch?	and the second second			2				
Cours	se Desig			<mark>lasamy,</mark> A san Colle								
			2	100	- V	erified B	y: Dr.Ga	andhimat	hi.R, Ch	airperson		
Mapp	oing with	n Pr <mark>ogra</mark> i	nme Out	comes	To a	20	F 1	R.				
COs	s PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10		
CO1	l S	S	S	S	S	S	S	S	L	L		
CO2	2 S	S	S	S	S	S	S	S	L	L		
CO3	3 S	S	S	S	S	S	S	S	L	L		
CO4	1 S	S	S	S	S	S	S	S	L	L		
CO5	5 S	S 2	S	S	S	S	S	S	L	L		

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



Course code 63A		L	Т	Р	С					
Core – X	INDUSTRIAL MICROBIOLOGY	5	-	-	4					
Pre- requisite	Basic knowledge on microorganisms gained during the first and second year of this programme.	Syllabus Version		2021 - 2022						
Course Objectives:										
The main objectives of th	is course are to:									
• impart knowledge	e on industrial production of economically impo	ortant pr	oducts	using						
microorganisms.										
• acquire knowledge on the production of health care products using microorganisms.										
• analyze the metho	ods for effective recovery and purification of fe	ermented	l produ	cts.						
Expected Course Outco										
	etion of the course, student will be able to:									
	tation and fermentors.				K 2					
	improve the beneficial microorganisms from th	e enviro	nment		К 3					
for improved yield.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~									
	production of commercially important microb	-			K2					
	and technical knowledge on microbial product	ion of he	alth	K	3 & 4					
care products.					2.0.4					
5 Develop as an entre		F 1			3 & 4					
	- Understand; K3 - Apply; K4 - Analyze; K5	- Evalua	ite; K 6							
Unit – I					Iours					
	tion & types – Submerged and Solid state - conical & airlift) – Batch fermentation – Con									
Unit –II		έ I		15]	Hours					
Mutation, Recombination Unit – III Production of beverages	strains – Screening methods – Strain develop on and protoplast fusion. s – beer and wine – vitamin B12 and Riboflay s – Amylases and Proteases – methods of immo	v <mark>in</mark> – An	tibiotic	15 1	Hours					
Unit – IV	HIAP UN	6		15 I	Iours					
Single cell protein – B (<i>Pleurotus</i>) and Button (Baker"s yeast, <i>Spirulina</i> – Details of mushro (<i>Agaricus</i>) mushroom.	oom dev	elopme	ent –	Oyster					
Unit – V	a gir	1		15 H	Iours					
1	iochemistry – Intercellular and extracellular action, precipitation – Breakage of cells – Phys	sical and	Chemi							
Text books	Total Lect	ure Hou	irs	75 H	Iours					
	trial Microbiology, (2016). 2 nd Ed. Laxmi Publ	ications	New I	Delhi						
	2019). Industrial Microbiology. New Age Inter									
References		ilutioilui	1 40115							
Stanbury P T and	d Whitaker, (2016). Principles of Fermentation	on Tech	nology.	3 rd Ed						
Pergamon Press. 1			liology,	5 10	•					
	Prescott SC and C G Dunn. Industrial Microbiology, (2011). Jodhpur: Agrobios									
	New York New York Nduka Okafor. Modern Industrial Microbiology and Biotechnology. (2007). CRC Press									
4 Michael J. Waites	Michael J. Waites, Neil L. Morgan, John S. Rockey, Gary Higton. Industrial Microbiology: An Introduction, (2013). Wiley Blackwell Publishers.									
5 Crueger W and C	Crueger W and Crueger A. Biotechnology: A Textbook of Industrial Microbiology.2 nd Ed. (1991). Sinauer Associates Inc.,U.S.									
	U, Biotechnology, (2005). 1 st Ed. Books and All	ied (P) I	Ltd.							
		· / -								

Co

7	Dubey R C. A Textbook of Biotechnology, (2014). S Chand & Co.						
Rela	Related Online Contents						
1	http://www.simbhq.org/						
2	https://www.rapidmicrobiology.com/						
3	http://rapidmicromethods.com/						
4	swayam.gov.in > nd1_noc20_bt21						
5	sites.google.com>site>microbiology-courses-in-swayam						
6	onlinecourses.nptel.ac.in>courses						
7	www.classcentral.com>Subjects>Sciences>Biology						
Cours	Course Designed By: Dr.A.K.Lakkumi Venmal, Assistant Professor & HOD of Microbiology,						

L.R.G. Government Arts College For Women, Tiruppur

Verified By: Dr.Gandhimathi.R, Chairperson										
Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	М	M	L	L	L
CO2	S	S	S	S	S	S	М	S	S	S
CO3	S	S	S	S	S	S	S	M	М	М
CO4	S	S	S	S	S	S	M	L	S	М
CO5	S	S	S	S	S	S	S	S S	S	S

*S – Strong; M – Medium; L – Low

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	ode 63B	ENVIRONMENTAL AND	L	Т	Р	С		
CORE	E - XI	AGRICULTURAL MICROBIOLOGY	5	-	-	4		
Dno	e- requisite	Basic knowledge on Microbiology gained from	ic knowledge on Microbiology gained from Syllabus					
rre	- requisite	the previous subjects in this programme.	Vers	sion	202	22		
Course (Objectives:							
	n objectives of th							
		stribution of microorganisms in nature and microbial						
		e about the key role of microbes in degradation of or	ganic m	atter.				
		l ecology, analysis and treatment of water.						
• pi	rovide basic info	rmation on air microbiology.						
-	d Course Outco							
		tion of the course, student will be able to:				_		
		basics of microorganisms in nature	• , •					
		out principles and applications of microbial decomp	position,	•	K Z			
		position of organic matter. on water microbiology.			<u> </u>			
	· · ·	ques in microbiological analysis of air.						
	*	Inderstand; K3 - Apply; K4 - Analyze; K5 - Evaluat	e' K6 –	Create		•		
		inderstand, its rippiy, it rindryze, its Evaluat	, 110	Cicuic	, 			
Unit– l	I 🦳				15 Ho	ours		
		ganisms in nature – Microbial communities in soil	- Factor	s Infl				
		il – zymogenous and autochthonous flora in Soil –						
		ation, Ammensalism, Commensalism, Syntropism,						
-	itable examples.			sin and	I I Ieuz	uion		
Unit–I	-	Frey See And			15 Ho	aure		
				_	15 11	Juis		
	nai accompositio	n. Cellulose Hemicellulose Lignin Pectin and Ch	itin _ Fa	ctors i	nfluen	cing		
degrada		on; Cellulose, Hemicellulose, Lignin, Pectin and Ch utilization – bioconversion of organic wastes – sug						
	ation – Acetate u	utilization – bioconversion of organic wastes – sug	arcane v					
compos	ation – Acetate u sition – compost		arcane v		– coir	pith		
compos Unit– l	ation – Acetate u sition – compost	utilization – bioconversion of organic wastes – suging, principles and Applications- conversion process	arcane v	vastes	– coir 15 Ho	pith ours		
compos Unit– I Microo	ation – Acetate u sition – compost III organisms in the	utilization – bioconversion of organic wastes – sug ing, principles and Applications- conversion process Decomposition of organic matter- Carbon cycle – N	arcane v 	vastes Cycle	– coir <u>15 Ho</u> – Nitro	pith ours		
compos Unit– I Microo fixing 1	ation – Acetate u sition – compost III organisms in the microorganisms	utilization – bioconversion of organic wastes – sug ing, principles and Applications- conversion process Decomposition of organic matter- Carbon cycle – N – Root nodule bacteria – non symbiotic Nitrogen	arcane v s. litrogen fixers -	vastes Cycle - biofe	– coir <u>15 Ho</u> – Nitro ertilizer	pith ours ogen rs in		
compos Unit– I Microo fixing 1	ation – Acetate u sition – compost III organisms in the microorganisms	utilization – bioconversion of organic wastes – sug ing, principles and Applications- conversion process Decomposition of organic matter- Carbon cycle – N	arcane v s. litrogen fixers -	vastes Cycle - biofe	– coir <u>15 Ho</u> – Nitro ertilizer	pith ours ogen rs in		
compos Unit– I Microo fixing t agricult	ation – Acetate u sition – compost III organisms in the microorganisms ture – Rhizobiu	utilization – bioconversion of organic wastes – sug ing, principles and Applications- conversion process Decomposition of organic matter- Carbon cycle – N – Root nodule bacteria – non symbiotic Nitrogen	arcane v s. litrogen fixers -	vastes Cycle - biofe	– coir <u>15 Ho</u> – Nitro ertilizer	pith ours ogen rs in rous		
compose Unit– I Microoo fixing fi agricult cycle. Unit– I	ation – Acetate u sition – compost III organisms in the microorganisms ture – Rhizobiu IV	utilization – bioconversion of organic wastes – sug ing, principles and Applications- conversion process Decomposition of organic matter- Carbon cycle – N – Root nodule bacteria – non symbiotic Nitrogen m and phosphate Solubilizers – Mycorrhizial ass	arcane v litrogen fixers - sociatior	vastes Cycle - biofe 1 – Pl	– coir <u>15 Ho</u> – Nitro ertilizen nospho <u>15 Ho</u>	pith ours ogen rs in rous ours		
compose Unit– I Microo fixing to agricult cycle. Unit– I Water	ation – Acetate u sition – compost III organisms in the microorganisms ture – Rhizobiu IV microbiology, a	utilization – bioconversion of organic wastes – sug ing, principles and Applications- conversion process Decomposition of organic matter- Carbon cycle – N – Root nodule bacteria – non symbiotic Nitrogen	arcane v Litrogen fixers - sociation	vastes Cycle - biofe 1 – Pl	– coir <u>15 Ho</u> – Nitro ertilizer nospho <u>15 Ho</u> obiolog	pith ours ogen rs in rous ours jical)		
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Rela	Related Online Contents							
1	https://en.wikipedia.org/wiki/Soil_organic_matter							
2	https://aem.asm.org/content/85/14/e00324-19							
3	https://en.wikipedia.org/wiki/Bacteriological_water_analysis							
4	https://www.researchgate.net/publication/286217260_Aero-microbiology							
5	https://aosts.com/role-microbes-microorganisms-used-wastewater-sewage-treatment/							
Cours	Course designed by: Mrs. M.Meenakshi, Assistant Professor of Microbiology Sri Ramakrishna College of Arts and Science For Women, Coimbatore							

