RCS – 2021

NEHRU ARTS AND SCIENCE COLLEGE

An Autonomous Institution affiliated to Bharathiar University
(Reaccredited with "A" Grade by NAAC, ISO 9001:2015 & 14001:2004 Certified
Recognized by UGC with 2(f) &12 B, Under Star College Scheme by DBT, Govt. of India)
Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105, Tamil Nadu.

REGULATIONS, CURRICULUM & SYLLABUS

B. Sc. MICROBIOLOGY

Effective from 2021 – 2022

REGULATIONS

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Programme: Microbiology

PROGRAM EDUCATIONAL OBJECTIVES

After 3 years of the programme, the graduates are expected to attain

PEO 1	To impart basic knowledge and skills to integrate principles of microbiology to achieve academic excellence
PEO 2	To train the students for industrial need and to pursue higher education
PEO 3	To develop the research skills to conduct research in the thrust areas of microbiology to benefit the society
PEO 4	To emphasize on hands on training
PEO 5	To inculcate entrepreneurship among the students so as to start their own ventures in the field of microbiology and shall be able to develop networking and entrepreneurship skills and establish links with industry

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PROGRAM SPECIFIC OUTCOME:

B. Sc. (Microbiology)

Upon completion of B. Sc. Microbiology programme, the students will be able to

PSO 1	Perform the basic techniques related to screening, isolation and cultivation of microorganisms from various sources.
PSO 2	Study the microorganism with regard to morphology, cultural, and biochemical characters. It will help to classify the microbes to certain extent.
PSO 3	Follow the aseptic techniques and conduct the process of sterilization as well as perform the techniques to control the microorganism
PSO 4	Study of the innate and adaptive immune system regulating the defense against microbial infections, microbial strategies to evade the immune response of the host organism.
PSO 5	Understand microorganisms and their relationship with the environment and their genetic principles with basic mechanism of biological processes.

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PROGRAMME OUTCOMES

PO1	**Critical Thinking**	Develop a systematic, critical approach to problem solving at all levels and apply the domain specific knowledge to form conclusions based on quantitative information to meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO2	**Usage of Technology**	Equip the students to meet the industrial needs by utilizing tools and technologies for Peer Communication, Data Interpretation and Problem-Solving aspects.
PO3	**Effective Communication**	Develop language competence and be proficient in oral and written communication with a focus on LSRW.
PO4	**Environment and Sustainability**	Understand the consequential responsibilities to analyze and realise the interactions between social and environmental sustainability procedures and create processes.
PO5	**Individual and Team Work**	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings and manifest the best outcomes.
PO6	**Ethics and Values**	Acquire life skills to become a better human being and apply ethical principles and commit to professional ethics and responsibilities.
PO7	**Social Interactions**	Participate actively in initiatives that encourage equity and growth for all and to act with an informed awareness of local, regional, national and global needs,
PO8	**Life Long Learning**	Engage in lifelong learning and Work on career enhancement and adapt to changing personal, professional and societal needs.

CURRICULUM

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Scheme of Examination

B. Sc. Microbiology

(Applicable to the students admitted during the academic year 2021-2022 onwards)

Semester	Part	Course Code	Name of the Course	Instruction hours / week	Duration of Examination	Examination Marks			Credits
						CIA	ESE	Total	
I	I	21U1TAM101/ 21U1HIN101/ 21U1MAL101/ 21U1FRN101	Language – I	5	3	50	50	100	4
	II	21U2ENG101	English – I	5	3	50	50	100	4
	III	21U3MBC101	Core Paper I – Fundamentals of Microbiology	4	3	50	50	100	4
		21U3MBC102	Core Paper II – Cell Biology	4	3	50	50	100	4
		21U3MBP204	Core Paper IV – Lab in Fundamentals of Microbiology and Cell Biology	3	-	-	-	-	-
		21U3BYA101	Allied Paper I – Biochemistry I	4	3	30	45	75	3
		21U3BYP203	Allied Paper III – Lab in Biochemistry	2	-	-	-	-	-
	IV	21U4ENV101	Ability Enhancement Compulsory Course – Environmental Studies	2	3	50	-	50	2
		21U4HVY201	Value Education – Human Values and Yoga Practice – I	1	-	-	-	-	-
	Sub Total			**30**				**525**	**21**
II	I	21U1TAM202/ 21U1HIN202/ 21U1MAL202/ 21U1FRN202	Language – II	5	3	50	50	100	4
	II	21U2ENG202	English – II	5	3	50	50	100	4
	III	21U3MBC203	Core Paper III – Microbial Diversity	4	3	50	50	100	4
		21U3MBP204	Core Paper IV – Lab in Fundamentals of Microbiology and Cell Biology	5	3	50	50	100	4
		21U3BYA202	Allied Paper II – Biochemistry II	4	3	30	45	75	3
		21U3BYP203	Allied Paper III – Lab in Biochemistry	4	3	25	25	50	2
	IV	21U4HRC202	Ability Enhancement Compulsory Course – Human Rights and Constitution of India	2	3	50	-	50	2
		21U4HVY201	Value Education – Human Values and Yoga Practice – I	1	2	50	-	50	2
	Sub Total			**30**				**625**	**25**
III	I	21U1TAM303/ 21U1HIN303/ 21U1MAL303/ 21U1FRN303	Language – III	5	3	50	50	100	4

	II	21U2ENG303	English – III	5	3	50	50	100	4
	III	21U3MBC305	Core Paper V – Microbial Physiology and Metabolism	4	3	50	50	100	4
		21U3MBP407	Core Paper VII – Lab in Microbial Physiology, Genetics and Molecular Biology	3	-	-	-	-	-
		21U3CNA304	Allied Paper IV –Fundamentals of Computer Applications	3	3	30	45	75	3
		21U3CNR406	Allied Paper VI – MS Office Practical	2	-	-	-	-	-
	IV	21U4MBS301	Skill Based Paper I – Fundamentals of Bioinformatics	3	3	30	45	75	3
		21U4NM3BT1/ 21U4NM3AT1/ 21U4NM3CAF/ 21U4NM3GTS/ 21U4NM3WRT	# @Basic Tamil – I ##Advanced Tamil – I * NME: Consumer Affairs Gandhian Thoughts Women's Rights	2	2	50		50	2
		21U4MB3ED1/ 21U4MB3ED2	Extra Departmental Course	2	3	-	50	50	2
		21U4HVY402	Value Education: Human Values and Yoga Practice II	1	-	-	-	-	-
		21U4MBVALC	Skill Enhancement Add on course – Institute Industry Linkage	-	-	-	-	-	-
	Sub Total			**30**				**550**	**22**
IV	I	21U1TAM404/ 21U1HIN404/ 21U1MAL404/ 21U1FRN404	Language – IV	5	3	50	50	100	4
	II	21U2ENG404	English – IV	5	3	50	50	100	4
	III	21U3MBC406	Core Paper VI - Microbial Genetics and Molecular Biology	4	3	50	50	100	4
		21U3MBP407	Core Paper VII – Lab in Microbial Physiology, Genetics and Molecular Biology	4	3	50	50	100	4
		21U3MTA405	Allied Paper –V Biostatistics	3	3	30	45	75	3
		21U3CNR406	Allied Paper VI – MS Office Practical	2	3	25	25	50	2
	IV	21U4MBS402	Skill Based Paper II – Biofertilizers and Biopesticides	4	3	30	45	75	3
		21U4NM4BT2/ 21U4NM4AT2/ 21U4NM4GEN	# @Basic Tamil - II ##Advanced Tamil - II General Awareness	2	3	50		50	2
		21U4HVY402	Value Education: Human Values and Yoga Practice - II	1	2	50	-	50	2
		21U4MBVALC	Skill Enhancement Add on course – Institute Industry Linkage	-	-	-	-	-	Grade
	Sub Total			**30**				**700**	**28**
V	III	21U3MBC508	Core Paper VIII–Environment and Agricultural Microbiology	4	3	50	50	100	4
		21U3MBC509	Core Paper IX – Industrial Microbiology	4	3	50	50	100	4
		21U3MBC510	Core Paper X– Medical Microbiology and Immunology	5	3	50	50	100	4
		21U3MBP613	Core Paper XIII – Lab in Environmental, Agricultural and Food Microbiology	5	-	-	-	-	-
		21U3MBP614	Core Paper XIV – Lab in Industrial, Medical Microbiology and Immunology	5	-	-	-	-	-