Verified By: Dr.Gandhimathi.R, Chairperson

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

*S – Strong; M – Medium; L – Low

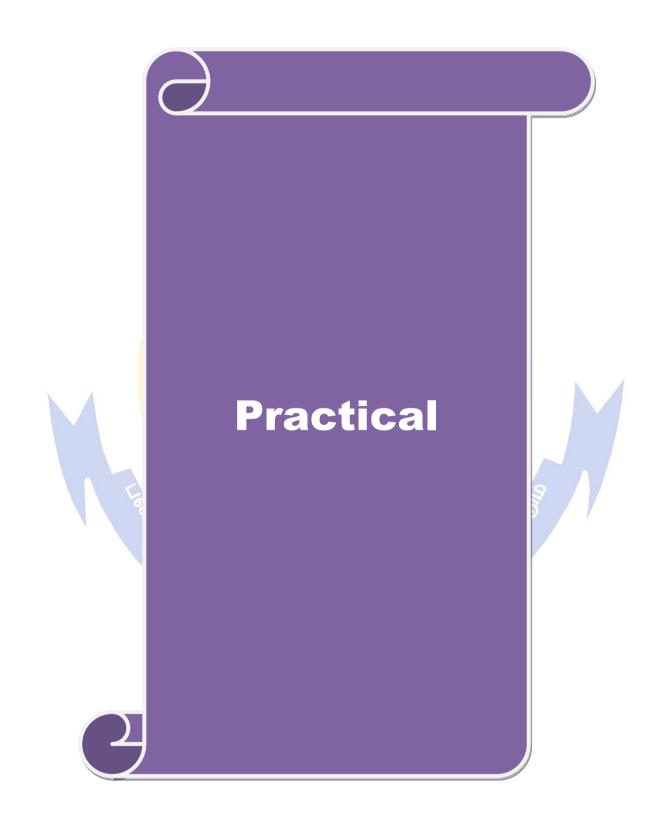


Course code											
	63C	-	VIROL	OGY				L	Т	P	C
Core – XII								4	-	-	4
Pre-		Basic knowledge	gained	during	HSc.	and	this	Sylla		202	
requisite		programme.						Vers	ion	202	22
Course Objecti											
•		his course are to:									
• Recall th	ne histori	ical development and	basic info	ormation	on viru	ses.					
• Learn the	e viral lif	fecycle.									
Acquire	knowled	lge about oncogenic v	irus and ł	numan vi	ral infe	ctions					
Expected Cour	se Outco	omes:									
On the successful	ul compl	letion of the course, st	udent wil	l be able	to:						
1 Able to kn	ow abou	t basics of virology &	assay of	viruses.						K	2
2 Gain know	2 Gain knowledge about lytic cycle of DNA phages. K 2										
Gain know		out lysogenic cycle o			l Multi	plicati	on of 1	RNA		TZ /	•
3 phages.	-	600)ဓာရပ္ဆ	25/2		-				K.	3
4 be familia	r with in	nportant plant and ani	mal virus	ses.	0					K	4
5 Understand	d and dia	agnose various viral di	iseases.		Sec.					K	4
		2 - Understand; K3 - A		4 - Analy	ze; K5	- Eval	uate; F	X6 – C1	eate		
	,	15 /		2	2	8					
Unit – I		5117			2	5			1	2 Ho	urs
Early develop	ment o	of virology – Genera	l Struct	ure – Pro	perties	and	Clas	sificatio		Baltim	
• 1		ntion of viruses – virus			-				```		
Unit –II		A LU	2	Taxa and	E	12		1	1	2 Ho	urs
Multiplication	of D <mark>NA</mark>	phages – Lytic cycle	of T4 pha	age – Ad	sorptio	n to th	e host	cell an	d per	etratio	on -
		leic acids and protein									
Unit – III	0	1.0.1.62	~~~		- /	0				2 Ho	
Multiplication	of DNA	. p <mark>hages – Lysogeny –</mark>	Tempera	te bacter	iophag	es – la	mbda i	hage -	- Indu	ction	of
Unit – IV	lysogens – Generation of defective phages and their uses. Multiplication of RNA phages.										
				11					87		irs
Viruses of Huk	arvotes -	- Reproduction of ani	mal (Pox	and Ade	no) an	d plant	viruse	s (TM			urs
		- Reproduction of ani			eno) an	d plant	viruse	es (TM			
Viruses of Alga		- Reproduction of ani and viruses – viruses			eno) and	d plant	viruse	es (TM	V and	I CMV	/) –
Viruses of Alga Unit – V	ae, fungi	and viruses – viruses	and canc	er.		60	<u>e</u>		V and	l CMV 2 Hou	/) –
Viruses of Alga Unit – V Human viral in	ae, fungi fections	and viruses – viruses – Pathogenicity and d	and canc	er. of Hepati	tis (A,	B & C	<u>e</u>		V and	l CMV 2 Hou	/) –
Viruses of Alga Unit – V Human viral in	ae, fungi fections	and viruses – viruses	and canc	er. of Hepati	tis (A, d Covi	B & C d - 19.	C). Mur	nps, N	V and 1 Ieasle	l CMV 2 Hou ² s,	/) – 1rs
Viruses of Alga Unit – V Human viral in Rubella, Polio,	ae, fungi fections	and viruses – viruses – Pathogenicity and d	and canc	er. of Hepati	tis (A, d Covi	B & C d - 19.	<u>e</u>	nps, N	V and 1 Ieasle	l CMV 2 Hou	/) – 1rs
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Viruses of AlgaUnit – VHuman viral in Rubella, Polio,Text boksAnantha $10^{th}Ed. 0$ 2Dubey, 1References1Luria S. Wiley and $11^{th}Ed. 1$ 2Joanne V $11^{th}Ed. 1$ 3Alan J. 04John Ca	ne, fungi fections Rabies, Rabies, Marayana Orient Lo R.C. & D E. Darne nd sons. Willey ar Mc Graw Cann, (20 rter, (20)	and viruses – viruses – Pathogenicity and d Influenza, AIDS, SAI an R and CK Jaya ongman. D.K. Maheshwari, (20 el, J.E Jr. Baltimore. nd Kathleen Sandmar v Hill Book. 011). Principles of Me 01). Virology: Princip	and canc iagnosis S, Ebola LIIGON TE TO E ram Pan 10). A tez D and C a and Dor plecular V les and A	er. of Hepati virus an icker, (2 xt Book of ampbell othy Wo /irology. .pplicatio	ttis (A, d Covi Tota 2017). of Micr A, (19 od, (20 5 th Ed ns, 1 st E	B & C d - 19. I Lect Textb obiolo 78). G (20). P Acade Ed. Wi	C). Mur ture H ook of gy. S. (eneral rescott mic Pr ley Put	nps, N ours Micro Chand Virolo "s Mic ess. Dicatio	V and 1 1 1 1 1 1 1 1 1 1 1 1 1	a CMV 2 Hou ss, 50 Ho gy d Ed.	/) – 1rs
Viruses of AlgaUnit – VHumar viral in Rubella, Polio,Text books1Anantha 10 th Ed. 02Dubey, 1References1Luria S. Wiley and 11 th Ed. 12Joanne V 11 th Ed. 13Alan J. 04John Ca5Nicholas	ne, fungi fections Rabies, 2 narayana Orient Lo R.C. & D E. Darne nd sons. Willey ar Mc Graw Cann, (20 rter, (200 s H. Ach	and viruses – viruses – Pathogenicity and d Influenza, AIDS, SAI an R and CK Jaya ongman. D.K. Maheshwari, (20 el, J.E Jr. Baltimore. nd Kathleen Sandmar v Hill Book. 011). Principles of Mo 01). Virology: Princip teson, (2011). Fundar	and canc iagnosis S, Ebola LIIGON TE TO E ram Pan 10). A tez D and C a and Dor plecular V les and A	er. of Hepati virus an icker, (2 xt Book of ampbell othy Wo /irology. .pplicatio	ttis (A, d Covi Tota 2017). of Micr A, (19 od, (20 5 th Ed ns, 1 st E	B & C d - 19. I Lect Textb obiolo 78). G (20). P Acade Ed. Wi	C). Mur ture H ook of gy. S. (eneral rescott mic Pr ley Put	nps, N ours Micro Chand Virolo "s Mic ess. Dicatio	V and 1 1 1 1 1 1 1 1 1 1 1 1 1	a CMV 2 Hou ss, 50 Ho gy d Ed.	/) – 1rs
Viruses of AlgaUnit – VHuman viral in Rubella, Polio,Text books1Anantha $10^{th}Ed.$ 2Dubey, 1References1Luria S. Wiley and $11^{th}Ed.$ 2Joanne V $11^{th}Ed.$ 3Alan J. C4John Ca5Nicholas	ne, fungi fections Rabies, 2 marayana Orient Lo R.C. & D E. Darne nd sons. Willey at Mc Graw Cann, (20 rter, (200 s H. Ach ne Conte	and viruses – viruses – Pathogenicity and d Influenza, AIDS, SAI an R and CK Jaya ongman. D.K. Maheshwari, (20 el, J.E Jr. Baltimore. nd Kathleen Sandmar v Hill Book. 011). Principles of Mo 01). Virology: Princip teson, (2011). Fundam ents	and cance iagnosis RS, Ebola LIIGOT ram Pan 10). A tes D and Cor a and Dor plecular V les and A pentals of	er. of Hepati virus an icker, (2 xt Book of ampbell othy Wo /irology. .pplicatio	ttis (A, d Covi Tota 2017). of Micr A, (19 od, (20 5 th Ed ns, 1 st E	B & C d - 19. I Lect Textb obiolo 78). G (20). P Acade Ed. Wi	C). Mur ture H ook of gy. S. (eneral rescott mic Pr ley Put	nps, N ours Micro Chand Virolo "s Mic ess. Dicatio	V and 1 1 1 1 1 1 1 1 1 1 1 1 1	a CMV 2 Hou ss, 50 Ho gy d Ed.	/) – 1rs
Viruses of AlgaUnit – VHuman viral in Rubella, Polio,Text boksText boks10 th Ed. 02Joubey, 1ReferencesJoubey, 1NicholasAnantha 10 th Ed. 02Joubey, 11Joubey, 1NicholasAlan J. 04Joanne V11 th Ed. 1Alan J. 04John Ca5NicholasRelated Onlin1https://e	ae, fungi fections Rabies, 2 marayana Orient Lo R.C. & D E. Darne nd sons. Willey ar Mc Graw Cann, (20 s H. Ach ne Conte n.wikipe	and viruses – viruses – Pathogenicity and d Influenza, AIDS, SAI an R and CK Jaya ongman. D.K. Maheshwari, (20 el, J.E Jr. Baltimore. nd Kathleen Sandmar v Hill Book. 011). Principles of Mo 01). Virology: Princip teson, (2011). Fundarr ents edia.org/wiki/Virology	and cance iagnosis of RS, Ebola LITGOL TE TO F ram Pan 10). A tes D and Cor D and Dor olecular V les and A nentals of	er. of Hepati virus an icker, (2 kt Book of ampbell othy Wo /irology. pplicatio Molecul	ttis (A, d Covi Tota 2017). of Micr A, (19 od, (20 5 th Ed ns, 1 st E ar Viro	B & C d - 19. I Lect Textb obiolo 78). G (20). P Acade Ed. Wi	C). Mur ture H ook of gy. S. (eneral rescott mic Pr ley Put	nps, N ours Micro Chand Virolo "s Mic ess. Dicatio	V and 1 1 1 1 1 1 1 1 1 1 1 1 1	a CMV 2 Hou ss, 50 Ho gy d Ed.	/) – 1rs
Viruses of AlgaUnit – VHuman viral in Rubella, Polio,Text books1Anantha $10^{th}Ed.$ 2Dubey, 1References1Luria S. Wiley and $11^{th}Ed.$ 2Joanne V $11^{th}Ed.$ 3Alan J. C4John Ca5NicholasRelated Online1https://e2https://a	ne, fungi fections Rabies, narayana Orient Lo R.C. & D E. Darne nd sons. Willey ar Mc Graw Cann, (20 rter, (200 s H. Ach ne Conte n.wikipe cademic.	and viruses – viruses – Pathogenicity and d Influenza, AIDS, SAI an R and CK Jaya ongman. D.K. Maheshwari, (20 el, J.E Jr. Baltimore. nd Kathleen Sandmar v Hill Book. 011). Principles of Mo 01). Virology: Princip teson, (2011). Fundam ents	and cance iagnosis (RS, Ebola (LIRGO) TE TO F ram Pan 10). A tex D and Co and Dor olecular V les and A hentals of (1e/30/3/3)	er. of Hepati virus an LEVAU icker, (2 kt Book of ampbell othy Wo /irology. .pplication Molecul	ttis (A, d Covit Tota 2017). of Micr A, (19 od, (20 $5^{th}Ed$ ns, $1^{st}Har Viro$	B & C d - 19. I Lect Textb obiolo 78). G (20). P Acade Ed. Wi logy. V	C). Mur ture H ook of gy. S. 0 eneral rescott mic Pr ley Put Wiley I	nps, N ours Micro Chand Virolo "s Mic ess. Dicatio	V and 1 1 1 1 1 1 1 1 1 1 1 1 1	a CMV 2 Hou ss, 50 Ho gy d Ed.	/) – 1rs

4	https://nptel.	ac.in/cou	rses/102/1	103/10210	03039/									
5	https://www	.healthlin	e.com/hea	alth/viral-	diseases#	contagiou	usness							
Cours	Course designed by: Mrs. M.Meenakshi, Assistant Professor of Microbiology,													
	Sri Ramakrishna College of Arts and Science For Women, Coimbatore													
	Verified By: Dr.Gandhimathi.R, Chairperson													
Марр	Mapping with Programme Outcomes													
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10				
CO1	S	S	S	S	S	М	S	L	L	М				
CO2	S	S	S	S	S	М	S	L	L	М				
CO3	S	S	S	S	S	М	S	L	L	М				
CO4	S	S	S	S	S	М	S	L	L	L M				
CO5	S	S	S	S	М	S	S	Μ	L	М				

*S – Strong; M – Medium; L – Low





Course code 23P		L	Т	P	С						
Core	CORE PRACTICAL – I	-	1	3	3						
Pre- requisite	Basic acquaintance gained during Semester I	Syll	abus		21 -						
r re- requisite	and II.	Ver	sion	20)22						
Course Objectives:											
The main objectives	of this course are to:										
 get acquainted 	l to the laboratory precautions and techniques to be	follow	ved in								
general micro	biology laboratory.										
 identify micro 	identify microorganisms microscopically.										
• train the stude	ents in culturing techniques.										
• acquire skills	to isolate and quantify microorganisms.										
_	plecules by separation techniques.										
Experiments											
1. Laboratory p	recautions.										
	f cleaning solutions.										
-	a preparation – Liquid and Solid medium.										
	differential media: MacConkey and Blood agar.										
5. Methods of st	terilization.										
6. Pure culture t	echniques – Pour plate, Spread plate and Streak plat	e metl	nods (S	Simp	le,						
	Continuous).										
7. Enumeration	of Bacteria, Fungi and Actinobacteria from soil.										
	<mark>n of</mark> Motility – Hanging drop & SIM a <mark>gar</mark> .										
9. Cultural chara	acteristics of Microorganisms - Colony morphology	<mark>7 on</mark> N	utrient	agar							
10. Maintenance	and preservation of cultures.										
	a <mark>cte</mark> ria - Simple, Negative, Gram, Spore, Fungal we	t moui	nt –LC	B - S	Slide						
culture metho											
	Separation Techniques - Paper chromatography & T	'hin la	yer								
chromatograp	ohy										
References		19									
	c <mark>cino. Microbiology: A Laboratory Manual 10th Ed.</mark>										
	is. G. <mark>W. (1989). Understanding Microbes –</mark> A Labo	ratory	textbo	ook f	or						
Microbiology	y, W.H. Freeman and Co., New York.										
3 Wilson. K an	d Goulding. K.H. (1986). A Biologist's Guide to Pri	nciple	s and								
J Techniques o	f Practical Biochemistry, ELBS, London.	8									
4 Dubey, R.C.	& D.K. Maheshwari. Practical Microbiology. S. Cha	and &	Co								
5 Kannan. N (1 Publication, I	996), Laboratory Manual in General Microbiology. Palani.	Palan	i Paran	noun	t						

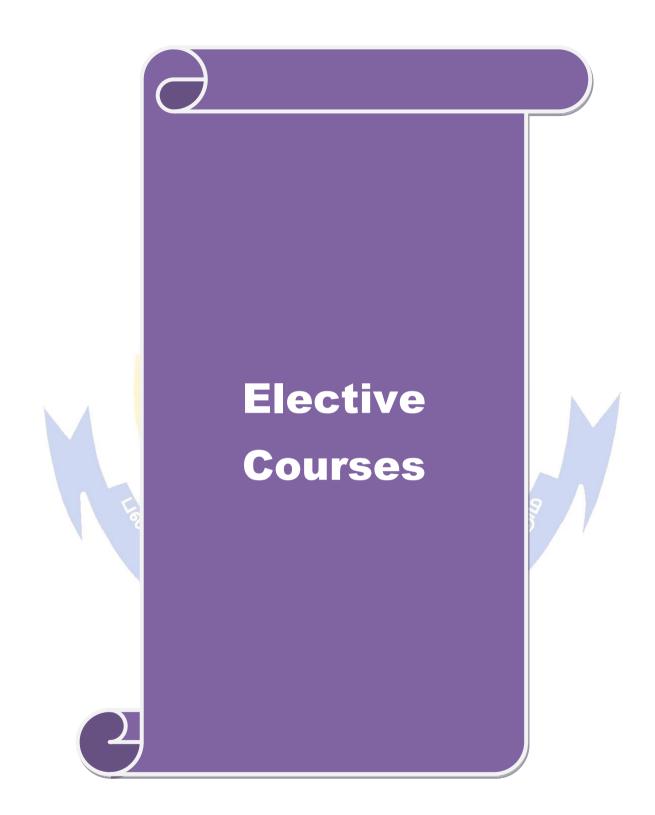
Dura	ntion :6 Hours		Max. Marks:45
Sl. No.	Experiment*		Marks
	I. Major experiment $(1 \times 15 = 15 \text{ marks})$		
1	i. Procedureii. Performanceiii. Result and Discussion	5 marks each	15
	II. Minor experiment (1×10 =10 marks)		
2	i. Procedure and Performance ii. Result and Discussion	5 marks each	10
	III. Spotters (5× 3 =15 marks)	6	
3	i. Identification ii. Description	1 mark 2 marks	15
4.	IV. Record	E	5
		otal Marks	45
experin separat	ents to be divided into batches (5 students /) nents. Question setting to be done by interna ely for each batch. designed by: Dr.Gandhimathi.R., Assistant Profes	al and exter	nal examiners an
Jourse	L.R.G. Government Arts College For Mrs. M.Meenakshi, Assistant Profes Sri Ramakrishna College of Arts and	Women, Tirussor of Microl	ppur piology,
	Coimbatore	Co. H.	
	Vonified Pro)r (Jandhima	thi.R, Chairperson

Course co	de 43P	CORE PRACTICAL – II	L	Т	Р	С
Core		COKE I KAC IICAL – II	-	1	3	3
Pre- rec	uisite	Basic knowledge on microbiology gained during Semester I and II.	-	labus rsion	2021 2022	
Course Ob	ectives:					
		is course are to:				
• expe	rtise in estim	ation of various biomolecules.				
• mea	ure morphol	ogical and population size of microbes.				
• acqu	re knowledg	e about the physiological characteristics of mich	roorga	nisms.		
• scree	n the enzyma	atic potential of microorganisms.				
• unde	rstand the mo	orphological characters of Algae, Fungi and Par	asites			
Experimen	S					
1. Prot	in estimation	n (Lowry <i>et. al.</i> method)				
		bohydrates (DNSA method)				
3. Mici	ometry	ൟ൭൙ഄഄഺഺ				
4. Mea	surement of	Microbial growth –Turbidity methods – Dete	rmina	tion of	Gener	ation
time	Neubaur Co	unting chamber.				
5. Influ	ence of <mark>pH a</mark>	nd Temperature on bacterial growth.				
		erobic Microorganisms – Wrights tube – McInto	osh fil	lde's ja	r	
		Citrate utilization tests				
		nentation tests – TSI – H2S production tests				
		e – Urease – Nitrate production tests				
		, Gelatin and Casein hydrolysis tests		1		
		presentative forms of Algae – Diatoms – Chlar	mydoi	monas	– Volv	ох —
		Dscillatoria – Nostoc – Anabaena				
		epresentative forms of Fungi – Aspergillus – I	Pencil	lium –	Rhizop	ous –
Yeas			DI	~.		
		epresentative forms of Parasites – Entamoeba	, Pla	ismodu	um, Asc	caris,
Таен	- 0			Į į		
Reference		the			1	
1 Jam	es Cappuccin	o. Microbiology: A Laboratory Manual 10 th Ed.	6			
/		W. (1989). Understanding Microbes – A Labo	ratory	textbo	ok for	
Mic		.H. Freeman and Co., New York.				
		oulding. K.H, (1986). A Biologist's Guide to F	rincip	oles and	d Techn	iques
Of I		hemistry, ELBS, London.				
4 Dub	ey, R.C. & D	.K. Maheshwari. Practical Microbiology. S. Ch	and &	c Co		
5 Kan	nan. N (1996). Laboratory Manual in General Microbiology.	Palar	ni Parai	nount	
	ication, Pala					
- Tiw	ari, G. S. Ho	ondal, (2005). Laboratory Techniques In Microb	oiolog	y &		
n		wastik publishers.	U	-		
KI		18). Laboratory Manual of Microbiology and Bi	otech	nology	, ED-	
$7 \qquad TEC$				07		

Juratio	n :6 Hours	Ma	x. Marks:45
Sl.No.	Experiment*		Marks
	I. Major experiment (1 × 15 = 15 Marks)		
	i. Procedure	5 marks	
1	ii. Performance	each	15
1	iii. Result and Discussion		15
	II. Minor experiment (1× 10 =10 Marks)		
	i. Procedure and Performance	5 marks	
2	ii. Result and Discussion	each	10
	III. Spotters (5× 3 =15 Marks)		
2	i. Identification	1 mark	15
3	ii. Description	2 marks	
4.	IV. Record	A E	5
		Total Marks	45
experim separate	ents to be divided into batches (5 students / ents. Question setting to be done by internely for each batch. e designed by: Dr.Gandhimathi.R., Assistant Prof. L.R.G. Government Arts College Fo Mrs.C.L.Shathiyaa Priyaa, Assista	nal and external ex Sessor of Microbiology or Women, Tiruppur ant Professor of	aminers a
	Microbiology, Tiruppur Kumaran Co	ollege For Women, Tiru	ippur
			•
	Verified By: D	Dr.Gandhimathi.R, Cl	nairperson

Course code	63P		L	Т	Р	С					
Core		CORE PRACTICAL – III	-	1	4	4					
Pre- requisi		Knowledge in practical and theory gained from previous years of this programme.	-	abus rsion	202	-					
Course Objectiv											
The main object											
-	-	e about isolation and identification of DNA.									
		porganisms involved in food spoilage.			0						
• Expose the products.		ing and production mechanism of commercially	y imp	ortant	ferme	nted					
		proach in laboratory diagnosis of mycotic infect	ions.								
	e quality	of drinking water from various sources.									
Experiments											
		DNA from <i>E.coli</i> .									
		i plasmid DNA and detection by agarose gel ele	-	horesis							
		esistant mutants using UV and Chemical agents									
	. Phenol Coefficient method.										
		duction test.									
	-	of spoiled food –Bread and Vegetables.									
		<mark>ing</mark> al food spoilers <i>–Aspergillus, Mucor, Penici</i>		Rhizo	pus						
		c examination of curd – observation of lactobac	cilli.								
		ay of Enzymes – protease and amylase.									
-		- Sugar Estimation.									
		emonstration.									
		ving nitrogen fixers –Azotobacter, Azospirillun	n– Pho	osphate	Э						
		obium from root nodule.									
13. Isolation	-		Ś.,								
		ification of clinically important fungi – Candida	a albi	cans,							
		formans and Aspergillus.		5							
	chnique –	Detection of potability of water.	25		1						
References	No.		<u></u>								
		o. Microbiology <mark>: A Laboratory</mark> Manual 10 th Ed.									
		.W. 1989. Understanding Microbes – A Labora	tory to	extboo	k for						
Microbi		H. Freeman and Co., New York.									
		oulding. K.H. 1986. A Biologist"s Guide to Prin	ciples	and To	echnio	ques					
of Pract		hemistry, ELBS, London.									
		.K. Maheshwari. Practical Microbiology. S. Ch									
	N (1996) ion, Palai), Laboratory Manual in General Microbiology.	Palan	i Parai	mount	t					
6 Tiwari, 0		ndal, Laboratory Techniques In Microbiology &	& Bio	techno	logy.						
	1	s. 2005. Diratory Manual of Microbiology and Biotechno	logy	2018	FD_T	ЕСН					
7 K. K. Al	icja, Lau	manual of microbiology and Diotechno	iogy,	<i>2</i> 010. 1	יי-ע						

	Scheme of Practical Examination	on	
Duration	:9Hours	Ma	ax. Marks: 50
Sl.No.	Experiment*		Marks
	I. Major experiment (1 × 15 = 15 Marks)		
1	i. Procedureii. Performanceiii. Result and Discussion	5 marks each	15
	II. Minor experiment - A (1×10 =10 Marks)		
2	i. Procedure and Performance ii. Result and Discussion	5 marks each	10
	III. Minor experiment - B (1×10 =10 Marks)		
3	iii. Procedure and Performance iv. Result and Discussion	5 marks each	10
	III. Spotters (5× 2 =10 Marks)	Ē	
4	iii. Identification iv. Description	1 mark each	10
5.	IV. Record	1	5
		Total Marks	50
experime	nts to be divided into batches (5 students / bat nts. Question setting to be done by internal y for each batch.		
Course d	lesigned by: Dr. Gandhimathi.R., Assistant Professo L.R.G. Government Arts College For Wo Mrs.C.L.Shathiyaa Priyaa, Assistant Pr Tiruppur Kumaran College For Women,	men, Tiruppur ofessor of Micro	-
	EDUCATeVerified By: Dr.Ga	andhimathi.R, C	hairperson



Course code	Course code 5EA RECOMBINANT DNA									
Elective – I (C	Group – A)	TECHNOLOG	Y – I	4	-	-	4			
Pre-	-	vledge on DNA gained during	g HSc. and	Sylla	bus	202	21 -			
requisite		previous years of this program		Vers			22			
Course Object	ives:									
The main object		course are to:								
• understa	and the role of	of Enzymes in Gene manipula	ation.							
• learn to	ols and techn	iques of R – DNA technolog	у.							
• understa	and the role of	of vectors in R – DNA techno	logy.							
Expected Count	rse Outcome	es:								
		n of the course, student will								
		dge about role of enzymes in	Gene manipulation.		K	2 &	K3			
2Understand the Gene isolation techniques.K 2 & K4										
3 Understand the uses of Vectors in rDNA technology K 2 & K3										
		Gene transfer techniques.	18			2&				
		g techniques.	Yo V			3&				
	mber; <mark>K2 - U</mark>	Inderstand; K3 - Apply; K4	- <mark>Analyze; K5 -</mark> Eva	luate;	K6 –					
Unit – I						12 H	ours			
	tion – <mark>Liga</mark>	nition and Application, Res ses and Methylases, Modif								
Unit –II	46		10.			12 H	ours			
		DNA (Chromosomal and Plass s of DNA – Genomic Library			ificatio	on of				
Unit – III		Providen port.				12 H	ours			
Vectors –Inse	rtion and R	ectors – pBR322 and pUC8, eplacement vectors – Hybr ial Chromosomes – BAC and	rid Vectors – Phage							
Unit – IV	8	An	TES A	9		12 H				
DEAE Metho	ds, Biologica nod – Select	s: Physical – Biolistic Met Il in vitro package method – ion by Complementation –	Screening and Selec	ction	of rec	ombir	nants			
Unit – V		SSUI IT COLL OF	MIGH			12 H	ours			
PCR – DNA S	1 0 1	Sanger's Method) – Blotting - RAPD and Applications – N		Nort						
KI LI allu A	ppneutons	I I I I I I I I I I I I I I I I I I I								

Text	books						
1	Sathyanarayana. U, Biotechnology, (2005). 1 st Ed. Books and Allied (P) Ltd.						
2	Desmond S. T. Nicholl, (2008). An Introduction to Genetic Engineering. Cambridge University Press.						
Refer	References						
1	Brown T.A, (2012), An Introduction to gene cloning 6 th Ed. Chapman and hall						
2	Old. RW and Primrose, (2003). Principles of Gene Manipulation, 7 th Ed. Blackwell Scientific Publication, Boston.						

3	Winnecke Panima P			-	s to clone	es, Introdu	uction to	Gene Teo	chnology	, 4 th Ed.
4	Bernard. Publishin	R Glick a	and Jack		ak, (2004	4). Molec	ular biote	chnology	$\sqrt{4^{th}}$ Ed.	Panima
Relat	ed Online	Content	S							
1	http://ww	w.bio.mia	ami.edu/d	ana/dox/1	estriction	enzymes.	.html#:~:t	ext=A%2	20restricti	on%20e
1	nzyme% 20is% 20a, the% 20bacteria% 20that% 20manufacture% 20them.									
	https://www.youtube.com/watch?v=YSFqEZ6jvOk									
	https://www.youtube.com/watch?v=npb06rF6Qww									
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Cours	se Desig <mark>ne</mark>	•								
	4	Sri Sri	Ramakri	shna Coll	lege of A	rts and Sc	ience For	Women,	Coimbat	ore
		31	K	5.0	Veri	ified By:	Dr.Gand	himathi.	R, Chair	person
Mappi	ng with P	ro <mark>gramn</mark>	ne Outco	mes	2	/	197			
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	So	S	S	S	S	М	L	S	S	S
CO2	S	S	S	S	S	М	L 🖉	S	S	S
CO3	S	° S	S	S	S	М	L	S	S	S
	~	UT0	~	~	~		56	~	~	~

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

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CO4

CO5

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Cou	rse code	5EB		L	Т	P	С
Elec	ctive – I (Gr	oup – B)	PLANT THERAPEUTICS	4	-	-	4
I	Pre- requisi	te	Basic knowledge on botany gained during HSc. and during the previous years of this programme.	Sylla Vers		202 20	
	learn the l understan	ves of this historical and d the contra nplete unde	course are to: nd cultural aspects of plants and medicine. ibution of medicinal plants to alternative therap rstanding of phytochemicals and production of p		eutica	1	
	ected Course						
1	Learn the hi	istory of m	n of the course, student will be able to: edicinal plants and methods of extraction of var icinal plants.	ious		K 2 &	: K3
2	be trained in important p	n skill <mark>s ass</mark> e lants <mark>.</mark>	ociated with screening of active principle of bio	logicall	у	K 3 &	: K4
3	antioxidant	defens <mark>e sys</mark>	nism of free radicals damage in living cells and tem from phytochemical sources.	1.		K 2 &	: K3
4	the knowled	l <mark>ge in main</mark>	etabolites distribution in therapeutic plants and taining health and lifestyle. reutical products and understand the tissue culture		ng	K 3 &	: K4
3	techniques	E.	Jnderstand; K3 - Apply; K4 - Analyze; K5 - Ev		K6 -		5 e
		,	Real and the second sec	,			
	dicinal plan		e principles in medicinal plants: methods o harmacologically active plants – CNS, CVS, H				
-	it–II	viceening, p	marmacologicany active plants – CIVS, CVS, II	ypogry		12 Но	ours
antii	malarial, ar	nti-inflamm	protective, anti allergic, anticancer, antiba atory, immunoactive properties of the me e stress, chemotherapeutic products.				
Uni	t– III		53/ 0.			12 Ho	ours
perc anti	oxidation, m oxidant def	easuremen ence syste	urces, importance, production, free radicals t of free radicals, disease caused by radicals, r m, enzymic and non-enzymic antioxidants, tochemicals as antioxidants.	reactive	oxyg	en spe	ecies,
	it– IV	`				12 H	ours
Occ	urrence, dist		loids, flavanoids, terpenoids, phenolics, steroid functions.	ls, Vita	mins,		
	it–V					12 Ho	
tissu		•	netabolite in plants, stages of secondary metabolites, elicitation, biotransformation- productio	n of	phar	maceu	tical
Tow	t books		Total Lecture F	iours		60 Ho	urs
1 ex		S (2005)	Agricultural Biotechnology, Dr.Updesh Purohi	t Public	shere	Iodhn	ur
1. 2.	Khan,I.A	and Khanu	m.A, (2004). Role of Biotechnology in medicin Ukkaz Publications, Hyderabad.			-	

Refe	rences
1	Slater.A. Scott.N.W and Fowler.M.R, (2004). Plant Biotechnology - The genetic
1	manipulation of plants, Oxford University Press, Oxford.
2	Singh.M.P and Panda .H, (2005). Medicinal Herbs with their formulations, Daya Publishing
2	House, Delhi
Rela	ted Online Contents
1	https://www.berkeleyherbalcenter.org/herbal-foundations-therapeutics-certification/
2	https://www.youtube.com/watch?v=_7RHYEZ5x9c
3	https://www.youtube.com/watch?v=DWZJEQv7kqY
4	https://www.youtube.com/watch?v=EvZZxDb7VpE
5	https://www.youtube.com/watch?v=hOHyIuO20-4

Course designed by: Dr.R.Parimala, Assistant Professor of Biochemistry, L.R.G. Government Arts College For Women, Tiruppur

Verified By: Dr.Gandhimathi.R, Chairperson

Al- Calé

Mapping with Programme Outcomes

	-	10 million (1997)		and the second second	1.					
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	L	М
CO2	S	S	S	S	S	S	S	S	L	М
CO3	S	S	S	S	S	S	S	L	L	М
CO4	S	S	S	S	S	S	S	L	L	M
CO5	S	S	S	S	S	S	S	S	L	М