		21U3MBE501/ 21U3MBE502/ 21U3MBE503	Discipline Specific Elective Paper I	4	3	50	50	100	4
	IV	21U4MBS503	Skill Based Paper III – Management of Human Microbial Diseases	3	3	30	45	75	3
				30				**475**	**19**
VI	III	21U3MBC611	Core Paper XI – Recombinant DNA Technology	4	3	50	50	100	4
		21U3MBC612	Core Paper XII – Food and Diary Microbiology	4	3	50	50	100	4
		21U3MBP613	Core Paper XIII – Lab in Environmental, Agricultural and Food Microbiology	5	6	50	50	100	4
		21U3MBP614	Core Paper XIV – Lab in Industrial, Immunology and Medical Microbiology	5	6	50	50	100	4
		21U3MBE604/ 21U3MBE 605/ 21U3MBE 606	Discipline Specific Elective Paper II	4	3	50	50	100	4
		21U3MBE607 / 21U3MBE608/ 21U3MBE609	Discipline Specific Elective Paper III	4	3	50	50	100	4
	IV	21U4MBZ604	Skill Based Paper IV – Lab in rDNA Technology	4	3	30	55	75	3
	V	21U5EXT601	Extension Activities	-	-	50	-	50	2
	Sub Total			**30**				**725**	**29**
	Total							**3600**	**144**
	Additional Credit (Optional)			**Semester II-VI**					**8$**

 # Basic Tamil -Students who have not studied Tamil upto 12th standard.
##Advance Tamil – Students who have studied Tamil language upto 12th standard and chosen other languages under part I of the programme but would like to advance their Tamil language skills.
*** NME** – Student shall choose any one course out of three courses.
@ No End Semester Examinations. Only Continuous Internal Assessment (CIA)
$ - Not included in Total marks & CGPA Calculation

LIST OF DISCIPLINE SPECIFIC ELECTIVE PAPERS:

Discipline Specific Elective Papers	Course code	Group	Name of the Course
Discipline Specific Elective Paper I / Sem. V	21U3MBE501	**A**	Microbial Biotechnology
	21U3MBE502	**B**	Soil Microbiology
	21U3MBE503	**C**	Advances in Microbiology
Discipline Specific Elective Papers II I/Sem. VI	21U3MBE604	**A**	Biosafety and Intellectual Property Rights (IPR)
	21U3MBE605	**B**	Plant Pathology
	21U3MBE606	**C**	Microbial Quality Control in Food and Pharmaceutical Industries
Discipline Specific Elective Papers III /Sem. VI	21U3MBE607	**A**	Nanobiotechnology
	21U3MBE608	**B**	Microbiology and Entrepreneurship
	21U3MBE609	**C**	Microbial Diagnosis in Health Clinics

Extra Departmental Course

S. No.	Course Code	Name of the Course
1	21U4MB3ED1	Mushroom Cultivation Technology
2	21U4MB3ED2	Vermitechnology

Self-Study Paper offered by Microbiology Department

S. No.	Semester	Course code	Course Title
1	Semester II to V	21UMBSS01	Solid Waste Management
2		21UMBSS02	Human Anatomy and Physiology

Chairman
Board of Studies in Microbiology
Nehru Arts and Science College
Coimbatore

SYLLABUS

SEMESTER – I

Course Code	Title		
21U1TAM101	Part I – Tamil - I		
Semester : I	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

(Common to all UG Programmes)

Course Objective: மொழி இலக்கியத்தின் வாயிலாக அறம் சார் பண்பு மற்றும் ஆளுமை மிக்க மாணவர்களை உருவாக்குதல்

Course Outcomes :

CO1	தமிழ் இலக்கியங்கள் வாயிலாக சமூகச் சீர்திருத்தச் சிந்தனைகள் பெறப்படும்.
CO2	அற இலக்கியங்களின் வழி தமிழர்களின் வாழ்வியல் பண்புகளைக் கற்று அறிதல்.
CO3	பெண்ணியக் கவிஞர்களின் படைப்புத் திறனை மாணவர்களுக்கு உணர்த்துதல்
CO4	சிறுகதைகளின் வழி சமூக கருத்துகளை மாணவர்களுக்கு அறிவுறுத்தல்
CO5	தமிழ் இலக்கிய வரலாற்றுத் திறனை வளர்த்தல்

Offered by : தமிழ்த்துறை

Unit	Description
I	சங்க இலக்கியம் ஐங்குநூறு ___ கிள்ளைப்பத்து (281-290) பாடல்கள் பதிற்றுப்பத்து ___ இரண்டாம் பத்து (11 -15 ஐந்து பாடல்கள்) பத்துப்பாட்டு ___ முல்லைப்பாட்டு - முல்லைப்பாட்டு முழுவதும் (1-103 வரிகள்) சிறுபாணாற்றுப்படை ___ சேரநாட்டின் வளமை
	Instructional Hours 15
II	அற இலக்கியம் - நீதிநூல்கள் அறன் வலியுறுத்தல் - (31-40 குறட்பாக்கள்) புகழ் - (231 - 240 குறட்பாக்கள்) வாய்மை - (291 - 300 குறட்பாக்கள்) நாலடியார் - பொருட்பால் 11 ஆவது அதிகாரம் (கூடா நட்பு 1 - 10) நான்மணிக்கடிகை - முதல் ஐந்து பாடல்கள்
	Instructional Hours 15
III	பெண்ணியம் ஏச்சி வாழ்க்கை ___ ஆண்டாள் பிரியதர்சனி (சுயம் பேசும் கிளி) தொட்டிச்செடி ___ கவிஞர் இளம்பிறை அம்மா ___ சுகிர்தராணி நீரில் அலையும் முகம் - அ.வெண்ணிலா
	Instructional Hours 15
IV	சிறுகதைகள் குட்டி ரேவதி ___ நிறைய அறைகள் உள்ள வீடு ஜெயமோகன் - யானை டாக்டர் ச.தமிழ்ச்செல்வன் - வெயிலோடு போய் வண்ணநிலவன் - எஸ்தர் உமா மகேஸ்வரி - மரப்பாச்சி
	Instructional Hours 15
V	தமிழ் - இலக்கிய வரலாறு புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும் சிறுகதையின் தோற்றமும் வளர்ச்சியும் படிமம் குறியீடு பற்றிய ___ விளக்கம்
	Instructional Hours 15
	Total Hours 75

இளங்கலை முதலாம் ஆண்டு தமிழ் மாணவர்களுக்குரிய பாடநூல்"இளந்தளிர்" தொகுப்பு: தமிழ்த்துறை ,நேரு கலை மற்றும் அறிவியல் கல்லூரி, கோயம்புத்தூர்

பார்வை நூல்கள்

1. ஐங்குநூறு - உரையாசிரியர் ஔவை துரைசாமிப்பிள்ளை, பதிப்பாசிரியர்கள் முதுமுனைவர் இரா.இளங்குமரனார், முனைவர்.பி.தமிழகன் தமிழ் மண் அறக்கட்டளை, சென்னை.17
2. திருவள்ளுவர் ___ திருக்குறள் பரிமேலழகர் உரை, சாரதா பதிப்பகம், ஐ ___ 4 சாந்தி அடுக்ககம், ஸ்ரீ கிருஷ்ணாபுரம் தெரு, இராயப்பேட்டை, சென்னை___ 014
3. ஆண்டாள் பிரியதர்ஷினி ___ சுயம் பேசும் கிளி கவிதைத் தொகுப்பு, ராகவேந்திரா வெளியீடு 163 2 பொன்விழா அச்சகம், பொன்னி வெளியீடு, பாக்குட்டசாலை, அண்ணாநகர், சென்னை.
4. கவிஞர் இளம்பிறை ___ தொட்டிச்செடி, பொன்னி வெளியீடு, சென்னை - 91 சுகிர்தராணி ___ தீண்டப்படாதமுத்தம், காலச்சுவடு பதிப்பகம், நாகர்கோயில்.
5. அ.வெண்ணிலா ___ நீரில் அலையும் முகம் முதல் கவிதைத் தொகுப்பு ___ 2000 தமிழண்ணல் - புதியநோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை ___625 001.
6. நிறைய அறைகள் உள்ளவீடு - குட்டிரேவதி எழுத்து பிரசுரம்
7. மாடல் நகர் 10 வதுவீதி, சென்னை.
8. யானை டாக்டர் - ஜெயமோகன் வம்சி பதிப்பகம் நியு செஞ்சுரி புக்கவுஸ் சென்னை.
9. வெயிலோடு போய் - ச.தமிழ்ச்செல்வன் சிறுகதைகள் தொகுப்பு பாரதி புத்தகாலயம் 7
10. இளங்கோ சாலை சுப்பராயன் நகர் சென்னை

எஸ்தர் - வண்ணநிலவன் சிறுகதைகள், நற்றிணைப் பதிப்பகம், 172, ஆர்கட் ரோடு, கன்னினாபுரம் வடபழனி

11.மரப்பாச்சி ___ உமா மகேஸ்வரி, தமிழினி பதிப்பகம், 342 டி.டி.கே சாலை, சென்னை.14

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Seminar	Assignment	Group Project	Total
8	8	10	8	8	8	50

Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	-	H	H	M	H	-	-	-	-	-
CO2	-	-	M	-	H	L	H	H	-	-	-	-	L
CO3	-	-	L	-	M	M	H	H	-	-	-	L	-
CO4	-	-	H	-	H	M	M	L	-	-	-	-	L
CO5	-	-	H	-	H	L	H	H	-	-	-	-	-

H-High; M-Medium; L-Low;

Course Designed by	Verified by	Checked by	Approved by
30/3/22 (Dr. A. Sridevi)	30/3/22 (Dr. A. Sridevi)		

CDC

30 MAR 2022

Course Code	Title		
21U1HIN101	PART – I : HINDI - I		
Semester : I	Credits:4	CIA : 50 Marks	ESE : 50 Marks

(Common to all UG Programmes)

कोर्स लक्ष्य रू छात्रदृछात्राओं में रा ट्रीय भावना का विकास करना तथा रा ट्रभा ाा हिंदी एवं उससे संबंधित साहित्य की जानकारी प्रदान करना

कोर्स परिणाम रू

CO1	सामाजिक, सांस्कृतिक और राजनैतिक परिवेष से छात्र. साहित्य के माध्यम से बोधवान होंगे।
CO2	व्याकरण के षिक्षण के माध्यम से छात्रों में ुद्ध भा ाा में बोलने की क्षमता को विकसित होगी।
CO3	अंतर्रा ट्रीय भा ाा अंग्रेज़ी से रा ट्रभा ाा हिंदी में सामग्री का अनुवाद करके छात्र हिंदी की ज्ञान संपदा बढ़ाने में कामयाब होंगे।
CO4	विविध अनुषासनों में अनुवादों को सुचारु बनाने के लिए पारिभा िक ांदावली का ज्ञान होगा।
CO5	विद्यार्थी विन्दी में अच्छा बोल सकें गे।

Offered by : Hindi Department

अध्ययन विषयिस्तु **ननर्देशात्मक घंटे / सप्ताह: 5**

इकाई	विि र ण	
I	लडाईदृसर्वष्वरदयाल सक्सेना	
	निर्देशात्मक घंटे	**20**
II	एकांकी संग्रह दृ 1. षिवाजी का सच्चा स्वअप (सेठ गोविन्ददास) 2. माँ (वि णु प्रभाकर) 3. 'ोंसले 4. रीढ़ की हड्डी (जगदीषचन्द्र माथुर) 5. वसपाि ी की माँ. मोि न राके श	
	निर्देशात्मक घंटे	**20**
III	व्याकरण रू संज्ञा, सर्वनाम, विषे ाण, क्रिया, वचन, लिंग, काल, वाच्य, प्रत्यय, उपसर्ग, 'ने' का प्रयोग	
	निर्देशात्मक घंटे	**15**
IV	अनुवाद रू अंग्रेज़ीदृहिंदी (अनुवाद अभ्यासदृ3) (1.15द्ध	
	निर्देशात्मक घंटे	**10**
V	**पारिभा िक ांदावली**	
	निर्देशात्मक घंटे	**10**

कुल घंटे 75

पाठ्यपुस्तकअ

1. **लडाई** रू सर्वेष्वरदयाल सक्सेना
2. एकांकी संग्रह
3. अनुवाद अभ्यासदृ3, दक्षिण भारत हिंदी प्रचार सभा, चेन्नैदृ17.
4. आलेखन व टिप्पणी

संदर्भ ग्रंथ रू

1. डॉ. एन.ई. विष्वनाथ अ'यर, अनुवाद कला, पलिषर, संस्करण 2000
2. भोलानाथ तिवारी, अनुवाद विज्ञान, संस्करण 2000
3. रामदेव, व्याकरण प्रदीप। प्रकाषन रू हिंदी भवन, 36, टागौर टाउन, इलहाबाद दृ2
4. नूतन ग4 संग्रह, सुमित्रा प्रकाषन, सुमित्रा निवास, 16/4 हास्टिंग्स रोड, इलहाबाद दृ211 001. संस्करण 2006

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Project	Total
8	8	10	8	8	8	50

Mapping

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	-	L	M	M	-	-	-	-	-	-
CO2	-	-	M	-	L	M	H	-	-	-	-	-	L
CO3	-	-	M	-	M	H	L	-	-	-	-	-	L
CO4	-	-	H	-	-	M	-	-	-	-	-	-	-
CO5	-	-	M	-	-	-	H	-	-	-	-	L	-

H-High; M-Medium; L-Low

Course Designed by	Verified by HoD	Checked by	Approved by
30.5.22	30.5.22	CDC	30 MAR 2022

Course Code	Title		
21U1MAL101	Part - I : Malayalam - I		
Semester : I	Credit : 4	CIA : 50 Marks	ESE : 50 Marks

(Common to all UG Programmes)

Course Objective : ആധുനികാലത്തെ മലയാളകഥകത്തള കുറിച്ുംും രത്തെ സുംGാ കുറിച്ുംും അവബഃാധും ഉണ്ടാക്കുന്നു

Course Outcomes:

CO1	കഥ യുത്തെ സുംബവദനും ആസവാദകന്ത്തറ അഭിരുചിത്തയ പൂർൊിയാക്കുന്നു
CO2	പ്പകൃതിയുമായി ഃന്ധത്തെൊുന്ന കഥാപരിസരും
CO3	ഭക്ഷണവും അ്ത്തിന്ത്ത് റ സുംGാക രവും കൂട്ടായ്മ ഉണ്ടാക്കുന്നു
CO4	ഭക്ഷണിന്ത്തറ മൂലയും അർത്ഥവൊക്കുന്നു
CO5	ആശയ വിപുലനും

Offered by : Malayalam Department

Course Content **Instructional Hours/Week: 5**

Unit	Description	
I	ത്തചറുകഥകൾ - സമകാല കഥകൾ	
	Instructional Hours	**15**
II	ത്തചറുകഥകൾ - സമകാല കഥകൾ	
	Instructional Hours	**15**
III	സുംGാക ര പഠനും	
	Instructional Hours	**15**
IV	സുംGാക ര പഠനും	
	Instructional Hours	**15**
V	ഉപനയാസും, വിവർൊനും, ആശയവിപുലനും	
	Instructional Hours	**15**
	Total Hours	**75**