*S – Strong; M – Medium; L – Low

SULITONT 2-11

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Course code	5EC		L	Т	Р	С
Elective – I (G	Group – C)	MEDICAL CODING	2	1	-	3
Pre-requ	isite	Basic knowledge on Human Physiology gained during HSc. and Semester – II of this programme	Sylla Vers		202 202	
Course Objectiv	/es:					
understandimpart knowprovide pra	ts on concep &Identify IG wledge on to	course are to: ts of terminologies in medical coding. CD guidelines. impart knowledge on assigning diagnosis and cation of coding operative reports and evaluat				ent
services.	- 0t					
Expected Cours						
	· ·	on of the course, student will be able to: usics of Medical coding.			IZ 1	
					K 1	
		different types of Coding.			К 2	
	CT & CPC c				К З	
		f procedure codes.	_		К4	
5 Help to pr	ed <mark>ict codes l</mark>	based on anatomy &its ICD guidelines.			K 5 &	К6
	em <mark>ber; K2 -</mark>	Understand; K3 - Apply; K4 - Analy <mark>ze; K5</mark> - Eval	uate; l	K6 – C	reate	
Unit – I		A Alternative Pi 16			ours	
		Codes – The Coder – ICD Coding – CPT Coding	– <mark>S</mark> pe	cialty	Coding	- 1
Liability and L	ega <mark>l Issues.</mark>	Proprietant and States and State				
Unit –II				-	ours	
The NATE of the C	Health Car	e – Introduction to Medical Terminology – N			-	
Dividing and	Combining T	erms – Medical Terminology: Abbreviations,	Syms		17	
Dividing and	Combining T	erms – Medical Terminology: Abbreviations, edical Records – Medical Ethics.		9 Ho	ours	
Dividing and Terms – Docu Unit – III Diagnostic Co Guidelines an	Combining 1 menting Me ding – ICD-1 d Rules – In		IM Dia	-	Codin	-
Dividing and Terms – Docu Unit – III Diagnostic Co Guidelines an System – the Unit – IV	Combining 1 menting Me ding – ICD-1 d Rules – In Digestive Sy	dical Records – Medical Ethics. 0-CM Coding Manual Introduction – ICD-10-C fections to Blood Diseases – Mental Disorder stem to Pregnancy – Skin – Perinatal Period.	M Dia rs to t	gnosis he Res 9 He	Codin pirato ours	ry
Dividing and C Terms – Docu Unit – III Diagnostic Co Guidelines an System – the Unit – IV CPT Coding Medicine and Surgery Cod System Codin Pulmonology	Combining T menting Me ding – ICD-1 id Rules – In Digestive Sy – Integume d Anesthes ling – Com g – Compre	dical Records – Medical Ethics. 0-CM Coding Manual Introduction – ICD-10-C fections to Blood Diseases – Mental Disorde	M Dia rs to t adiolog s – C prehen	gnosis he Res 9 He gy, Pa compresive I Compr	Codin pirato ours tholog ehensi Digesti ehensi	ry 3y, ve ve
Dividing and C Terms – Docu Unit – III Diagnostic Co Guidelines an System – the Unit – IV CPT Coding Medicine and Surgery Cod System Codin	Combining T menting Me ding – ICD-1 id Rules – In Digestive Sy – Integume d Anesthes ling – Com g – Compre	dical Records – Medical Ethics. 0-CM Coding Manual Introduction – ICD-10-C fections to Blood Diseases – Mental Disorder stem to Pregnancy – Skin – Perinatal Period. Entary System – Reproductive Systems – Ra ia – Evaluation and Management Service nprehensive Musculoskeletal coding – Comp hensive Urology and Reproductive system cod	M Dia rs to t adiolog s – C prehen	gnosis he Res 9 He gy, Pa compresive I Compr	codin pirato ours tholog chensi Digesti	ry 3y, ve ve
Dividing and C Terms – Docu Unit – III Diagnostic Co Guidelines an System – the Unit – IV CPT Coding Medicine and Surgery Cod System Codin Pulmonology Unit – V History of HC	Combining T menting Ma ding – ICD-1 d Rules – In Digestive Sy – Integume d Anesthes ling – Com g – Compre and Cardiov	 dical Records – Medical Ethics. O-CM Coding Manual Introduction – ICD-10-C fections to Blood Diseases – Mental Disorder stem to Pregnancy – Skin – Perinatal Period. Management System – Reproductive Systems – Rational Management Service prehensive Musculoskeletal coding – Complemensive Urology and Reproductive system cod ascular coding. Levels of HCPCS – Medical Coding – Medical - Compliance – Medical coding tools. 	M Dia rs to t adiolog s – C prehen ing – C	gnosis he Res 9 He gy, Pa ompro sive I Compr 2 Ompr 9 H ng – Au	Codin pirato ours tholog ehensi Digesti ehensi ours uditing	sy, ve ve ve
Dividing and C Terms – Docu Unit – III Diagnostic Co Guidelines an System – the Unit – IV CPT Coding Medicine and Surgery Cod System Codin Pulmonology Unit – V History of HC Medical Docu	Combining T menting Ma ding – ICD-1 d Rules – In Digestive Sy – Integume d Anesthes ling – Com g – Compre and Cardiov	 dical Records – Medical Ethics. O-CM Coding Manual Introduction – ICD-10-C fections to Blood Diseases – Mental Disorder stem to Pregnancy – Skin – Perinatal Period. Entary System – Reproductive Systems – Rational Management Service prehensive Musculoskeletal coding – Complementive Urology and Reproductive system cod ascular coding. – Levels of HCPCS – Medical Coding – Medical 	M Dia rs to t adiolog s – C prehen ing – C	gnosis he Res 9 He gy, Pa ompro sive I Compr 2 Ompr 9 H ng – Au	Codin pirato ours tholog ehensi Digesti ehensi ours	sy, ve ve ve
Dividing and C Terms – Docu Unit – III Diagnostic Co Guidelines an System – the Unit – IV CPT Coding Medicine and Surgery Cod System Codin Pulmonology Unit – V History of HC Medical Docu	Combining T menting Me ding – ICD-1 id Rules – In Digestive Sy – Integume d Anesthes ling – Com g – Compre and Cardiov	Adical Records – Medical Ethics. O-CM Coding Manual Introduction – ICD-10-C fections to Blood Diseases – Mental Disorder stem to Pregnancy – Skin – Perinatal Period. Management Systems – Reproductive Systems – Ra- ia – Evaluation and Management Service prehensive Musculoskeletal coding – Complensive Urology and Reproductive system cod ascular coding. – Levels of HCPCS – Medical Coding – Medica – Compliance – Medical coding tools. Total Lecture I	M Dia rs to t adiolog s – C prehen ing – C	gnosis he Res 9 He gy, Pa ompro sive I Compr 2 Ompr 9 H ng – Au	Codin pirato ours tholog ehensi Digesti ehensi ours uditing	sy, ve ve ve
Dividing and 0 Terms – Docu Unit – III Diagnostic Co Guidelines an System – the Unit – IV CPT Coding Medicine and Surgery Cod System Codin Pulmonology Unit – V History of HC Medical Docu References 1 Alok Gh	Combining T menting Ma ding – ICD-1 d Rules – In Digestive Sy – Integume d Anesthes ling – Com g – Compre and Cardiov PCS Coding mentation	dical Records – Medical Ethics. O-CM Coding Manual Introduction – ICD-10-C fections to Blood Diseases – Mental Disorder stem to Pregnancy – Skin – Perinatal Period. Entary System – Reproductive Systems – Ra- ia – Evaluation and Management Service nprehensive Musculoskeletal coding – Complenesive Urology and Reproductive system cod ascular coding. – Levels of HCPCS – Medical Coding – Medical – Compliance – Medical coding tools. Total Lecture I Arora- Medical Transcription Made easy.	M Dia rs to t adiolog s – C prehen ing – C I Billir Hours	gnosis he Res 9 He gy, Pa compresive I Compr 9 H ng – Au	Codin pirato ours tholog ehensi Digesti ehensi ours uditing 45 Ho	y, y, ve ve ve g – urs
Dividing and 0 Terms – Docu Unit – III Diagnostic Co Guidelines an System – the Unit – IV CPT Coding Medicine and Surgery Cod System Codin Pulmonology Unit – V History of HC Medical Docu References 1 Alok Gh 2 Terry Tra	Combining T menting Me ding – ICD-1 id Rules – In Digestive Sy – Integume d Anesthes ling – Com g – Compre and Cardiov PCS Coding mentation	dical Records – Medical Ethics. O-CM Coding Manual Introduction – ICD-10-C fections to Blood Diseases – Mental Disorder stem to Pregnancy – Skin – Perinatal Period. Mentary System – Reproductive Systems – Ra- ia – Evaluation and Management Service prehensive Musculoskeletal coding – Comp- hensive Urology and Reproductive system cod ascular coding. – Levels of HCPCS – Medical Coding – Medical – Compliance – Medical coding tools. Total Lecture I Arora- Medical Transcription Made easy. RHIA, CCS-P, AHIMAICD-10-CM- Coding guide	M Dia rs to t adiolog s – C prehen ing – C I Billir Hours	gnosis he Res 9 He gy, Pa compresive I Compr 9 H ng – Au	Codin pirato ours tholog ehensi Digesti ehensi ours uditing 45 Ho	y, ve ve ve g – urs
Dividing and 0 Terms – Docu Unit – III Diagnostic Co Guidelines an System – the Unit – IV CPT Coding Medicine and System Codin Pulmonology Unit – V History of HC Medical Docu References 1 Alok Gh 2 Terry Tro 3 Besty J S	Combining T menting Ma ding – ICD-1 d Rules – In Digestive Sy – Integume d Anesthes ling – Compre- and Cardiov PCS Coding mentation a, Priyanka opin M Shai, Shiland- Med	dical Records – Medical Ethics. O-CM Coding Manual Introduction – ICD-10-C fections to Blood Diseases – Mental Disorder stem to Pregnancy – Skin – Perinatal Period. Entary System – Reproductive Systems – Ra- ia – Evaluation and Management Service nprehensive Musculoskeletal coding – Complenesive Urology and Reproductive system cod ascular coding. – Levels of HCPCS – Medical Coding – Medical – Compliance – Medical coding tools. Total Lecture I Arora- Medical Transcription Made easy.	I Billir Hours	gnosis he Res 9 He gy, Pa compresive I Compr 9 H ng – Au	Codin pirato ours tholog ehensi Digesti ehensi ours uditing 45 Ho	y, y, ve ve ve g – urs

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5	ICD-10-CI	M Officia	l Guideli	nes for Co	oding & F	Reporting.				
Relat	ted Online (U	1 0				
	https://ww		om/medi	cal-codin	g/medica	-				
1	coding.asp									
2	https://ww	w.medica	albillingar	ndcoding.	org/codir	ng-trainin	g/			
3	https://ww	w.rasmu	ssen.edu/	/degrees/	<u>'health-sc</u>	iences/bl	og/what-	<u>is-medic</u>	al-coder/	
4	https://rev		ligence.c	om/featu	res/explo	oring-the-	fundame	ntals-of-ı	<u>medical-</u>	
	billing-and									
5	https://ww								ng-special	<u>ist/</u>
Cours	e Designed	By: Mrs. I	M.Meena	kshi, Assi	istant Pro	tessor of	Microbio	logy,		
		Sri Ran	nakrishna		of Arts an	d Caianaa		.		
		0		Conege	UI AILS all	a science	FOR WOR	nen, Coir	nbatore	
		Unitar		College					nbatore R, Chairpe	rson
Марр	ing with Pro		<u> </u>							rson
Mapp COs			<u> </u>							rson PO 10
	PO1	ogramme	Outcome	es	Ver	rified By:	Dr.Gandł	nimathi.F	R, Chairpe	PO
COs	PO1	pgramme PO2	Outcome PO3	es PO4	Ver PO5	rified By: PO6	Dr.Gandł	PO8	R, Chairpe PO9	PO 10
COs CO1	PO1 S S	pgramme PO2 S	Outcome PO3	es PO4 S	Ver PO5 S	PO6 S	Dr.Gandł PO7 S	nimathi.F PO8 L	R, Chairpe PO9 M	PO 10 S
COs CO1 CO2	PO1 S S S	PO2 S S	Outcome PO3 S S	PO4 S S	Ver PO5 S	PO6 S S	Dr.Gandł PO7 S S	PO8 L L	R, Chairpe PO9 M M	PO 10 S S

*S – Strong; M – Medium; L – Low

PSESI QE

Course code	6EA	RECOMBINANT DNA	L	Т	Р	С
Elective – II (C		TECHNOLOGY – II	4	-	-	4
Pre- requ		Basic knowledge about DNA gained in theprevious years of the programme.	Sylla Vers		2021 202	-
Course Object	ives:					
The main objec	tives of this co	urse are to:				
 Learn at 	out commercia	al production of Recombinant products.				
Know al	oout emerging	techniques in Recombinant DNA Technolog	у.			
		cines, Transgenic plants & Animals, DNA fi	nger pri	nting		
		enome Project (HGP).				
Expected Cour						
	•	of the course, student will be able to:				_
		al synthesis of commercial products .			<u>K</u>	
		odern vaccines and gene therapy.			<u>K</u>	
^		sgenic plants and Microbial insecticides .	• •		K	
		hodology and applications of Transgenic an	imals.		K	
—		nger printing and HGP.			K	5
	mber; <mark>K2 - Un</mark>	derstand; K3 - Apply; K4 - Analyze; K5 - Ev	valuate;	K6 –	Create	
Unit – I	S		_		12 Ho	
		ercial products = Pharmaceuticals - Recom				
-		ons – Monoclonal antibodies for drug	deliver	y — 1	Antibio	otics
· · · ·	– Biopolymer	s (Xanthan gum).				
Unit –II	1				12 Hou	
		(HSV and FMDV) – Edible vaccine – Live				nes
	Vector vaccin	es) – Genetherapy (Germline and Somatic c	ell gene	e thera	ру).	
Unit – III	102	men / A			12 Hou	
insect, virus, he		l – Ti plasmid based cloning vectors (Bina nt plants – Microbial insectic <mark>ides –bacter</mark> ia,		ld viru	ses.	
Unit – IV	64	14 martine	<u>~</u>		12 Hou	
	method – Eng	nsgenic mice methodology – Retrov ineered Embryonic stem cell method – Ap				
Unit – V	<u>.</u>	20.		1	12 Hou	
						irs
LATER THE COLUMN	rinting and its	Application – Human Genome Project (HGP)-	Histo	ry and	
Applications.	rinting and its	Application – Human Genome Project (HGP)-	Histo	ry and	
	rinting and its	Application – Human Genome Project (DUCATE TO ELEVINE Total Lecture			ory and	l its
	rinting and its	EDUCATE TO ELEVATE				l its
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5	https://ww _Technol		chgate.ne	et/publica	tion/3093	81953_Fi	undament	als_of_R	ecombina	int_DNA
6	https://ww	ww.ncbi.n	lm.nih.go	ov/pmc/ar	ticles/PM	IC385421	2/			
7	https://ww	ww.britan	nica.com	/science/r	ecombina	nt-DNA-	technolog	gy/Gene-t	herapy	
8	https://ww	vw.ncbi.n	lm.nih.go	ov/pmc/ar	ticles/PM	IC517836	54/			
9	https://pe	ople.ucalg	ary.ca/~l	orowder/t	ransgenic	.html				
Manni	ing with P				<u> </u>		ence For ` Dr.Gand			
mapp		raaramm		mec						
COs	PO1	rogramn PO2	PO3	mes PO4	PO5	PO6	PO7	PO8	PO9	PO10
COs CO1		-			PO5 S	РО6 М	РО7 М	РО8 М	PO9 S	PO10 L
	PO1	PO2	PO3	PO4						
CO1	PO1 S	PO2 S	PO3	PO4 S	S	М	М	М	S	L
CO1 CO2	PO1 S S S	PO2 S S	PO3 S S	PO4 S S	S S	M M	M M	M M	S S	L L

*S – Strong; M – Medium; L – Low



Elec	se code 6EB	ENTREPRENEURIAL	L	Τ	P	С
	ctive – II(Group – B)	MICROBIOLOGY	3	1	-	4
_		Basic knowledge on microorganisms	Sylla	bus	20	21
]	Pre- requisite	gainedfrom courses learned in this	Vers		-	022
		programme.	v er b		_	
	rse Objectives:					
The	main objectives of this					
•	L .	preneur by imparting knowledge on industrial pro	oductic	on of		
	• •	rtant products using microorganisms.				
•		ation, brewing and their types.	_			
•	1 0	on the commercial production of health care pro-	ducts ı	using		
	microorganisms.					
•		ational and international patent / patenting process	ses.			
-	ected Course Outcom					
		on of the course, student will be able to:				
1		of entrepreneur development		K	2	
/	Comprehend that microacter earth.	roorganisms play a vital role to all forms of life or	n	K	3	
	Acquire theoretical a	nd technical knowledge on production of				
3	mushrooms and			K 4,5	5 & 6)
	biofertilizers.					
4	Attain acquaintance al processes.	bout national and international patent / patenting		K 2	& 3	
	1	erstanding of brewing process.		K 5	&K6	
		Understand; K3 - Apply; K4 - Analyze; K5 - Eva	aluate;			
	nit–I	Leon Kine Variation	,		12 H	
En	trepreneur developm	ent activity – Institutes involved, Governme	ent co	ontribu	itions	s
		essment. Industrial Microbiology– Definition, se				
	velopment.	90	R			
dev				1 1		
	nit–II	A De Caller	S		12 H	our
Un		entation products – Bakers yeast, food and fe	ed ye			
Un Mi	crobial cells as ferm	entation products – Bakers yeast, food and fe culants, Mush <mark>rooms, Algae.</mark> Enzymes as ferment	7	asts, I	Bacte	
Un Mi Ins	crobial cells as ferme secticides, Legume Ino		ation 1	asts, I	Bacte sts –	
Un Mi Ins Ba	crobial cells as ferme secticides, Legume Ino	culants, Mushrooms, Algae. Enzymes as ferment	ation 1	asts, I produc enzy	Bacte sts –	rial
Un Mi Ins Ba Un Mu bis ma His Rh	acrobial cells as ferma secticides, Legume Ino cterial and Fungal Ar hit–III ushroom cultivation a <i>porus</i> , and <i>Volvariell</i> uintaing optimal temp storical background - <i>izobium sp</i> , <i>Azospirillu</i>	culants, Mushrooms, Algae. Enzymes as ferment	ation j ther ampest ay bee .ge. B	asts, I produc enzy tris, A ds, sp ioferti ic far	Bacte ets – mes. 12 H <i>gari</i> awni lizers ming	our cus ng, s –
Un Mi Ins Ba Un Mu bis ma His Rh	acrobial cells as ferma secticides, Legume Ino cterial and Fungal An hit–III ushroom cultivation a <i>sporus</i> , and <i>Volvariell</i> uintaing optimal temp storical background -	culants, Mushrooms, Algae. Enzymes as ferment nylases, Proteases, Pectinases, Invertases and o and Composting – Cultivation of <i>Agaricus ca</i> <i>a volvaciae;</i> Preparation of compost, filling tr erature, casing, watering, harvesting and stora – Chemical fertilizers versus biofertilizers –	ation j ther ampest ay bee .ge. B	asts, I produc enzy tris, A ds, sp ioferti ic far	Bacte ets – mes. I 2 H e garie awni lizers	our cus ng, s –
Un Mi Ins Ba Un Mu bis ma His Rh Un Pat cha	acrobial cells as ferma secticides, Legume Ino cterial and Fungal Ar hit–III ushroom cultivation a <i>sporus</i> , and <i>Volvariell</i> uintaing optimal temp storical background - <i>izobium sp</i> , <i>Azospirillu</i> hit–IV tents and secret proc	culants, Mushrooms, Algae. Enzymes as ferment nylases, Proteases, Pectinases, Invertases and o and Composting – Cultivation of Agaricus ca a volvaciae; Preparation of compost, filling tr erature, casing, watering, harvesting and stora - Chemical fertilizers versus biofertilizers – um sp, Azotobacter sp, as Biofertilizers.	ation j ther ampest ay bee ge. B Organ subjec	asts, I produce enzy tris, A ds, sp ioferti ic far	Bacte ets – mes. 12 H awni lizers ming	rial our cus ng, s – g – our
Un Mi Ins Ba Un Mu bis ma His Rh Un Pat cha cou	acrobial cells as ferma secticides, Legume Ino cterial and Fungal An hit–III ushroom cultivation a <i>sporus</i> , and <i>Volvariell</i> uintaing optimal temp storical background - <i>izobium sp, Azospirillu</i> hit–IV tents and secret proc	culants, Mushrooms, Algae. Enzymes as ferment nylases, Proteases, Pectinases, Invertases and o and Composting – Cultivation of Agaricus ca a volvaciae; Preparation of compost, filling tr erature, casing, watering, harvesting and stora - Chemical fertilizers versus biofertilizers – um sp, Azotobacter sp, as Biofertilizers.	ation j ther ampest ay bee ge. B Organ subjec	asts, I producenzy tris, A ds, sp ioferti ic far 1 t mat	Bacte ets – mes. 12 H awni lizers ming	our cus ng, g – our and her
Un Mii Inss Baa Un Mu bisy maa Hiis Rh Un Pat cha cou Un Bro car	acrobial cells as fermi- secticides, Legume Ino cterial and Fungal An- hit–III ushroom cultivation a <i>sporus</i> , and <i>Volvariell</i> uintaing optimal temp storical background - <i>izobium sp</i> , <i>Azospirillu</i> hit–IV tents and secret pro- aracteristics of a paten untries. Fermentation H hit–V ewing – Media compo	culants, Mushrooms, Algae. Enzymes as ferment nylases, Proteases, Pectinases, Invertases and o and Composting – Cultivation of Agaricus ca a volvaciae; Preparation of compost, filling tr erature, casing, watering, harvesting and stora - Chemical fertilizers versus biofertilizers – um sp, Azotobacter sp, as Biofertilizers.	ation p ther ampest ay bec ge. B Organ subjec s in Ir involv	asts, I produc enzy tris, A ds, sp ioferti ic far 1 t mat ndia an yed, m	Bacte mes. 12 H <i>gari</i> awni lizers ming 2 H ter a nd ot 12 H atura	ria oun cus ng, g - oun and her oun tio

Tex	xt bo	oks									
1.	Entr	reprene	urial Dev	elopmen	t in India	- By Aror	a.				
2.	Sath	iyanara	yana. U,	Biotechn	ology. (2	$005) 1^{st}E$	d. Book	s and Allie	d (P) Ltd	•	
Ref	feren	ces									
1		nbury] ss. NY	P T and	Whitake	r, (1984)	. Princip	les of F	ermentatio	on Techn	ology, Pe	rgamon
2			E JR. (20	19). Indu	strial Mi	crobiolog	v. New	Age Intern	ational P	ublishers	
3	K.F	R.Aneja	ı, Experii	ments in	Microbio	ology, Pla d Publicat	nt patho	ology, Tiss	ue cultur	e and Mu	shroom
4								iotechnolo	gy. 2007.	CRC Pre	SS
5	Mic	chael J.	Waites,	Neil L. N	lorgan, J		ckey, G	ary Higtor			
6	A.F	I. Patel	. Industri	al Microl	biology.2	016. 2 nd E	d. Laxm	ni Publicati	ons, New	v Delhi.	
7	Dul	bey R C	C. A Text	book of I	Biote <mark>chno</mark>	ology. (20	14). S C	Chand Publ	ishers.		
8.	Rob	oert D. H	Hisrich, M	ichael P. I	Peters, "Er	ntrepreneu	rship De	velopment"	, Tata Mc	Graw Hill	
Rel	ated	Onlin	e Conten	ts			~	0			
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5	site	s.goog	le.com>s	ite>micro	biology-	courses-in	n-swaya	m			
6	WW	w.class	scentral.c	om>Subj	ects>Scie	ences>Bio	ology	2	Q1 • 1		
Cou	rse D	esigne						Professor Women, T		of Microb	iology,
			- 10	100	1.20	Ve	rified B	y: Dr. <mark>G</mark> an	<mark>idh</mark> imath	ii.R, Chai	rperson
Map	ping	, with I	Program	me Outc	omes	36					
CO)s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO)1	S	2) S	S	S	S	S	S	S	М	S
CO	2	S	S	S	S	S	S	S	S	М	S
CO	3	S	S	S	S	S	S	S	S	М	S
CO	94	S	S	S	S	S	S	S	S	М	S
CO		S	S	S	S.	S	S	5°S	S	М	S
	*S -	- Strong	g; M – M	edium; L	- Low	E116071) TE TO EL	EVATE				

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Course code 6EC		L	Т	Р	С
Elective – II (Group –	C) MEDICAL BIOCHEMISTRY	4	•	-	4
Pre- requisite	Basic knowledge on biochemistry gained in the second year allied subject of this programme.	Sylla Vers		202 202	
Course Objectives: The main objectives of t					
	owledge about various metabolic diseases.	_			
	rstanding on blood sugar level and diabetes mellitu		ahania	m .c	
	etabolic processes, molecular, biochemical and cellagen balance of living cells.	inar me	chams	ms.	
Expected Course Outc					
	tion of the course, student will be able to:				
1 Receive a fundame	ntal grounding in the principles of carbohydrate me mely diabetes mellitus and glycogen storage disease		n,	K	2
	ge in abnormalities of lipid metabolism and theirre		nip	K	2
	<mark>ne function</mark> s of liver and kidney and th <mark>eir</mark> a <mark>bnor</mark> mali			K	3
4 and monitoring the	of amino acid and protein intermediates of their me deficiency disorders.		m	K	4
³ important role of b	emoglobin is a key molecule in blood and recognize ood clotting mechanism.			K	4
	- Understand; K3 - Apply; K4 - Analyze; K5 - Eva	uluate; l	K6 - C	Create	
Unit – I	A states and fit 19			12 Ho	urs
blood, renal threshold diseases, pentosuria, ga	te metabolism – Diabetes mellitus, Glucose tolera for glucose, factors influencing blood glucose actosemia.		glycog	en sto	rage
and disease, hyperlipid	asma lipo proteins, cholesterol, triglycerides and mia, hyperlipoproteinemia, Gaucher''s disease, Ta		olipid		ealth
β- lipoproteinemia. Unit – III	A AR UN	2		12 Ho	
	idney- Jaundice, fatty liver, normal and abnormal	functio	one of		
kidney, insulin and ure		Tunctio			
	en metabolism- Uremia, hyperurecemia, porphyria	a and fa		12 Ho affecti	
nitrogen balance.	0414 IU 455 II				
Unit–V		1 1 1		<u>12 Ho</u>	
disturbances in blood		haemo d proth	ophilia Irombi	a, purp in com	pura, plex
	Total Lecture H	lours	60	Hours	;
	inical correlations. Thomas M Devlin. 7 th Ed. (2010). A Joł	nn Wil	ey and	of
References	s, Inc., publications., New York.				
	biochemistry. A. C. Deb. 9 th Ed. (2008). New cer	ıtral bo	ok ag	ency P	vt.
	Sathyanarayana. 4 th Ed. (2013). Books and Allied P	vt. ltd.			
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3	Fundamen	ntal of Bio	ochemisti	ry for med	dical stud	ents. Aml	oika Shan	mugam. I	Revised 8	th Ed.
5	(2016). Pr	ublished b	y the Au	thor, Che	nnai					
Relat	ed Online	Contents	8							
1	https://wv	ww.scienc	edirect.co	om/topics	/biochem	istry				
2	https://wv	vw.youtuł	be.com/w	atch?v=N	loyM9zQ	amE0				
3	https://wv	ww.youtuł	be.com/w	atch?v=8	F7wKGN	JAlpg				
4	https://wv	ww.resear	chgate.ne	t/publicat	tion					
5	https://on	linelearnii	ng.hms.h	arvard.ed	u/hmx/co	urses/hm	x-biocher	nistry/		
Cours	se designe	d by: Dr.	R.Parim	ala, Assi	stant Prof	fessor of	Biochemi	stry.		
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					ver	mea By:	Dr.Gand	himathi.	R, Chair	person
Mappi	ng with P	rogramm	e Outco	mes	ver	inea By:	Dr.Gand	himathi.	R, Chair	person
Mappi COs	ng with P PO1	rogramm PO2	ne Outco PO3	mes PO4	PO5	PO6	PO7	himathi. PO8	R, Chair PO9	person PO10
						·			, .	
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
COs CO1	PO1 S	PO2 S	PO3 S	PO4 S	PO5 S	PO6 M	PO7 L	PO8 S	PO9 L	PO10 L
COs CO1 CO2	PO1 S S S	PO2 S S	PO3 S S	PO4 S S	PO5 S S	PO6 M M	PO7 L L	PO8 S S	PO9 L L	PO10 L L

5 S S S S *S – Strong; M – Medium; L – Low



Course code 6ED)		L	Т	Р	С
Elective – III (Group –	- A)	DAIRY MICROBIOLOGY	3	1	-	4
Pre- requisite	11)	Basic knowledge on Microbiology and Food Microbiology gained from this programme.	Sylla Vers	bus	202 20	21 - 22
Course Objectives:			-			
The main objectives of t	his co	burse are to:				
• learn the basics of	of dair	ry processing units.				
 impart knowledg 	e on f	fermented milk products.				
		od quality standards.				
Expected Course Outco	omes					
On the successful compl	etion	of the course, student will be able to:				
1 Understand the dai	ry pro	ocessing unit operations.			K 2	
2 be acquainted with	vario	ous types of dairy products.		K	2 & 2	K3
		oorganisms on fermented milk products and	milk	K	3&1	K 4
4 Gain information a	bout	hygienic manufacturing of dairy products.		K	3 & I	Χ4
Get the knowledge		t Government regulatory practices and polici	es for	T		
5 quality assurance of	of dair	y products.		K	4 & 1	K 5
K1 - Remember; K	2 - Ur	nderstand; K3 - Apply; K4 - Analyze; K5 - E	valuate;	K6 –	Creat	e
Unit–I					12 Ho	ours
Lactobacillus bulgar homogenization, Me	<mark>icu</mark> s) mbrai	res their biochemical activities. (<i>Strepto</i> Dairy processing unit operations: Pasteuriz ne processing, storage, transportation and k and its products.	ation, I	JHT ution	treatm	ent, nilk.
	ction	: Overview and Fluid Milk Products, Conce	ntrated			
Products, condensed	milk,	evaporated milk, whole and skimmed milk j Ice Cream, Butter, Whey Products.				
Unit–III	,		8	· · · ·	12 H o	mrs
Slightly acid ferment Fermented milk pr antimicrobial systems infective and toxic ty	ed mi oduct s in m pes –	I milk products – Acid fermented milks (acid ilks (Cultured butter milk), Acid-alcoholic f ion with extended self-life (labneh)). I nilk, sources for contamination of milk – bac Clostridium, Salmonella, Shigella, Staphyloc lk with reference to Aspergillussp.	ermente Milk b terial w	ed mil orne ith ex	k (Ke disea ample	efir). uses, es of
		ik with reference to Aspergulussp.			10 II.	
milk and milk produc	ts. In	Milk Products: Cleaning of Dairy Equipm -plant cleaning system. Dairy Processing Pla dairy by product – whey.		nstant		n of
Unit–V					12 Ho	
		ological quality standards of food. Governme EPA, HACCP, ISI. HACCP – Food safety, sa	afety of	dairy	produ	icts,
Tort hools		Total Lecture 1	iours		60 Ha	urs
	ducts	– Clarence Henry Eckles, Tata McGraw Hill	publish	ing co	mpan	у
Ltd, New Delhi. 2 Jay,J.M , (2005).	Mode	ern Food Microbiology 4 th Ed., Van Nostra ar	d Rainl	nokdd	Co.	

ILCIU.	rences									
1	Dairy Mic	robiolog	y by Robi	inson R.K	K, (1990).	Volume	I and II. E	Elsevier A	pplied So	cience,
1	London.									
2	Roday. S,	(1998). F	Food Hyg	eine and	Sanitatio	n. Tata M	cgraw Hi	ll Publica	tions.	
3	Fundamer	ntals of D	airy Micı	robiology	v by Praja	pati.				
4	Dey, S, (1	994). Ou	tlines of l	Dairy Tec	chnology.	Oxford U	Jniv. Pres	s, New D	elhi.	
5	Rosenthal	, I, (1991). Milk a	nd Milk F	Products.	VCH, Ne	w York.			
6	Warner, J	.M, (1976	5). Princij	ples of Da	airy Proce	essing. W	iley Easte	rn Ltd. N	ew Delhi	•
7	Yarpar, W	J. and H	all, C.W,	(1975). I	Dairy Tec	hnology a	nd Engin	eering AV	VI, Westr	oort.
Rela	ted Online	Content	S							
1	https://ww	ww.agrifa	rming.in/	dairy-pro	cessing-p	lant-proje	ect-report	-setup		
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	oing with P	rogramn	ode Arts a	and Scien	ce Colleg Ver	ge, Erode ified By:	Dr.Gand	lhimathi.	R, Chair	- -
COs	PO1	rogramn PO2	e Outco PO3	mes	ce Colleg Ver PO5	e, Erode ified By: PO6	Dr.Gand	lhimathi. PO8	R, Chair PO9	PO10
	PO1	rogramn	ode Arts a	and Scien	ce Colleg Ver	ge, Erode ified By:	Dr.Gand	lhimathi.	R, Chair	- -
COs	PO1 S	rogramn PO2	e Outco PO3	mes	ce Colleg Ver PO5	e, Erode ified By: PO6	Dr.Gand	lhimathi. PO8	R, Chair PO9	PO10
COs CO1	PO1 S S	rogramn PO2 S	ode Arts a ne Outco PO3 S	mes PO4 S	Ce Colleg Ver PO5 S	re, Erode ified By: PO6 S	Dr.Gand PO7 M	lhimathi. PO8 S	R, Chair PO9 M	PO10
COs CO1 CO2	PO1 S S S S	rogramn PO2 S S	e Outco PO3 S S	mes PO4 S S	Ce Colleg Ver PO5 S S	re, Erode ified By: PO6 S S S	Dr.Gand PO7 M M	lhimathi. PO8 S	R, Chair PO9 M M	PO10 S S
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Co	ourse code	6EE		L	Т	Р	С
Elect	ive – III(Grou	Ip – B)	BIONANOTECHNOLOGY	4	-	-	4
	Pre- requisite		Basic knowledge gained in the previous years of the programme.	Sylla s Vers		202 202	
Cour	se Objectives			•			
	nain objectives		ourse are to:				
•	understand b	oionano m	nachines.				
٠	impart know	ledge abo	out structural principles of bionanotechnology				
•	know variou	s tools, te	echniques and applications of bionanotechnol	ogy.			
	cted Course C						
			of the course, student will be able to:				
1			bionanomachines and history of bionanotechi	nology		K	
2		0	structural principles of bionanomachines.			K	
3			of functional principles of bionanotechnolog	у.		K	2
4			us tools and techniques being used in			K	2
_	bionanotechr	0,				TZ	-
5			of bionanotechnology	1 /	V	K	-
ľ	XI - Remembe	r; K2 - Ui	nderstand; K3 - Apply; K4 - Analyze; K5 - Ev	valuate	; K0 -	- Crea	te
T T •	- -	15		_		10.11	
Uni				1 1		12 Ho	
			bout Bionanomachines, Molecular Bionanotec				
			ard Feynman and his contributions. Bio	otechno	biogy	vers	18
	it–II	. Natural	Bionanomachines.		_	12 Ho	
		les of Bio	onanaotechnology – Environment in which th	PA Rio			
Fun Disj effe	ctions. Princip persions and re- ect. Hierarchica	ples behi epulsion f al strategy	nd design of Natural Bionanaomachines – forces. Hydrogen bonding, Electrostatic Inter- in construction of Bionanomachines – Self as olecular recognition.	Cova action,	lent l Hydr	oondin ophob	g,
	t–III			<u>s</u>		12Ho	ars
as a path	assembler to ways, electroo	construct	onanotechnology – Information storage – Nuc proteins. Energetics – Energy from Light gradient. Biocatalysts – Enzymes and its regu cular sensing- Biosensors.	, elect	ron t	ranspo	ort
	it–IV		Southeon B			12 Ho	urs
Too dire Ato	ols and techniq ected mutagene	esis, Fusio icroscopy	ed for Bionanaotechnology – Recombinant D on proteins. X-Ray Crystallography, NMR, E 7. Bioinformatics – Molecular Modeling,	lectror	chnolo Mici	ogy; si roscop	te y,
	nit–V	ucoigii.			1	2 Hou	rs
		Bionanote	chnology – Nanomedicines; Immunotoxins,	Linos			
carr	iers, Gene the	erapy, Pe	ersonalised Medicines; Lab on chip concept rials, Biosensors.	t. DNA		mputer	rs,
_			Total Lecture I	lours		60 H	ours
Text b							
1		Bionanote	chnology 1 st Ed. (2004). Wiley-Blackwell Pub	lishers			
	erences	1		~			
1			sh Bharadwaj, Nanomedicines, (2006). Pentag			D	
2			Nanoparticles as Drug Carriers, (2006). Imperiate USA	rial Co	llege	Press,	
	North Easter	in University	sity, USA.				