പാഠപുGകങ്ങൾ :

1. ത്തചറുകഥകൾ - സമകാല ത്തചറുകഥകൾ (10 ത്തചറുകഥകൾ)
2. സുംGാ ര പഠ നും ബകരള ഭക്ഷണിനത്ത റ സുംGാ രചരിപ്പ്ും ബ ാ.സി. ഗബണഷ്, ി.സി.ഃുക്്സ ബകാട്ടയും

സഹായകപ്പന്ഥങ്ങൾ :

1. എും അചയുതൻ - ത്തചറുകഥ ഇന്നത്തല ഇന്ന് - ി.സി.ഃുക്്സ ബകാട്ടയും
2. എരുബമലി പരബമശവരൻ പിള്ള - മലയാള സാഹിതയും കാലഘട്ടങ്ങളിലൂത്തെ - ി.സി.ഃുക്്സ ബകാട്ടയും
3. പുതിയ കഥ പുതിയ വായന - എ ി : ബ ാ.ഷീഃാ ബലാകും ദിവാകരൻ പുGകസദ്ധീകരണും

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Group Project	Total
8	8	10	8	8	8	50

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	M	H	H	-	-	-	-	-	-	-
CO2	-	-	H	L	H	M	-	-	-	-	-	L	L
CO3	-	-	-	M	M	H	-	-	-	-	L	-	-
CO4	-	-	L	M	L	H	-	-	-	-	-	L	-
CO5	-	-	L	-	H	-	-	-	-	-	-	-	-

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by
Rajani 30/3/22 RAJANI K	Rajani 30/3/22 RAJANI K	(Dr. K. Selvirayaki)	30 MAR 2022

Course Code	Title		
21U1FRN101	Part - I : French - I		
Semester : I	Credits : 4	CIA : 50 Marks	ESE: 50 Marks

(Common to all UG Programmes)

Course Objective:

Acquisition of standard French through fundamental French grammar.

Course Outcomes:

Students will be able to

CO1	Learn basic French grammar along with French civilisation
CO2	Know the gender of nouns
CO3	Learn Negation, articles and understand the usage of preposition.
CO4	Learn Futur proche, Pronominal verb,
CO5	Know to self introduce and translate simple sentences.

Offered by : French Department

Course Content **Instructional Hours/Week : 5**

Unit	Description	
I	Mes cinq sens en action	
	Instructional Hours	**15**
II	S'ouvrir aux autres	
	Instructional Hours	**15**
III	Partager son lieu de vie	
	Instructional Hours	**15**
IV	Vivre au quotidien	
	Instructional Hours	**15**
V	S'ouvrir a la culture	
	Instructional Hours	**15**
	Total Hours	**75**

Text Book :

1. Saison 1 Méthode de Français – Marie-Noëlle Cocton, Anouchka De Oliveira, Dorothée Dupleix

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Group Project	Total
8	8	10	8	8	8	50

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	M	-	L	-	H	M	-	-	-	-	-
CO2	-	-	H	-	-	L	L	-	-	-	-	L	-
CO3	-	-	H	-	L	-	H	-	-	-	L	L	-
CO4	-	-	H	-	-	L	M	M	-	-	-	-	L
CO5	-	-	M	-	M	-	M	M	-	-	-	-	-

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by
30/3/22 Ms. Abirami M	30/3/22 Ms. Abirami. M	30/3/22 Dr. K. Selvavinayaki Convenor CDC	30 MAR 2022

Course Code	Title		
21U2ENG101	Part II - English I		
Semester : I	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

(Common to All UG Programmes)

Course Objective:

To help students to imbibe, develop, practice and use the LSRW skills and fine tune their productive skills.

Course Outcomes:

CO1	Recognize listening, and reading proficiency through the prose discourses.
CO2	Use and interpret imaginative, and creative skills through the poetic genre.
CO3	Enhance the students to use English effectively through short story.
CO4	Execute and exercise grammatical skills in academics and career.
CO5	Evaluate the LSRW skills through literature.

Offered by : English department

Course Content **Instructional Hours / Week : 5**

Unit	Description	Text Book	Chapter
I	**Prose** **Leigh Hunt** – Getting Up On Cold Morning **Rajagopalachari** – Tree Speaks **Swami Vivekananda** – The Secret of Work	1	1-3
	Instructional Hours		**15**
II	**Poetry** **D.G Rossetti** – The Blessed Damozel **Maya Angelou** -Phenomenal Women **A. K. Ramanujan** – A River	1	4-6
	Instructional Hours		**15**
III	**Short Stories** **O. Henry** – The Last Leaf **R. K. Narayan** – The Missing Mail **Oscar Wilde** - The Happy Prince	1	7-9
	Instructional Hours		**15**
IV	**Grammar and Vocabulary** **Parts of Speech** Tenses – Present, Past, Vocabulary of the specific domain, Punctuations, Kinds of Sentences.	1	10-13
	Instructional Hours		**15**

V	**Oral & Written Communication** **Listening** : (UNIT I – IV) **Listening** – Comprehension practice from Poetry, Prose, Short-stories, observing / viewing E-content (with subtitles), Guest / Invited Lectures, Conference / Seminar Presentations & Tests and DD National News Live, BBC, CNN, VOA etc **Speaking** – In a Group Discussion Forum, speak about Tongue Twisters, Critical Thinking, and Seminar Presentations on Classroom-Assignments, and Peer-Team interactions. **Reading** – Pronunciation practice and enhancement from Poetry, Prose, Short-stories, Magazines, News Paper etc **Writing** – Asking & Giving Directions/Instructions, Developing Hints, and Filling Forms.	1	14-17
		Instructional Hours	**15**
		Total Hours	**75**

Books for study:

Unit I – V : Compiled by the PG & Research Department of English

Books for Reference:

1. CLIL (Content & Language Integrated Learning) – Module by TANSCHE NOTE: (Text: Prescribed chapters or pages will be given to the students by the department and the college)

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Speaking	Reading	Total
8	8	10	8	8	8	50

Mapping

COS / POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	-	H	H	M	M	H	H	-	-	-	-	-
CO2	H	-	H	H	M	H	H	H	-	-	-	-	H
CO3	H	-	H	M	H	H	H	H	-	H	-	-	H
CO4	H	L	H	M	H	H	H	H	-	-	-	-	H
CO5	H	L	H	H	H	H	H	H	-	-	-	-	H

H-High; M-Medium; L-Low

Course Designed by	Verified by HoD	Checked by	Approved by
Dr. M. Devendiram	Dr. R. Malathi	(Dr. K. Selvavinayagi) Convener CDC	30 MAR 2022

Course Code	Title		
21U3MBC101	Core Paper I – Fundamentals of Microbiology		
Semester : I	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

Course Objective:

This subject aims to introduce the history and development of Microbiology. The contents of this course will help students understand history, biology of microorganisms, growth and control of microbes. Thus the beginners are rightly exposed to foundation of Microbiology which would lead them towards progressive advancement of the subject.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Get an idea about the historical events and diversity in Microbiology
CO2	Understand different types and principle techniques in Microscopy
CO3	Understand different methods of staining and culture techniques
CO4	Acquaint with various sterilization techniques and use various method to control microbes
CO5	Describe the Estimation, Maintenance and Preservation