Relate	ed Online	Contents	8								
1	1 https://www.youtube.com/watch?v=ebO38bbq0_4										
2	2 https://nanohub.org/resources/101										
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Cours	Course designed by: Dr.Gandhimathi.R., Assistant Professor of Microbiology										
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				levan, As			IOD of M	licrobiolo	gy		
		Eroc	le Arts ar	nd Science	e College	, Erode					
					Ver	ified By:	Dr.Gand	himathi.	R, Chair	person	
N/	Verified By: Dr.Gandhimathi.R, Chairperson Mapping with Programme Outcomes										
wappu	ng with P	rogramn	e Outco	mes							
COs	ng with Pr PO1	rogramn PO2	PO3	mes PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	
		U			PO5 S	РО6 М	РО7 М	PO8 S	PO9 S	-	
COs	PO1	PO2	PO3	PO4						0	
COs CO1	PO1 S	PO2 S	PO3 S	PO4 S	S	М	М	S	S	0 S	
COs CO1 CO2	PO1 S S	PO2 S S	PO3 S S	PO4 S S	S S	M M	M M	S S	S L	0 S S	

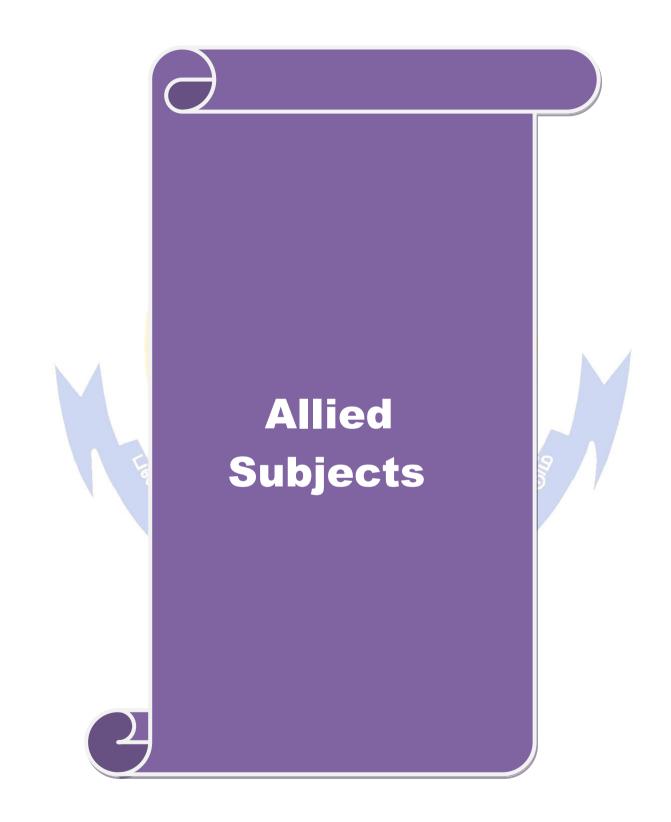
*S-Strong; M-Medium; L-Low



Course code 6EI	BIOINFORMATICS	L	Τ	P	C
Elective – III(Group –	C) BIOINFORMATICS	3	1	-	4
Pre- requisite	Basic knowledge on database, proteomics and genomics gained from Recombinant DNA Technology learned in the previous semester of this programme.	-	abus sion	202 20	21 -)22
Course Objectives:					
The main objectives of	this course are to:				
5	asics of bioinformatics and its role in biosciences.				
• gain knowledge	about biological database and its types.				
• familiarize with	the nucleotide sequence databases.				
 know about prot 	eomics and genomics.				
• understand gene	finding, protein prediction, phylogenetic analysis and	drug d	esignir	ıg.	
	and the second sec				
Expected Course Outc					
	letion of the course, student will be able to:				
1 know about basics relationship with b	of bioinformatics and information technology and the biology.	ir		K	1
2 gain knowledge at	pout nucleotide sequence database.			K	2
3 explore proteomic				K	3
	biological databases.			K	4
designing.	ein, bio-molecular visualization, phylogenetic analysis			K	5
K1 - Remember; K	2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluation	iate; K	6 – Cr	eate	
T T 1 / T			10		
Unit–I	formation Commence of in Disinformation DNI			Hou	
	formatics, Sequences used in Bioinformatics – DNA application of Bioinformatics.	4, KN	A and	Prot	ein
Sequences, Scope and	application of Bioinformatics.	3			
Unit–II		9 /	12	Hou	rs
Biological databases a	nd its significance – objectives, properties and classif relationships between databases, Symbols used in data		n of Bi		
	NGA AV				
Unit–III	A A A A A A A A A A A A A A A A A A A		12	Hou	rs
	ICBI – GenBank, EMBL, DDBJ. Sequence Alignme tiple sequence alignment (ClustalW).	nt Pair	rwise (BLA	ST
Unit–IV				Hou	
	e of Protein; Nomenclature of Protein Sequences ; Pro Protein visualization tools – RASMOL, Swiss PDB v		atabase	e Swi	iss-
Unit–V			12	Hou	rs
Gene finding, protein	prediction, phylogenetic analysis & Drug designing.				
				0 ==	
	Total Lecture Ho	urs	6	0 Ho	urs

Text	books									
1	Bioinfo	rmatics f	or beginn	ers (2002) K.Mani	i and Vija	yaraj.			
2				atics S.Su			• •			
Refer	ences				•	<u> </u>				
1	A.D.Bax of gene p			. ,			"- A prac	tical guid	e to the a	nalyzing
2	Bioinform	natics – S	Sequence	and Geno	ome analy	sis, (200/	1). David	W.Mour	nt.	
3	Bioinform	natics – H	R. Sundar	alingam,	V. Kuma	resan.				
4	Introduct	ion to Bi	oinformation	tics Artho	r M.Lesl	e.				
5	Bioinforr M.Browr		biologist	ts guide	to bio-c	omputing	g and the	e interne	t, (2000)	. Stuart
6	Ruchi Sin (2010). U							orithms a	ind Appli	ications,
Relat	ed Online	e Content	ts							
1	http://ww	w.ncbi.n	lm.nih.go	V	a wyy	Sin				
2	https://w	ww.ndl.ii	tkgp.ac.ii	1			\mathbf{O}			
3	https://ac	ademic.o	up.com/n	ar/article/	/33/suppl	_2/W3/2	505760			
4	https://w				1 A					
5	http://bio	infbook.c	com/bioir	formatics	s/bioinf14	_mainbi	oinf.htm			
6	https://w		and the second se		The fil	C	1 5			
7	https://ww application			m/course/	/swayam-	bio-infor	matics-al	gorithms-	-and-	
8	http://ww	w.dypati	l.edu/sch	ools/biote	ch-and-b	ioinform	atics/sway	yam-npte	l-local-ch	apter/
Cour	se designe	ed by: Dr	.Gandhi	mathi.R.	, Assistar	nt Profess	or of Mie	crobiolog	y,	
		L.F	R.G. Gov	ernment A	Arts Colle	ege For W	Vomen, T	iruppur		
		M	.M.Vasu	idevan, A	sst. Profe	essor and	HOD of	Microbio	logy	
		Erc	o <mark>de Arts a</mark>	and Scien	ce Colleg	ge, Erode	$ \rangle$			
			2	for	Ver	rified By	: Dr.Gan	<mark>dhimath</mark>	i.R, Chai	rperson
Mappi	ing with P	rogram	ne Outco	mes						
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	M	L	6L	L	М
CO2	S	S	S	S	S	Μ	LC	° L	L	М
CO3	S	S	S	S	S	М	L	L	L	Μ
CO4	S	S	S	S	S	M	ゆL	L	L	М
CO5	S	S	S	2811	பாலர	2-S	L	L	L	М
				EDUCAT	TTO EL	EVALE				

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



Course code Allied A – I	1AB	BIOSTATISTICS AND COMPUTER APPLICATIONS – I	L 3	T 1	Р	C 3
Anteu A – I		Basic knowledge on statistics	-		-	
Pre- requi	site	gained during school education and	Sylla		2021	
		on computer.	Vers	ion	202	2
Course Objecti	ves:	*				
•		his course are to:				
0		nts to learn the statistical methods and measure	s.			
		oncept of probability.				
		entals of computers.				
		nts to basics of MS Office Excel.				
1						
Expected Cours	se Outc	omes:				
		letion of the course, student will be able to:				
		of Data Collections and Diagrams			K2	
		Measures of Location and Dispersion			K3	
		sics of Probability and Various Distribution me	thods		K4	
		e about the Basics of Computer Software and H		e	K2	
5 Explore the	e MS Of	ffice Excel for the use of Biological data analys	sis		K5 &]	K6
K1 - Rememb	er; <mark>K2</mark> -	Understand; K3 - Apply; K4 - Analyze; K5 -	<mark>Eval</mark> uate	e; K6	– Crea	te
	n					
Unit– I	46				Hour	
		f Statistical methods and their limitations				
Classification	and Tab	pulation – Primary and Secondary data and the	<mark>leir a</mark> ppl	licatio	ns in 1	life
	grams -	Line diagnam Dan diagnam and Dia diagnam	a 1 ·			
		Line diagram, Bar diagram and Pie diagram –	Graphic	al pre	esentati	
sciences – Dia – Histogram ar			Graphic	al pre	esentati	
– Histogram ar			Graphic			ion
– Histogram ar Unit–II	nd Ogive	es		12	Hour	ion s
– Histogram an Unit–II Measures of L	nd Ogive	and Dispersion – Stem and Leaf plots – Box a		12	Hour	ion s
– Histogram an Unit–II Measures of L	nd Ogive	es		12	Hour	ion s
– Histogram an Unit–II Measures of L efficient of var	nd Ogive	and Dispersion – Stem and Leaf plots – Box a		12 ker Pl	Hour ots – C	ion s Co-
– Histogram an Unit–II Measures of L efficient of var Unit– III	nd Ogivo ocation riation –	and Dispersion – Stem and Leaf plots – Box a Skewness and its measures.	nd Whis	12 ker Pl	Hour ots – C	ion s Co- s
 Histogram an Unit–II Measures of L efficient of var Unit–III Probability – C 	ocation riation –	and Dispersion – Stem and Leaf plots – Box as Skewness and its measures.	nd Whis	12 ker Pl 12 s of P	Hour ots – C Hour robabi	ion s Co- S lity
 Histogram an Unit–II Measures of L efficient of var Unit–III Probability – C (statement only) 	ocation iation – Concept y) – sim	and Dispersion – Stem and Leaf plots – Box at Skewness and its measures. and Definition – Addition and Multiplication ple problems – Binomial, Poisson and Norma	nd Whis	12 ker Pl 12 s of P	Hour ots – C Hour robabi	ion s Co- S lity
 Histogram an Unit–II Measures of L efficient of var Unit–III Probability – C 	ocation iation – Concept y) – sim	and Dispersion – Stem and Leaf plots – Box at Skewness and its measures. and Definition – Addition and Multiplication ple problems – Binomial, Poisson and Norma	nd Whis	12 ker Pl 12 s of P	Hour ots – C Hour robabi	s Co- Ss lity
 Histogram an Unit–II Measures of L efficient of var Unit– III Probability – C (statement only proof) – simple 	ocation iation – Concept y) – sim	and Dispersion – Stem and Leaf plots – Box at Skewness and its measures. and Definition – Addition and Multiplication ple problems – Binomial, Poisson and Norma	nd Whis	12 ker Pl 12 s of P utions	Hour ots – C Hour robabi	s Co- rs lity out
 Histogram an Unit–II Measures of Liefficient of var Unit–III Probability – Ciefficient only proof) – simple Unit–IV 	nd Ogive ocation riation – Concept y) – sim e proble	and Dispersion – Stem and Leaf plots – Box as Skewness and its measures. and Definition – Addition and Multiplication ple problems – Binomial, Poisson and Norma ms.	nd Whis theorem 1 distrib	12 ker Pl 12 s of P utions	Hour ots – C Hour robabi (with	ion s Co- lity out
 Histogram an Unit–II Measures of L/ efficient of var Unit–III Probability – C (statement only proof) – simple Unit–IV Introduction to 	ocation riation – Concept y) – sim e proble	and Dispersion – Stem and Leaf plots – Box as Skewness and its measures. and Definition – Addition and Multiplication ple problems – Binomial, Poisson and Norma ms.	nd Whis theorem 1 distrib	12 ker Pl 12 s of P utions 12 Com	Hour ots – C Hour robabi (with Hour pilers a	s Co- S lity out s and
 Histogram an Unit–II Measures of Liefficient of var Unit–III Probability – Ciefficient only proof) – simple Unit–IV Introduction to Interpreters – 1000 	ocation ocation – concept y) – sim e proble	and Dispersion – Stem and Leaf plots – Box at Skewness and its measures. and Definition – Addition and Multiplication ple problems – Binomial, Poisson and Norma ms.	nd Whis theorem 1 distrib	12 ker Pl 12 s of P utions 12 Comj racter	Hour ots – C 2 Hour robabi 3 (with 2 Hour pilers a istics a	ion s Co- lity out s and and
 Histogram an Unit–II Measures of Liefficient of var Unit–III Probability – Ciefficient only proof) – simple Unit–IV Introduction to Interpreters – Tiepplication, B 	nd Ogive ocation riation – Concept y) – sim e proble o Compu Persona IT, BY	and Dispersion – Stem and Leaf plots – Box as Skewness and its measures.	nd Whis theorem 1 distrib	12 ker Pl 12 s of P utions 12 Comj racter	Hour ots – C 2 Hour robabi 3 (with 2 Hour pilers a istics a	s Co- lity out s and and
 Histogram an Unit–II Measures of Liefficient of var Unit–III Probability – Ciefficient only proof) – simple Unit–IV Introduction to Interpreters – 1 	nd Ogive ocation riation – Concept y) – sim e proble o Compu Persona IT, BY	and Dispersion – Stem and Leaf plots – Box as Skewness and its measures.	nd Whis theorem 1 distrib	12 ker Pl 12 s of P utions 12 Comj racter	Hour ots – C 2 Hour robabi 3 (with 2 Hour pilers a istics a	ion s Co- ity out s and and
 Histogram an Unit–II Measures of Liefficient of var Unit–III Probability – Ciefficient only proof) – simple Unit–IV Introduction to Interpreters – application, Biestorage, binary 	nd Ogive ocation riation – Concept y) – sim e proble o Compu Persona IT, BY	and Dispersion – Stem and Leaf plots – Box as Skewness and its measures.	nd Whis theorem 1 distrib	12 ker Pl 12 s of P utions 12 Comj racter resent	Hour ots – C Hour robabi (with Hour pilers a istics a ation a	ion s Co- lity out s and and and
 Histogram an Unit–II Measures of Liefficient of var Unit–III Probability – Ciefficient only (statement only proof) – simple Unit–IV Introduction to Interpreters – application, Biestorage, binary Unit–V 	ocation ocation riation – Concept y) – sim e proble p Compu Persona IT, BY v codes,	and Dispersion – Stem and Leaf plots – Box at Skewness and its measures. and Definition – Addition and Multiplication ple problems – Binomial, Poisson and Norma ms.	nd Whis theorem 1 distrib	12 ker Pl 12 s of P utions 12 Compracter resent	Hour ots – C 2 Hour robabi 3 (with 2 Hour pilers a istics a ation a	ion s Co- S lity out s and and and s s
 Histogram an Unit–II Measures of Liefficient of var Unit–III Probability – Ciefficient only proof) – simple Unit–IV Introduction to Interpreters – Tiapplication, Bistorage, binary Unit–V Microsoft Excel 	nd Ogive ocation riation – Concept y) – sim e proble o Compu Persona IT, BY codes,	and Dispersion – Stem and Leaf plots – Box as Skewness and its measures.	nd Whis theorem l distrib	12 ker Pl 12 s of P utions 12 Comp racter resents resents 12 and	Hour ots – C Hour robabi (with Hour pilers a istics a ation a 2 Hour function	ion s Co- S lity out s and and and and s ons
 Histogram an Unit–II Measures of Liefficient of var Unit– III Probability – Ciefficient only proof) – simple Unit– IV Introduction to Interpreters – application, Biestorage, binary Unit– V Microsoft Excession Microsoft Excession 	nd Ogive ocation riation – Concept y) – sim e proble o Compu Persona IT, BY v codes, cel – Da expected	and Dispersion – Stem and Leaf plots – Box as Skewness and its measures. and Definition – Addition and Multiplication ople problems – Binomial, Poisson and Norma ms.	nd Whis theorem 1 distrib vstems – heir cha lata repu ormulae nt numb	12 ker Pl 12 s of P utions 12 Comj racter resent: resent: 12 and er sys	Hour ots – C 2 Hour robabi 3 (with 2 Hour pilers a istics a ation a 2 Hour function	ion s Co- lity out s and and and and s ons and
 Histogram an Unit–II Measures of L/ efficient of var Unit– III Probability – C (statement only proof) – simple Unit– IV Introduction to Interpreters – 1 application, B storage, binary Unit– V Microsoft Exc (students are e conversions, in 	nd Ogive ocation riation – Concept y) – sim e proble o Compu Persona IT, BY v codes, cel – Da expected nput an	and Dispersion – Stem and Leaf plots – Box as Skewness and its measures. and Definition – Addition and Multiplication ople problems – Binomial, Poisson and Norma ms.	nd Whis theorem 1 distrib vstems – heir cha lata repu ormulae nt numb	12 ker Pl 12 s of P utions 12 Comj racter resent: resent: 12 and er sys	Hour ots – C 2 Hour robabi 3 (with 2 Hour pilers a istics a ation a 2 Hour function	ion s Co- lity out s and and and and s ons and
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 Histogram an Unit–II Measures of L/ efficient of var Unit– III Probability – C (statement only proof) – simple Unit– IV Introduction to Interpreters – 1 application, B storage, binary Unit– V Microsoft Exc (students are e conversions, in 	nd Ogive ocation riation – Concept y) – sim e proble o Compu Persona IT, BY v codes, cel – Da expected nput an	and Dispersion – Stem and Leaf plots – Box as Skewness and its measures. and Definition – Addition and Multiplication ople problems – Binomial, Poisson and Norma ms.	nd Whis theorem 1 distrib 2 stems – heir cha lata repu ormulae nt numb - Numer	12 ker Pl 12 s of P utions 12 Comp racter resent resent 12 and er sys rical p	Hour ots – C 2 Hour robabi 3 (with 2 Hour pilers a istics a ation a 2 Hour function	ion s Co- lity out s and and and and s ons and ms