Offered by : Department of Microbiology

Course Content **Instructional Hours / Week : 4**

Unit	Description	Text Book	Chapter
I	**History and Scope of Microbiology**: Spontaneous generation theory- conflict. Contribution of Leuvenhoek, Louis Pasteur, Robert Koch, Edward Jenner, Joseph Lister, Winogradsky, Waksman, John Tyndall. Whittaker's five kingdom concept.	1	1
	Instructional Hours		**12**
II	**Microscop**y: Bright field: - Dark Field - Phase contrast and Fluorescence microscope. Electron Microscope - Specimen preparation -TEM and SEM.	3	2
	Instructional Hours		**12**
III	**Culture & Staining techniques:** Media preparation: Media and its Types, Pure culture technique – Tube dilution, Pour,Spread, Streak plate. Anaerobic culture technique – Wright's tube, Roll tube, Mclntostfildes jar method. Staining Technique - Simple, Gram, Negative, Acid Fast, Endospore, LCB.	2 & 3	3 & 2, 5, 6
	Instructional Hours		**12**
IV	**Sterilization and Disinfection**: Principles- Methods of Sterilization – Physical methods – Dry heat- Moist heat, Filtration (Membrane & HEPA) - Radiation – Chemical Sterilization -Chemical agents Mode of action. Sterility testing. Phenol coefficient test	1	22-24
	Instructional Hours		**12**
V	**Estimation of Microbes:** Direct Microscopic count, Turbidometric assay, TVC- Indirect Method- CO_2 liberation. Maintenance and Preservation - Short term – Slant, Stab, Mineral oil overlay - Long term – Lyophilization, Cryo preservation, Storage in sterile soil , Storage in silica gel.	3	6
	Instructional Hours		**12**
	Total Hours		**60**

Text Book(s):

1. Pelczar MJ, Chan ECS and Kreig NR. **Microbiology**, 5th edition, Tata McGrawHill-Hill Education Pvt. Ltd., New Delhi, 2012.
2. Dubey RC and Maheswari DK.**A Textbook of Microbiology**, Revised Multicolour Edition. S Chand and Company Limited, New Delhi, 1999.
3. Prescott, Harley, and Klein's. **Microbiology**, 7thedition McGraw-Hill, 2008.

Unit I : Text book 1, Chapter 1: 3- 37
Unit II : Text book 3, Chapter 2: 17-31
Unit III : Text book 2 & 3, Chapter 3 & 2, 5, 6: 59-78 &25-28; 101-142;
Unit IV : Text book 1, Chapter 22-24: 469-510
Unit V : Text book 3, Chapter 6: 119-142

Reference Book(s):

1. Presscott, L.M., J.P. Harley and D.A. Klein. **Microbiology**, 6thedition, TATA McGraw Hill, New Delhi.2005.
2. Alcamo, E. **Fundamentals of Microbiology**, 6thedition. Jones and Bartlett Publishers, New Delhi. 2001
3. Salle, A.J. **Fundamentals and Principles of Bacteriology**, 7thedition. Tata MC Graw Hill, New Delhi.2001.
4. Brooks, G.F., E. Jawetz, J.L. Melnick and E.A. Adelberg.**Medical Microbiology.** 26thedition, New York: McGraw Hill Medical. 2013.
5. Patricia, M.T. **Bailey and Scott's Diagnostic Microbiology**,13thEedition, Mosby, Inc. Publishers, China. 2014.
6. Harley. Laboratory Excersices in Microbiology, 5th Edition, McGraw – Hill, 2002.
7. http://www.nptel.ac.in/courses/102103015/pdf/mod3.pdf

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Seminar	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	M	M	M	M	L	H	H	H	M	L	L
CO2	H	H	M	L	H	H	L	H	H	H	M	L	L
CO3	H	H	M	L	H	H	L	H	H	H	M	L	H
CO4	H	H	L	H	L	H	L	H	H	H	H	L	L
CO5	M	H	L	H	H	L	L	H	H	H	H	H	H

H-High; M-Medium; L–Low

Course Designed by	Verified by HOD	Checked by	Approved by
		Convenor CDC	30 MAR 2022

Course Code	Title		
21U3MBC102	Core Paper II – Cell Biology		
Semester : I	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

Course Objective:

This subject aims to introduce the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, organelles, Transport mechanisms and cellular components underlying mitotic cell division.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Know characteristics and basic structure of prokaryotic cell.
CO2	Understand organization and structure of eukaryotic cell.
CO3	Distinguish transport mechanisms of cell.
CO4	Identify concepts of cell division in bacteria.
CO5	Explain basic concepts of cell cycle, death mechanism andstem cells.

Offered by: Department of Microbiology

Course Content **Instructional Hours / Week : 4**

Unit	Description	Text Book	Chapter
I	**Ultrastructure of Eubacteria**: Cell membrane- Extra mural layer - Slime – Capsule. Cytoplasmic inclusions – Mesosomes – Nuclear material, Reserve materials. Capsule, slime layer, flagella and pili.Ultra structure of algae,Cyanobacteria, protozoa, fungi	1	2
	Instructional Hours		**16**
II	**Ultrastructure and functions of Eukaryotic cell organelles:** Cell wall – Cell membrane -Mitochondria – Chloroplast – Endoplasmic reticulum –Golgi complex – Nucleus – Ribosomes, Other cell inclusions and Flagella.	1	5
	Instructional Hours		**12**
III	**Transport mechanisms**: Diffusion - Facilitated diffusion. Active transport – Group translocation – phagocytosis– Pinocytosis	1	20
	Instructional Hours		**12**
IV	**Cell division in Bacteria:** Binary fission– Mitosis and Meiosis. Cell division of Eukaryotes -Mitosis and Meiosis.	2	4, 6,
	Instructional Hours		**08**
V	**Cell Cycle, Cell Death and Cell Renewal**:Eukaryotic cell cycle and its regulation. Development of cancer, causes and typesProgrammed cell death,Stem cells - Embryonic stem cells induced pluripotent stem cells.	3	11
	Instructional Hours		**12**
	Total Hours		**60**

Text Book(s):

1. Pelczar MJ, Chan ECS and Kreig NR. **Microbiology**, 5th edition, Tata McGrawHill-Hill Education Pvt., Ltd., New Delhi, 2008.
2. Joanne M.Willey, Linda M. Sherwood, Christopher J.Woolverton, **Prescott,Harley, and Klein's Microbiology**, 7th Edition, McGraw Hill Edition, 2008.
3. Ivan M.Roitt's& Peter J Delves. **Essential of Immunology**, 10thedition, Blackwell Science, UK, 2011.

Unit I : Text book 1, Chapter 2 (73 -97)
Unit II : Text book 1, Chapter 5 (333-389)
Unit III : Text book 1, Chapter 20(171-176)
Unit IV : Text book 2, Chapter 4(79 - 96), Chapter 6(119 - 148)
Unit V : Text book 3, Chapter 11(203 - 207)

Reference Book(s):

1. Stainer R.Y. Ingraham J.L. Wheolis H.H and Painter P.R., **The Microbial World**, 5th edition, Eagle Works Cliffs N.J. Prentice Hall, 1986.
2. Jain V.K. Fundamentals of Plant **Physiology**,5th edition, S. Chand & Co Ltd., New Delhi, 2000.

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Seminar	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	H	H	H	M	H	H	H	H	H
CO2	H	H	M	M	H	H	H	M	H	M	H	H	H
CO3	H	H	M	H	H	M	H	M	H	M	M	H	M
CO4	H	H	M	M	H	H	L	H	H	M	M	M	H
CO5	H	H	H	H	M	H	H	M	H	L	H	M	M

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
	30/3/22		30 MAR 2022

Course Code	Title		
21U3BYA101	Allied Paper I – Biochemistry I		
Semester : I	Credits : 3	CIA : 30 Marks	ESE : 45 Marks

Course Objective:

Understand the concept of Biochemistry regarding Biomolecules - Carbohydrates, proteins, lipids, Enzymes.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Know about the basic biomolecules present inside the body.
CO2	Understand the basic structure of lipids and its importance.
CO3	Recognize basic structure of amino acid and proteins their role in metabolic pathways.
CO4	Gain knowledge on vitamins and vitamin deficiency diseases.
CO5	Explain the enzymes (biochemical catalysts), and the chemistry involved in enzyme action.