Text b	ooks										
1	P.Rama	ıkrishnan	(2017). I	Biostatisti	ics. Saras	Publicati	ion.				
Referen	ices										
1		Daniel W.W, (1995). Biostatistics: A foundation for Analysis in health sciences, 6 th Ed., John Wiley.									
2	Camphe	mphellR.C,(1989) Statistics for Biologists, Cambridge University Press.									
3	Snedec	decor G.W. and Cochran W.G, (1967). Statistical Methods, Oxford Press.									
4	Gupta S	pta S.P, (2017). Statistical Methods 45 th Ed. Sultan Chand & Sons.									
5	Arora P	P.N, Sume	eet Arora	and Aror	r <mark>a .S: C</mark> on	nprehens	ive Statis	tical Met	hods.		
6	R.K. Ta	axali: PC	Hardwar	e <mark>and Sof</mark>	tware, Ga	algotia Pu	iblication				
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1	https://r	nicroben	otes.com	/primary-	data-and-	secondar	y-data				
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		E	rode Arts	and Scie	nce Colle	ege, Erod	e				
		13			Verified	l By: Dr.	<mark>Gandhi</mark> n	nathi.R,	Chairpe	rson	
Mappin	g with P	rog <mark>ram</mark> r	ne Outco	omes	-ca-	2		9			
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	
CO1	М	М	S	S	М	S	М	L	L	S	
CO2	М	M	S	M	M	М	M	L	L	S	
CO3	М	М	'ୟ/S	S	М	S	M	L	L	S	
CO4	S	S	S	SSI1	г оом 🧕	S	М	L	L	S	
CO5	S	S	S	MTE	TO MLEV	S	М	L	L	S	

*S – Strong; M – Medium; L – Low

Course code	2AB	BIOSTATISTICS AND	L	Т	Р	С
Allied A – II		COMPUTER APPLICATIONS – II	3	1	-	3
		Basics of Bio-Statistics and Computer	Syll	hua	201	21 -
Pre- requis	ite	Applications – I learned during the	Sylla Ver			21 -
		previous semester.	ver	SIOII	20	
Course Objecti						
The main object						
		th computer knowledge for statistical analysis	•			
		s to learn the Sampling methods.				
-		wledge about Artificial Intelligence in Biologi	cal Scie	nces.		
 make stu 	dents fam	iliar with the Big-Data Analysis.				
Expected Cours	se Outcor	nes:				
On the successfu	ul comple	tion of the course, student will be able to:				
1 Know the l	basics of	Correlation and its various types.			K2 8	k K3
2 Understand	d the basi	cs of Sampling and Distributions			K2 8	& K3
		ly Non-Parametric tests			K2 8	& K3
4 Acquire ki	nowledge	about the Artificial Intelligence and its ap	plicatio	ns in	K	2
Biology	Z				Ν	<u>_</u>
		Data Analysis and its applications			K	
K1 - Remen	n <mark>ber; K2</mark>	- Understand; K3 - Apply; K4 - Analyze; K5	- Evalu	ate; K6	– Crea	te
	95					
Unit–I						
Correlation –		iagram – Karl Pearson's co-efficient of Co nan's Rank Correlation – Linear Regression.				nt of
Correlation – determination Linear curves. Unit–II Need for Sam random and C	– Spearn pling – M Cluster sa	han's Rank Correlation – Linear Regression. Methods of Sampling – Simple random, Stra Impling – Sampling and Non-sampling error	Curve tified r	fitting andom, ncept o	efficie – Fittin 12 Ho Systen of Sam	nt of ng of ours matic pling
Correlation – determination Linear curves. Unit–II Need for Sam random and C	– Spearn pling – M Cluster sa	nan's Rank Correlation – Linear Regression. Methods of Sampling – Simple random, Stra	Curve tified r	fitting andom, ncept o	efficie – Fittin 12 Ho Systen of Sam	nt of ng of ours matic pling
Correlation – determination Linear curves. Unit–II Need for Sam random and C Distribution –	– Spearn pling – M Cluster sa	han's Rank Correlation – Linear Regression. Methods of Sampling – Simple random, Stra Impling – Sampling and Non-sampling error	Curve tified r	fitting andom, ncept o	efficie – Fittin 12 Ho Systen of Sam	nt of ng of ours matic pling
Correlation – determination Linear curves. Unit–II Need for Sam random and C Distribution – distributions.	– Spearn pling – M Cluster sa Standard	han's Rank Correlation – Linear Regression. Methods of Sampling – Simple random, Stra Impling – Sampling and Non-sampling erro error – Tests of significance based on Norm	Curve ttified r ors. Co al, "t",	fitting andom, ncept o "F" and	efficie – Fittin 12 Ho Systen f Sam Chi so 12Ho	nt of ng of ours matic pling quare urs
Correlation – determination Linear curves. Unit–II Need for Sam random and C Distribution – distributions. Unit–III Non – parame	– Spearn pling – M Cluster sa Standard tric tests	han's Rank Correlation – Linear Regression. Methods of Sampling – Simple random, Stra Impling – Sampling and Non-sampling error	Curve ttified r ors. Co al, "t",	fitting andom, ncept o "F" and	efficie – Fittin 12 Ho Systen f Sam Chi so 12Ho	nt of ng of ours matic pling quare urs
Correlation – determination Linear curves. Unit–II Need for Sam random and C Distribution – distributions. Unit–III Non – parame "U" test, Krusk	– Spearn pling – M Cluster sa Standard tric tests	han's Rank Correlation – Linear Regression. Methods of Sampling – Simple random, Stra ampling – Sampling and Non-sampling erro error – Tests of significance based on Norm	Curve ttified r ors. Co al, "t",	fitting andom, ncept o "F" and	efficie – Fittin 12 Ho Syster of Sam Chi so 12Ho – Wh	nt of ng of matic pling quare urs itney
Correlation – determination Linear curves. Unit–II Need for Sam random and C Distribution – distributions. Unit–III Non – parame "U" test, Krusk	– Spearn pling – N Cluster sa Standard tric tests kal – Wall	Aethods of Sampling – Simple random, Stra mpling – Sampling and Non-sampling erro error – Tests of significance based on Norm – Advantages and Disadvantages – Uses – S is test and Run test.	Curve atified r ors. Co al, "t",	fitting andom, ncept o "F" and	efficie – Fittin 12 Ho Systen f Sam Chi so 12Ho – Wh 12Ho	nt of ng of matic pling quare urs itney urs
Correlation – determination Linear curves. Unit–II Need for Sam random and C Distribution – distributions. Unit–III Non – parame "U" test, Krusk Unit–IV Artificial Intell AI – AI enviro	– Spearn pling – N Cluster sa Standard tric tests cal – Wall ligence (A onment – ligence ir	han's Rank Correlation – Linear Regression. Methods of Sampling – Simple random, Stra ampling – Sampling and Non-sampling erro error – Tests of significance based on Norm	Curve tified r ors. Co al, "t", Sign test ed for <i>A</i> allenges	fitting andom, ncept o "F" and t, Mann t, Mann AI – Fou	efficie – Fittin 12 Ho Syster f Sam Chi so 12Ho – Wh 12Ho indatio uture o	nt of ng of matic pling quare urs itney urs ns of f AI.
Correlation – determination Linear curves. Unit–II Need for Sam random and C Distribution – distributions. Unit–III Non – parame "U" test, Krusk Unit–IV Artificial Intell AI – AI enviro Artificial Intel	– Spearn pling – N Cluster sa Standard tric tests cal – Wall ligence (A onment – ligence ir	Al): Introduction to AI – Fundamentals – New Application domains of AI – AI tools – Ch	Curve tified r ors. Co al, "t", Sign test ed for <i>A</i> allenges	fitting andom, ncept o "F" and t, Mann t, Mann AI – Fou	efficie – Fittin 12 Ho Syster f Sam Chi so 12Ho – Wh 12Ho indatio uture o	nt of ng of matic pling quare urs itney urs ns of f AI. next
Correlation – determination Linear curves. Unit–II Need for Sam random and C Distribution – distributions. Unit–III Non – parame "U" test, Krusk Unit–IV Artificial Intel AI – AI enviro Artificial Intel generation sequ Unit–V Big Data: Digi Data. Characte Learning – Clo	 – Spearn pling – M Cluster sa Standard tric tests cal – Wall ligence (A onment – ligence in uencing. tal Data – eristics o oud Comp 	Al): Introduction to AI – Fundamentals – New Application domains of AI – AI tools – Ch	Curve tified r ors. Co al, "t", Gign test ed for A allenges in Phyle Big Da tentials Data in	fitting andom, ncept o "F" and t, Mann aI – Fou s and Fu ogeny – ta – Sou – AI Industr	efficie – Fittin 12 Ho Syster of Sam Chi so 12Ho 12Ho undatio uture o – AI in 12Ho uture o – AI in	nt of ng of matic pling quare urs itney urs ns of f AI. next urs f Big chine

Text	books									
1	P.Ramak	rishnan (2	017). Bios	statistics.	Saras Pu	blication.				
Refere	ences									
1								sity Press	•	
2	Gupta S.H	P. (2017).	Statistical	l Method	s, 45 th Ed.	Sultan Cl	nand & S	ons.		
3								l Methods		
4		neswari, T								
5								each, 3 rd Ec		
6								Systems,		
7	Nilsson,		larcourt, ((2000). A	rtificial I	ntelligen	ce: A Ne	w Synthe	esis, $2^{nd}E$	d.
	AsiaPTE									
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1	-			bmj/reso	urces-read	lers/publi	cations/s	tatistics-so	quare-one	2/11-
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6	https://ww	ww.sas.co	m/en_in/i	nsights/b	ig-data/wl	hat-is-big	-data.htm	h		
7	https://ww					48	10			
Cour	se Design	e <mark>d By: M</mark>	r.M.Vasu	devan, A	Asst. Profe	essor and	HOD of			
		M	icrobiolog	gy,Erode	Arts and S	Science C	College, E	rode		1
			100	Sea 20	Veri	fied By:]	Dr.G <mark>and</mark>	<mark>hima</mark> thi.I	R, Chairj	person
Mappi	ing with P	r <mark>ogramm</mark>	ne Outcor	nes	Cherry .	Line				
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	М	M	M	M	L	L	М
CO2	S	M	S	М	М	M	M	L	L	М
CO3	S	M	S	М	М	M	M	L	L	М
CO4	S	M	S	S	S	S	M	L	L	М
CO5	S	М	S	М	M	S	М	[Å [™] L	L	М
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*	S – Strong	; M - Me	dium; L –	Low			al			
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				DUCAT	oimbatore माळाए १ ६ TO ELE	VALE				

Course code	2PB		PRACTICAL – I	L	Т	Р	С
Allied – A			ATISTICS AND R APPLICATIONS)	-	-	2	2
problemsprovide ba	es: ves of this dents wit in microb asic know	Basic knowledge on F Computer Application Semester I and II. s course are to: h computer knowledge piology using MS-Exce	Bio-Statistics and ns gained during to draw various diagrams l. intelligence in Biological S		ion lving	-	21 -)22
Programs: The listed topics t exposure in the pa		ered under pr <mark>actical in 1</mark>	MS-Excel provided the st	udents l	nave p	rior	
1. Graphical Rep	oresentat	ion	a. Histogram b. Ogives c. Scatter diagram				
2. Diagrams	And A		a. Line diagram b. Bar diagram c. Pie diagram				
3. Measures of L	ocation	AR	a. Mean (Arithmetic, Ge b. Median c. Mode	ometric	and I	Harmo	nic)
4. Measures of D	visper <mark>sio</mark>	Constant of the second	 a. Range (max –min) b. Standard Deviation c. Variance d. Coefficient of variation e. Skewness 	on			
5. Correlation	9 49) S	RATHIAR	a. Karl Pearson's coeffic b. Spearman's Rank c. Coefficient of determi	S I			
6. Curve Fitting		Coimb	a. Linear Regression				
7. Parametric tes	sts	ூதி இந்தப்பான EDUCATE TO	a. Normal(z) b. t (Equal Variance) c. F d. Chi square				
8. (i) Implement managemen	nt tasks i	n Hadoop	a. Adding files and direcb. Retrieving filesc. Deleting files	etories			
ii) Benchmark Apache Hac							

	Scheme of Practical Examination	
Dur	ation : 3Hours Max.M	arks:25
Sl. No.	Program*	Marks
	I. Program (1 × 10 = 10 marks) From Programs 1 to 4 (Graphical Representation, Diagrams Measures of Location and Measures of Dispersion)	10
1	i. Algorithm 5 marks ii. Execution each	
	II. Program $(1 \times 10 = 10 \text{ marks})$ (From Programs 5 to 8 (Correlation, Curve Fitting, Parametric tests, Implement the following file management tasks in Hadoop and Benchmark and stress test an Apache Hadoop cluster)	10
2	i. Algorithm ii. Execution 5 marks each	10
3	III. Record	5
	Total Marks	25
expe sepa	tudents to be divided into batches (5 students / batch) in order to performents. Question setting to be done by internal and external examinarately for each batch.	
Cou	L.R.G. Government Arts College For Women, Tiruppur Mr.M.Vasudevan, Asst. Professor and HOD of Microbiology, Erode Arts and Science College, Erode	
	Verified By: Dr.Gandhimathi.R, Chai	rperson
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Course code 3ZA	DIAGNOSTIC	L	Т	P	С
Skill Based Subject – I	MICROBIOLOGY-I	2	1	-	3
Pre- requisite	Basic knowledge gained in the previous semester of this programme.	Sylla Vers		2021 202	
Course Objectives:					
The main objectives of t	his course are to:				
1 0	e about the collection and processing of clinical samp	ples.			
-	at the complete blood components and processing.				
• Acquire skills to	examine Urine, stool and sputum samples.				
Expected Course Outco	mes				
A	etion of the course, student will be able to:				
Enable to learn abo	but the collection, transport, preservation and procession	ing of			
clinical samples.	லக்கம்கு	U		X 3 &	K4
2 Gain insight about tissue specimens.	the complete blood components and processing of hu	ıman	1	X 3 &	K4
	amine urine sample.		I	X 3 &	K4
4 Learn laboratory te	chniques to examine stool samples.]	X 3 &	K4
	ry tract infections by examining sputum sample.			X 3 &	K4
K1 - Remember; K	2 - Understand; K3 - Apply; K4 - Analyze; K5 - Eval	luate; F	<u> X6 – (</u>	Create	
				0.77	
Unit–I	to a state of the	C(1.)		9 Hou	
& Pus.	transport and storage of specimens – Blood, Urine, S	Stool , 3	sputu	m, CS	F
cc T us.	Contraction and a second				
Unit–II				9 Hou	rs
Blood smear prepa	rations: Staining, blood smear examination	and	morph	nologia	cal
	ntial WBC count – Peripheral - Reticulocyte count-			-	
	Blood indices - Platelet count: BT, CT, CRT- Prothro	ombin	time,	A.P.P.	.Т,
FDP estimation.	AR UNIT S				
	Coimbatore			0.11	
Unit–III		•		9 Hou	
	e: Physical and chemical tests, microscopic examines examined tests – Diagnosis (Protocol Outline) of Urinary				ais,
custo, seumento, pregn	50/0275 75 100000 Outline) or Offiliary	tract II		/11.	
Unit–IV	- OGATE TO ELEVE			9 Hou	rs
	- Physical, Chemical and Microscopic examination ar	nd its s			
			0		
Unit–V				9 Hou	rs
T I I A A	tum: Microscopic examination – Diagnosis (P	rotocol	Ou	tline)	of
_	10ng (Linner and Lower)				
Examination of Spu Respiratory tract infect	ions (Upper and Lower).				
_	Total Lecture	Hours	4	5 Hou	irs
_		Hours	4	5 Hou	Irs
		Hours	4	5 Hou	irs

Medical laboratory techniques, Abdul Khader, (2003). 1stEd. Frontline Publications.

2

(2017). OrientLongman.

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Refe	rences									
1	Diagnostic	Microbio	ology, Ba	iley and S	Scott"s, (2	2013). 13	th Ed. The	Mosby C	Company.	
2	Talib. V.H							BS Publi	shers.	
3	James Cap	puccino.	Microbio	logy: A I	Laborator	y Manual	10^{th}Ed.			
4	Dubey, R.	C. & D.K	. Mahesh	wari. Pra	ctical Mi	crobiolog	y. S. Cha	nd & Co.		
Rela	ted Online	Content	S							
1	-	ww.youtu								
2		ww.youtu								
3	-	ww.youtu			Oy5uixdz	zJ_c				
4	https://w	ww.ndl.ii	tkgp.ac.ir	1 I						
	rse Designe	Bł M	narathidas [rs. M.M (san Colle eena <mark>kshi</mark>	ge of Art , Assistan lege of A	s and Scient The Profess	ence, Ero or of Mic cience Fo	de robiolog r Womer	n, Coimba	
Map	oing with P	rogramn	ne Outco	mes		nicu Dy.	Dittoui		int, chu	
COs	s PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO	l S	S	S	S	S	S	S	L	L	S
CO	2 S	S	S	S	S	S	S	L	L	S
CO.	3 S	S	S	S	S	S	S	L	L	S
CO4	4 🔥 S	S	S	S	S	S	S	L	L	S
CO	5 S	S	S	S	S	S	S	L	L	S

*S – Strong; M – Medium; L – Low

Course code	Course code 4ZB DIAGNOSTIC L T							
Skill Based Subje		MICROBIOLOGY-II	2	1	Р -	<u>C</u> 3		
Pre- requisite	bus sion							
Course Objectives: The main objectives		semester of this programme.						
-		ial pathogen by microscopic and physiological char	acteriz	ation				
•		tibiotic susceptibility and resistance pattern of path			esult			
interpretati			0					
-		lge about the Immunological and rapid diagnostic to						
 learn basi 	c Labora	atory techniques in mycology and diagnosis of para	sitic in	fectio	ns.			
Expected Course C	outcome	es:						
		n of the course, student will be able to:						
1Identify the tests from cli		l pathogen by microscopic observation and bioch nples.	nemica	I K	3&1	K4		
		c susceptibility testing and result interpretation.			3&1			
1		in Immunological and rapid diagnostic tests.			3&1			
		sis in mycology to identify fungal pathogens.			3&1			
5 Diagnose par		fections. Understand; K3 - Apply; K4 - Analyze; K5 - Evalu	atas VA		<u>3 & 1</u>	<u> </u>		
Unit–I	r; K 2 - 0	Understand, KJ - Appry, K4 - Anaryze, KJ - Evaru			eate Iours			
	acterial	pathogens – Microscopic examination of specimen	– sim		4	tial		
		chemical reaction – Sugar fermentation test.		p10, 01				
Unit–II		Trous good And		9 H	Iours			
Antimicrobial susc of results and inter		ty testing- Disc diffusion – Kirby Bauer method. M n.	IC, E t	est –r	eportir	ıg		
Unit–III			9	9 E	Iours			
Hemaaglutination Immunoelectoropl RadioimmunoAss	Preci- noresis ay (RIA	ntibody reactions – Agglutination (blood grouping pitation (VDRL), Immunodiffusion – (Mo (Rocket and Counter current). Advanced te) Quantitative study of Antigen – Antibody react Western blot analysis for HIV, RT-PCR for Covid	ono chniqu ions. I	and es –	Doub ELIS	le), SA,		
Unit–IV		aligner a will pop		9 H	Iours			
Laboratory methods in basic Mycology – Direct Microscopic examination of clinical specimens, culture media and incubation, Serological tests for fungi – Antifungal susceptibility testing. superficial infections – <i>Dermatophytes</i> – <i>Microsporum</i> – <i>Trichophyton</i> , <i>Epidermophyton</i> – <i>Madura</i> <i>mycosis</i> – Opportunistic fungal infections – <i>Aspergillus</i> and <i>Mucor</i> .								
Unit–IV 9 Hours								
Laboratory method	imen. Id	rasitic infections – Diagnostic techniques for faeca entification of Protozoa – Amoebiasis and Malaria. Ascariasis.				nd		
		Total Lecture Hours	4	5 Hou	rs			
Text books								
1 P.B. Godkar, Publication.	Text Bo	ok of Medical Laboratory Technology, 2 nd Ed. (200	3). Bha	alani				
References								
1 Diagnostic Mi	crobiolo	ogy, Bailey and Scott's, (2013). 13 th Ed. The Mosby	Compa	ıny.				

in the second

•	Ananthanarayanan R and CK Jayaram Panicker, Textbook of Microbiology, 10 th Ed.,									
2 (2017). OrientLongman.										
3	Medical laboratory techniques, Abdul Khader, (2003), 1 st Ed. Frontline Publications.									
4	Medical Parasitology, Rajesh Karyakarte, Ajit Damla, 2004. Books and Allied publishers.									
5	Textbook of Medical Parasitology, Subash O. Parija, (2013). 1 st Ed. All India Publishers									
5	and Distributors.									
6	Rajesh Karyakarte and Ajith Damle, (2005). Medical Parasitology, Books and Allied Pvt.Ltd									
Rel	ated Online Contents									
1	https://www.youtube.com/watch?v=uAmTgVvTUNk									
2	https://www.youtube.com/watch?v=KrpooZv5juo									
3	https://www.youtube.com/watch?v=Oy5uixdzJ_c									
4	https://sites.google.com/view/frejltsgqy/medical-mycology-lecture-notes-ppt									
5	https://www.dailymotion.com/video/x3eoujz									
(Course Designed By: Mr.P.Nallasamy, Asst. Professor in Microbiology									
	Bharathidasan College of Arts and Science, Erode									
	Mrs. M.Meenakshi, Assistant Professor of Microbiology,									
	Sri Ramakrishna College of Arts and Science For Women, Coimbatore									
	Verified By: Dr.Gandhimathi.R. Chairperson									

	Verified By: Dr.Gandhimathi.R, Chairperson									hairperson
Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	L	L	S
CO2	S	S	S	S	S	S	S	CL	L	S
CO3	S	S	S	S	S	S	S	CL	L	S
CO4	S	S	S	S	S	S	S	L	L	S
CO5	S	S	S	S	S	S	S	L	L	S

*S – Strong; M – Medium; L – Low

Course code	5ZC	INFECTIOUS DISEASES AND THEIR MANAGEMENT	L	Т	Ρ	С
Skill base	d Subject		3	-	-	3
Pre-requisite		Basic knowledge on Microbiology during the	Sylla	Syllabus 202		21
The requisite	Version 20)22		
Course Obje	ctives:					
The main of	ojectives of th	nis course are to:				
• Devel	lop knowledg	ge about epidemiological methods to investigate and m	anage	outb	reak	s.
• Apply health		of infectious disease epidemiology for the improv	vemen	ts in	pul	bli
• Becon	ne skilled at	the diagnosis of various infectious diseases.				
• Acqui	ire knowledg	ge about Immunization and Health programmes.				
Expected Co	urse Outcom	es:				
On the succe	ssful comple	tion <mark>of</mark> the co <mark>urse, student w</mark> ill be able to:				
1 Describ	e and diagno	ose respiratory infections.			КЗ	
2 Become	e skilled at t <mark>l</mark>	he diagnosis of intestinal infections.			КЗ	
3 Carry o	ut the dia <mark>gno</mark>	ostic procedures of vector borne infections.			К3	
4 Acquire	Acquire information about Health Programmes in our country.					
5 Be acq	Be acquainted with Immunization and Immunization programmes.					
K1 - Rememk	oer; <mark>K2</mark> - Und	<mark>ers</mark> tand; K3 - Apply; K4 - Analyze; <mark>K5 -</mark> Evaluate; <mark>K6 –</mark> C	reate			
Un	it–I Sa	10.	9 Hou	rs		
<u> </u>	Infections – ty and diagno	Bacterial pharyngitis – TB – Common cold – SAR osis.	RS –	Covi	d-19) –
Unit–I		Real Providence States		Hour		
	fections – A ty and diagno	cute diarrheal diseases – Cholera – ETEC – Typhoic osis.	l – Dy	sent	ery	_
Unit-		2 Contraction of the	9 H	lour	5	
	Infections – Infections – Infections – Infections	<mark>Valaria – Dengue – Chikungunya –</mark> Jap <mark>anese</mark> Enceph osis	alitis k	tala a	zar	-
	it–l		9 Hou	irs		
		dia – Programm <mark>es for Malaria</mark> control – TB control – A			_	
-		programmes.		-		
	it–l		9 Hou	irs		
Immunizatio	on – Brief	note on vaccines and vaccination - Immunization	n pro	gram	mes	; –
Universal Im		Program (UIP) – Immunization schedule in India.				
Universal III		•				

Text B	Books					
1	Ananthanarayanan R and CK Jayaram Panicker, (2017). Textbook of Microbiology 10 th Ed. Orient Longman.					
2	R. C. Dubey, D. K. Maheshwari. 2010. A Textbook of Microbiology. S. Chand Publication.					
Refere	ence Books					
1	K Park's Textbook of Preventive and Social Medicine 25 th Ed. Banarasidas Bhanot Publishers.					
2	David Greenwood, Richard C B Slack, Michael R. Barer, Will L Irving, (2012), Medical Microbiology, 18 th Ed. Elsevier Ltd.					
Related Online Contents						

பாத்திட வேச்

1	www.who.int/topics/vaccines/en/.									
2	https://www.mooc-list.com/course/global-disease-masterclass-communicable-diseases-									
2	epidemiology-intervention-and-prevention									
3	http://nhp	.gov.in/u	niversal-i	mmunisa	ition-pro	gramme_	pg			
4	https://nh	m.gov.in								
5	https://nh	p.gov.in								
6										
7	https://ma	in.mohfv	v.gov.in							
8	https://nco	dc.gov.in								
Cou	rse designe	ed by: Dr	.Gandhi	mathi.R.	, Assistar	nt Profess	sor of Mi	crobiolog	gy,	
			R.G. Gove			0				
			rs.C.L.Sh	·	•				obiology	
		Tir	uppur Ku	ımar <mark>an C</mark>	_					
				-	Veri	fied By:	Dr.Gand	lhimathi	.R, Chai	rperson
Mapp	ing with Pr	ogramm	e Outcor	nes		-24D				
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	L	L	S
CO2	S	S	S	S	S	S	S	L	L	S
CO3	S	S	S	S	S	S	S	L	L	S
CO4		S	S	S	S	S	S	L	L	S
CO5	S	S	S	S	S	S	S	L	L	S

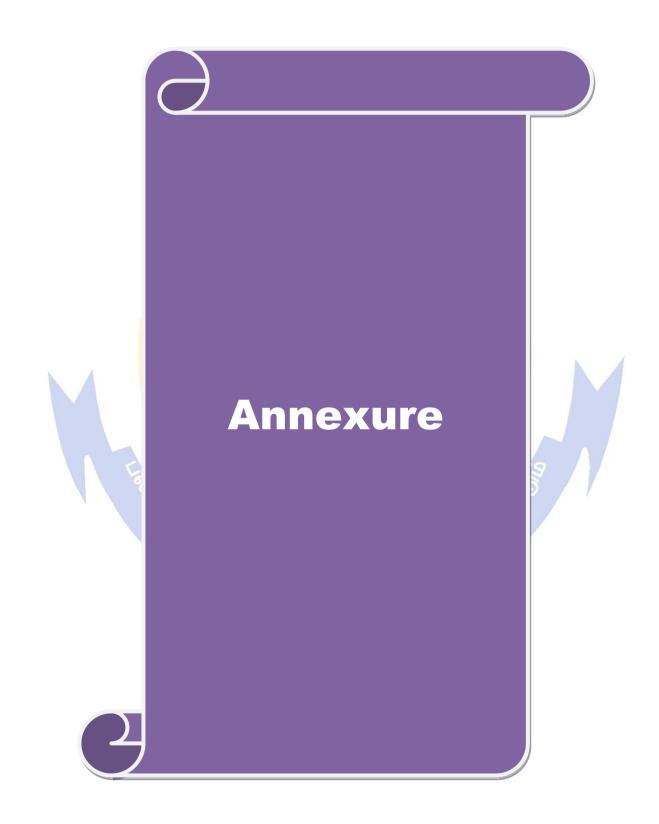
*S – Strong; M – Medium; L – Low

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Course code 6ZE		L	Т	Р	С					
Skill Based Subject	t SKILL BASED SUBJECT PRACTICAL	-	-	3	3					
Dro roquisito	Knowledge in practical and theory gained									
Pre- requisite	from previous years of this programme.	Version 202								
Course Objectives:										
The main objectives	of this course are to:									
• Acquire skill on collection and processing of clinical specimens.										
• Gain knowled	lge on various serological techniques.									
• Get accustom	ed to immunological techniques involved in diagnos	sis.								
• Visualize diff	erent types of infectious fungi.									
Experiments										
-	ansport, processing of specimen and Identification o	f bact	eria							
	specimens –Urine, Blood, Sputum, Pus and Faeces.									
	ation – Blood grouping									
	ation – WIDAL									
4. Precipitation	- RPR									
5. Immunodiffu	sion – Radial and Ouchterlony's									
6. Immunoelect	rophoresis – Rocket and Counter current									
7. ELISA										
8. SDS–PA <mark>GE</mark>										
	of fungi – LCB and KOH mount									
10. Observation of	of representative forms of Parasites – Entamoeba, P	<mark>lasm</mark> e	odium,	Asca	ris.					
References										
1 James Capput	ccino. Microbiology: A Laboratory Manual 10 th Ed.									
2 William Clau	William Claus. G.W. (1989). Understanding Microbes – A Laboratory textbook for									
² Microbiology	Microbiology, W.H. Freeman and Co., New York.									
2 Wilson. K and	l Goulding. K.H, (1986). A Biologist's Guide to Prin	nciple	s and T	Techr	niques					
	liochemistry, ELBS, London.		3		-					
	& D.K. Maheshwari. Practical Microbiology. S. Cha	nd &	Co	1						
	996). Laboratory Manual in General Microbiology.	143								
Paramount P	ublication, Palani.									
G Tiwari, G.	S. Hoondal, (2005). Laboratory Techniques	In M	licrobi	ology	/					
6 And Biotechn	ology. Swastik publishers.									
	aboratory Manual of Microbiology and Biotechnology	ogy, (2018).]	ED-T	ECH					
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	Scheme of Practical Examinat	ion						
Dura	tion : 6 Hours		Max. Marks: 45					
Sl. No.	Experiment*	Marks						
	I. Major experiment (1 × 15 = 15 Marks)							
1	i. Procedureii. Performanceiii. Result and Discussion	5 marks each	15					
	II. Minor experiment (1× 10 =10 Marks)							
2	i. Procedure and Performance ii. Result and Discussion	5 marks each	10					
	III. Spotters (5 × 3 =15 Marks)	312						
3	i. Identification ii. Description	1 mark 2 marks	15					
4	IV. Record	19.	5					
	То	tal Marks	45					
exper	idents to be divided into batches (5 students / batches) riments. Question setting to be done by internal rately for each batch.							
Course designed by: Mrs. M.Meenakshi, Assistant Professor of Microbiology, Sri Ramakrishna College of Arts and Science For Women, Coimbatore Mrs.C.L.Shathiyaa Priyaa, Assistant Professor of Microbiology Tiruppur Kumaran College For Women, Tiruppur								
	Verified By: Dr.Gandhimathi.R, Chairperson							
	EDUCATE TO ELEVATE							



BHARATHIAR UNIVERSITY, COIMBATORE – 641 046

UG -MICROBIOLOGY MISSION

The mission of the programme is to;

- Create an awareness on "the wonderful microbial world"
- Impart knowledge on the integral role of microbiology in the science of life.
- Inculcate theoretical knowledge on the various applied fields of microbiology.
- Facilitate acquisition of technical skills through practical and institutional training.
- Develop the students to acquire suitable career opportunities.
- Encourage entrepreneurship.
- Develop confidence and leadership along with team spirit.
- Nurture them towards self, national and global development.