Offered by : Department of Microbiology

Course Content **Instructional Hours / Week : 4**

Unit	Description	Text Book	Chapter
I	**Carbohydrates**: Introduction, classification, Structure and importance of monosaccharide, disaccharides and polysaccharides. Homopolysaccharides and heteropolysaccharides.	1	5-8
		Instructional Hours	**12**
II	**Lipids:** Introduction classification physical properties, and chemical properties of fats and oils. Structure and importance of saturated and unsaturated fatty acids.	1	12-14
		Instructional Hours	**12**
III	**Amino acids and Proteins**: Amino acids-classification and properties. Protein – structure, classifications and properties.	1	9-11
		Instructional Hours	**12**
IV	**Vitamins**: Introduction, properties, functions. Deficiency diseases of fat soluble and water soluble Vitamins biochemical roles, daily requirement.	2	5
		Instructional Hours	**12**
V	**Enzymes**: Classification of enzymes with examples, coenzymes and cofactors. Mechanism - Lock and Key model, Induced fit hypothesis. Types of inhibition of enzyme action. Chemical and industrial applications of enzymes.	2	4
		Instructional Hours	**12**
		Total Hours	**60**

Text Book(s):

1. Jain, J. L. **Fundamentals of Biochemistry**. New Delhi: S. Chand, 2004.
2. Shanmugam, A. **Ambika Shanmugam's Fundamentals of Biochemistry for MedicalStudents**. New Delhi: Wolters Kluwer Health/Lippincott Williams & Wilkins, 2016.

Unit I : Text Book 1, Chapter 5-8: 91-163.
Unit II : Text Book 1, Chapter 12-14: 280-340.
Unit III : Text Book 1, Chapter 9-11: 164-295.
Unit IV : Text Book 2, Chapter 5: 97-133.
Unit V : Text Book2, Chapter 4:79-96.

Reference Book(s):

1. Lehninger, A. L., Nelson, D. L., & Cox, M. M. **Principles of Biochemistry**. NewYork: W.H. Freeman, 2013.
2. Murray, R. K. **Harper's Biochemistry**. New York: McGraw-Hill, 2003.
3. Chatterjee, M. N., &Shinde, R. **Textbook of Medical Biochemistry**. New Delhi:Jaypee Brothers Medical (P). 2013.
4. Deb, A. C. **Fundamentals of Biochemistry**. London: New Central Book Agency, 2011.

Tools for Assessment (30 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Seminar	Total
4	4	7	5	5	5	30

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	M	M	H	L	L	L	H	M	M
CO2	M	H	M	H	H	H	H	M	M	L	M	H	M
CO3	H	H	H	M	M	H	L	M	H	M	M	H	L
CO4	H	M	L	M	H	H	H	M	M	H	L	H	M
CO5	M	H	H	H	H	M	L	H	H	H	H	M	L

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
		Convener CDC	3 0 MAR 2022

Course Code	Title	
21U4ENV101	Ability Enhancement Compulsory Course - Environmental Studies	
Semester : I	Credits : 2	CIA : 50 Marks

(Common to all UG Programmes)

Course Objective:

This course enables the students to recognize the interconnectedness of multiple factors in environmental challenges and communicate clearly and competently matters of environment concern.

Course Outcomes:

On completion of course the students will be able to

CO 1	Understand key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
CO 2	Understand concepts and methods from ecological and physical sciences and their application in environmental problem solving.
CO 3	Solve the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
CO 4	Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
CO 5	Apply systems concepts and methodologies to analyse and understand interactions between social and environmental processes.

Course Content **Instructional Hours / Week : 2**

Unit	Description	Text Book	Chapter
I	**Natural Resources:** Forest resources, Water resources, Mineral resources, Food resources, Energy resources and Land resources.	1	2
	Instructional Hours		**6**
II	**Ecosystems:** Concept of an ecosystem, Structure and function; Introduction, types, characteristic features, structure and function of ecosystem - Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). **Activity: Prepare an album on types of Ecosystem.**	1	3
	Instructional Hours		**6**
III	**Environmental Pollution:** Definition Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution and Noise pollution, Solid waste management. **Activity: Discuss the solutions for water pollution**	1	5
	Instructional Hours		**6**
IV	**Social Issues and the Environment:** Water conservation, rain water harvesting, watershed management, Environmental ethics - Issue summits' and possible solutions and Public awareness. **Activity: Identify and analyse a Social Issue and an Environment issue in your locality.**	1	6
	Instructional Hours		**6**

V	**Disaster Management:** Floods, Earthquakes, Cyclones, Landslides: From management to mitigation of disasters: The main elements of a mitigation and measures of strategy: Floods, Earthquakes, Cyclones and Landslides	2	16
		Instructional Hours	**6**
Field Work: Visit to local area to document Environmental assets (River / Forest / Grass land / Mountain), Visit to local polluted site (Urban / Rural /industrial / Agricultural), Study of common plants, insects, birds, Study of simple ecosystem: Pond, River, Hill slopes.			
		Total Hours	**30**

Text Book(s):

1. Shashi Chawla. A Text Book of Environmental Studies, Tata McGraw-Hill, 2012.
2. From UGC website: https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf

Reference Book(s):

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Public Ltd., Bikaner.
2. Jadhav, H & Bhosale, V.M. 1995 Environmental Protection and Laws Himalaya Pub. House, Delhi 284 p.
3. Mckinney, M.L. & Schoch R.M. 1996. Environmental Science systems & Solutions
4. Odum, E.P. 1971 Fundamentals of Ecology. W.B. Saunders Co. USA. 574 p
5. Rao MN & Datta, A.K. 1987 Waste Water treatment, Oxford & IBH Publication Co. Pvt. Ltd., 345 p.

Tools for Assessment (50 Marks)

Ecosystem Album Preparation	Field visit and report submission	Group discussions about issues related to their locality / about Disaster Management	CIA	Total
10	10	5	25	50

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	-	L	H	H	H	H	L	-	-	-	-	-
CO2	L	-	L	H	H	H	H	L	-	-	-	-	L
CO3	L	-	L	H	H	H	H	L	-	-	L	L	-
CO4	L	-	L	H	H	H	H	L	-	-	-	L	-
CO5	L	-	L	H	H	H	H	L	-	-	-	-	-

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by
Dr. K. Franceline Noah		Convenor CDC	30 MAR 2022

SEMESTER – II

Course Code	Title		
21U1TAM202	PART – I TAMIL – II		
Semester : II	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

(Common to all UG Programmes)

Course Objective: மொழி இலக்கியத்தின் வாயிலாக அறம்சார் பண்பு மற்றும் ஆளுமைமிக்க மாணவர்களை உருவாக்குதல்

Course Outcomes:

CO1	பக்தி இலக்கியங்கள் வழி வாழ்வியல் நெறிகளை மாணவர்களுக்கு எடுத்துரைத்தல்
CO2	சிற்றிலக்கியங்களின் மூலம் தமிழர்களின் வாழ்க்கை கூறுகளை எடுத்துரைத்தல்
CO3	தமிழ் நாவல்களின் வழி சமுதாயச் சிந்தனைகளைக் கூறுதல்
CO4	இலக்கண அறிவை வளர்த்தல்
CO5	தமிழ் இலக்கிய வரலாற்றுத் திறனை மேம்பாடு அடையச் செய்தல்

Offered by : தமிழ்த்துறை

Course Content **Instructional Hours / Week : 5**

Description
Unit I பக்தி இலக்கியங்கள்
1. திருமந்திரம் - மூன்றாம் தந்திரம் (அதிகாரம் 2) அசஷ்டமாசித்திகள் 2. நாலாயிரத் திவ்யப்பிரபந்தம் - பெரியாழ்வார் - திருப்பல்லாண்டு 3. மாணிக்கவாசகர் - எட்டாம் திருமுறை - அச்சோப்பதிகம் 4. திருநாவுக்கரசர் - திருவரங்கமாலை ___ நான்காம் திருமுறை - தேவாரம்
Instructional Hours :15
Unit II சிற்றிலக்கியங்கள்
1. கலம்பகம் - நந்திக்கலம்பகம் (91 -100 பாடல்கள்) 2. பள்ளு ___ முக்கூடற்பள்ளு (350 ___ 360) 3. குறவஞ்சி ___ திருக்குற்றாலக்குறவஞ்சி (1-10) 4. பிள்ளைத்தமிழ் - மீனாட்சியம்மை (1 -10) 5. பட்டினத்தார் பாடல்கள் (358 ___ 367)
Instructional Hours: 15
Unit III நாவல் செல்லாதபணம் - இமையம் (வெ.அண்ணாமலை)
Instructional Hours :15
Unit IV ~~, லக்கணம்~~ 1. வல்லினம் மிகும் இடங்கள 2. வல்லினம் மிகா இடங்கள் 3. தொடை வகைகள;
Instructional Hours :15
Unit V இலக்கிய வரலாறு பாடத்திட்டத்தைத் தழுவியது
1 .சிற்றிலக்கியம் - அறிமுகம 2. -புதினத்தின் தோற்றமும் வளர்ச்சியும் 3. விண்ணப்பங்கள், மடல்கள், எழுதச் செய்தல்.
Instructional Hours : 15
Total Hours :75

பாடத்தொகுப்பு

இளங்கலை முதலாம் ஆண்டு தமிழ் மாணவர்களுக்குரிய பாடநூல்"இளந்தளிர்" தொகுப்பு: தமிழ்த்துறை,நேரு கலை மற்றும் அறிவியல் கல்லூரி, கோயம்புத்தூர்.

பார்வை நூல்கள்

1. திருமந்திரம் - மாணிக்கவாசகர் அருளிய திருவாசகம் - சித்தாந்த பண்டிதர் திரு.ப.இராமநாத பிள்ளை விளக்க உரையுடன் கழக வெளியீடு, திருநெல்வேலி, தென்னிந்திய சைவ சித்தாந்த நூற்பதிப்புக் கழகம் லிமிடெட், 522 டி.டி.கேசாலை, சென்னை—600118.
2. புலவர்த.திருவேங்கட இராமனுஜதாசன் - நாலாயிரதிவ்யப் பிரபந்தம் முதல் ஆயிரம் மூலமும் உரையும், உமாபதிப்பகம், 171,புதிய எண்.18 பவளக் காரத்தெரு, மண்ணடி, சென்னை
3. தாயுமானவர் இயற்றிய பராபரக்கண்ணி -ஸ்ரீமத் சுவாமி சித்பவானந்தர் விரிவுரையுடன் ஸ்ரீ ராம கிருஷ்ண தபோவனம், திருப்பராய்த்துறை — 639115 திருச்சி மாவட்டம்
4. நந்திக்கலம்பகம் - மணிவாசகர் பதிப்பகம், ராஜவீதி, கோயமுத்தூர் — 641 001
5. முனைவர்.கதிர்முருகு—முக்கூடற்பள்ளு மூலமும் உரையும், சாரதா பதிப்பகம், சென்னை.
6. புலியூர்க்கேசிகன் தெளிவுரை—திருக்குற்றாலக்குறவஞ்சி, செல்லப்பா பதிப்பகம், சென்னை.
7. சாந்தலிங்கசுவாமிகள் - சாந்தலிங்க அடிகளார், திருமடம் வெளியீடு, பேரூர், கோவை— 10
8. அ.மாணிக்கம் உரையாசிரியர் - பட்டினத்தார் பாடல்கள் மூலமும் உரையும், வர்த்தமானன் பதிப்பகம், 40, சரோஜினி தெரு, தியாகராயநகர், சென்னை -17.
9. தமிழண்ணல் - புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை
10. நல்லதமிழ் எழுத வேண்டுமா? —அ.கி. பரந்தாமனார், அல்லி நிலையம், சென்னை— 007
11. முனைவர்.பாக்கியமேரி—தமிழ் இலக்கிய வரலாறு—என்.சி.பி.எச். வெளியீடு. கோவை— 600098
12. திருவருட்பா—அருள் விளக்கம், மணிவாசகர் பதிப்பகம், சென்னை.
13. மு.வ. தமிழ் இலக்கிய வரலாறு சாகித்ய அகாதெமி, புதுதில்லி — 110 001.
14. செல்லாதபணம் -இமையம் கிரியா பப்ளிகேசன்ஸ், சென்னை.

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Seminar	Assignment	Group project	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	M	-	H	H	M	H	-	-	-	-	-
CO2	-	-	H	-	M	M	L	H	-	-	-	-	L
CO3	-	-	H	-	M	H	H	M	-	-	L	-	-
CO4	-	-	H	-	H	M	L	H	-	-	-	-	L
CO5	-	-	H	-	M	L	M	H	-	-	-	-	-

H-High; M-Medium; L-Low;

Course Designed by	Verified by	Checked by	Approved by
30/3/22 (Dr. A. Sridevi)	30/3/22 (Dr. A. Sridevi)	CDC	30 MAR 2022

Course Code	Title		
21U1HIN202	PART – I : HINDI - II		
Semester : II	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

(Common to all UG Programmes)

कोर्स लक्ष्य रू भारतीयता की साहित्य के माध्यम से पहचान कराना। कहानी के माध्यम से समकालीन समय के सच की पहचान कराना। हिंदी से अंग्रेज़ी में अनुवाद के माध्यम से भारतीय ज्ञान संपदा को अंतर्रा ट्रीय स्तर तक पहुँचाने में छात्र को समर्थ बनाना। दैनन्दिन की बातचीत में हिंदी का निर्बाध प्रयोग करने में छात्र को सक्षम बनाना।

कोर्स परिणाम रू

ंल	छात्रों में साहित्यिक अभिरुचि के साथ सामाजिक बोध बढ़ेगा। पत्राचार के क्षेत्र में वे स्वावलम्बी हो सकेंगे।
ं2	भारतीय भा ाा के ज्ञान को विदेष तक पहुँचाने के क्षेत्र में क्षमता हासिल करेंगे।
ं3	रा ट्रभा ाा हिंदी से अंतर्रा ट्रीय भा ाा अंग्रेज़ी में सामग्री का अनुवाद करके छात्र हिंदी की ज्ञान संपदा बढ़ाने में कामयाब होंगे।
ं4	रोज़मरा जीवन में हिंदी को बोल पाने में कामयाब होंगे।
ं5	छात्र लघु कथाएँ ललखने में पारंगत होंगे।

Offered by : Hindi Department

अध्यन विषयिस्तु **ननर्देशात्मक घंटे / सप्ताह: 5**

इकाई	विि र ण	
I	आधुनिक काव्य रू रष्मिरथी, रामधारीसिंह दिनकर	
	ननर्देशात्मक घंटे	**25**
II	कहानी दृ 1. पूस की रात (प्रेमचन्द), 2. आकाषदीप (जयषंकर प्रसाद) 3. अकेली (मन्नू भंडारी), 4. खेल (जैनेन्द्र कुमार) 4. सच बोलने की भूल (यषपाल) 5. चीफ की दावत (भी म साहनी) 6. आरोहण (संजीव) 7.; कफन प्रेमचंद द्ध	
	ननर्देशात्मक घंटे	**20**
III	पत्र लेखन रू (सरकारी पत्र, निजी पत्र, संपादक को पत्र, ज्ञापन, परिपत्र)	
	ननर्देशात्मक घंटे	**10**
IV	अनुवाद रू हिंदी से अंग्रेज़ी	
	ननर्देशात्मक घंटे	**10**
V	बोलचाल हिंदी दृ 1. साक्षात्कार 2. अध्यापकदृवि4ार्थी 3. ग्राहकदृदूकानदार 4. डॉक्टरदृमरीज 5. मुसाफिरदृयात्री	
	ननर्देशात्मक घंटे	**10**
	कुल घंटे	**75**

पाठ्यपुस्तक रू

1. रामधारीसिंह दिनकर, रष्मिरथी।
2. **कहानी**
3. **अनुवाद अभ्यासदृ3,** (दक्षिण भारत हिंदी प्रचार सभा)
4. आदर्ष पत्र लेखन
5. व्याकरण

संदर्भ ग्रंथ रू

1. प्रोफ. नीरज एम., **प्रामाणिक आलेखन और टिप्पणी**, राजपाल एंड सन्स, काश्मीर गेट, नई दिल्ली।
2. नीलम कपूर, **प्रयोजनमूलक हिंदी**, श्री नटराज प्रकाषन, साउथ गारडी, नई दिल्लीदृ2
3. डॉ. मधुधवन, **नवीन एकांकी संग्रह**, सुमित्रा प्रकाषन, अषोक नगर, अलहाबाददृ1

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Project	Total
8	8	10	8	8	8	50

Mapping

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	M	-	L	H	M	-	-	-	-	-	-
CO2	-	-	L	-	L	M	H	-	-	-	-	-	L
CO3	-	-	H	-	M	H	M	-	-	-	L	-	L
CO4	-	-	H	-	-	M	-	-	-	-	-	L	-
CO5	-	-	M	-	L	-	L	-	-	-	-	-	-

H-High; M-Medium; L-Low

Course Designed by	Verified by HoD	Checked by	Approved by
30.5.22	30.3.22	CDC	30 MAR 2022

Course Code	Title		
21U1MAL202	Part - I : Malayalam - II		
Semester : II	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

Course Objective: വിദ്യാർത്ഥികളിൽ മലയാള ഭാഷയുടെ വികാസവും മലയാള സാഹിത്യത്തിൽ നവോവലുകൾക്കുള്ള സ്ഥാനവും വായനാശീലവും വർദ്ധിപ്പിക്കുന്നു.

Course Outcomes:

CO1	സമൂഹത്തിടല ഒരു വിഭാഗത്തിന്ടെ ജീവിത്ും
CO2	പ്രകൃത്ിയും മറ്റു ജീവജാലങ്ങളുടെയും മാറ്റങ്ങൾ
CO3	പ്രകൃത്ി നാശത്തിടനത്ിരായി ഒന്നിച്ചു പ്രവർത്തിക്കുന്നു
CO4	സമൂഹത്തിടല ഭാഷാസങ്കല്പും ത്ിരിച്ചെിയുന്നു
CO5	ഏല ഭാഷ എങ്ങടനയ സൃഷ്ടിക്കാടമന്ന് മനസ്സിലാക്കുന്നു

Offered by : Malayalam Department

Course Content **Instructional Hours/Week: 5**

Unit	Description	
I	നവോവൽ - എൻമകടജ	
	Instructional Hours	**15**
II	നവോവൽ - എൻമകടജ	
	Instructional Hours	**15**
III	നവോവൽ - എൻമകടജ	
	Instructional Hours	**15**
IV	ഭാഷാരരിചയും – ടത്ിമലയാളും	
	Instructional Hours	**15**
V	ഭാഷാരരിചയും – ടത്ിമലയാളും	
	Instructional Hours	**15**
	Total Hours	**75**

രാഠരുസ്ത്കങ്ങൾ :

1. ആുംബികാസുത്ൻ മാങ്ങാട് - എൻമകടജ - ഡി.സി.ബുക്സ് നകാട്ടയും
2. എും.എൻ.കാരനേരി – ടത്ിമലയാളും - ഡി.സി.ബുക്സ് നകാട്ടയും

സഹായകപുസ്തകങ്ങൾ :

1. ടപ്രാഫ.എൻ.കൃഷ്ണപ്പിള്ള – കകരളിയുടെ കഥ - ഡി.സി.ബുക്സ് നകാട്ടയും
2. നഡാ. രനവ രാമചപ്രൻ നായർ - സമ്പൂർണ്ണമലയാള സാഹിത്യ ചരിപ്ുും - ഡി.സി.ബുക്സ് നകാട്ടയും
3. നഡാ.ടക.എും. നജാർജ് - ആധുനിക മലയാള സാഹിത്യ ചരിപ്ും പ്രസ്ഥാനങ്ങളിലൂടെ - ഡി.സി.ബുക്സ് നകാട്ടയും

4. എരുമമലി - മലയാള സാഹിത്യും കാലഘട്ടത്തിലൂെ - ഡി.സി.ബുക്കസ് നകാട്ടയും

Tools for Assessment (50 Marks)

CIA I	CIA II	CIAIII	Assignment	Seminar	Group Project	Total
8	8	10	8	8	8	50

Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	H	H	H	-	-	-	-	-	-	L
CO2	-	-	H	M	H	M	-	-	-	-	-	-	-
CO3	-	-	M	M	M	H	-	-	-	-	-	L	L
CO4	-	-	L	H	L	H	-	-	-	-	-	-	-
CO5	-	-	L	M	L	H	-	-	-	-	-	-	L

S-Strong; H-High; M-Medium; L-Low;

Course designed by	Verified by	Checked by	Approved by
Rajani 30/3/22 RAJANI M	Rajani 30/3/22 RAJANI M	(Dr. K. Selvirayaki)	30 MAR 2022

Course Code	Title		
21U1FRN202	Part - I : French - II		
Semester : II	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

(Common to all UG Programmes)

Course Objective:

This course comprises of French grammar that aims to apply the grammatical structures in the language.

Course Outcomes:

Students will be able to

CO1	Acquire an understanding of French culture and use basic verbs.
CO2	Describe about a place, learn pronom en, y and adjectives.
CO3	Recall the tenses and learn Imparfait tense
CO4	Narrate about the weather and learn pronom COD and COI
CO5	Draft short passages, translate and comprehend .

Offered by : French Department

Course Content **Instructional Hours/Week : 5**

Unit	Description	
I	Gouter a la campagne	
	Instructional Hours	**15**
II	Voyager dans sa ville	
	Instructional Hours	**15**
III	Faire du neuf avec du vieux	
	Instructional Hours	**15**
IV	Changer d'air	
	Instructional Hours	**15**
V	Devenir eco-citoyen	
	Instructional Hours	**15**
	Total Hours	**75**

Text Book:

1. Saison 1 Méthode de Français – Marie-Noëlle Cocton, Anouchka De Oliveira, Dorothée Dupleix

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Group Project	Total
8	8	10	8	8	8	50

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	-	-	M	S	-	-	-	-	-	-
CO2	-	-	H	-	L	-	M	L	-	-	-	-	L
CO3	-	-	H	-	-	-	M	M	-	L	-	L	L
CO4	-	-	H	-	L	M	S	L	-	-	-	-	-
CO5	-	-	H	-	-	M	S	-	-	-	-	-	-

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by
30/3/22 Ms. Abirami M	30/3/22 Ms. Abirami M	30/3/22 Dr. K. Selvavinayaki Convenor CDC	30 MAR 2022

Course Code	Title		
21U2ENG202	Part II - English II		
Semester : II	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

(Common to All UG Programmes)

Course Objective:

To equip the students with the language skills and its functional usage. Facilitate the insight and taste of Literature.

Course Outcomes:

CO1	Mastering life skills through prose discourse.
CO2	Acquire ethics and values through poetic genre.
CO3	Recognise the nuances of English language through short stories.
CO4	Enhance fluency over language with self-confidence.
CO5	Examine how the language is used in literature and develop LSRW Skills

Offered by : English department

Course Content **Instructional Hours / Week : 5**

Unit	Description	Text Book	Chapter
I	**Prose** Sachin Tendulkar - Learning the Game Mahatma Gandhi - Women Not the Weaker Sex Issac Asimov - The Fun They had	2	
	Instructional Hours		**15**
II	**Poetry** Robert Frost - Stopping by Woods on a Snowy Evening William Blake - A Poison Tree Oliver Goldsmith - The Village School Master	2	
	Instructional Hours		**15**
III	**Short Stories** Mark Twain - The Cat and the Painkiller Japanese Folk Tale - The Envious Neighbour Khushwant Singh – Karma	1	
	Instructional Hours		**15**
IV	**Grammar** Active and Passive Voices Direct and Indirect Speech Sentence Connectors and Linkers	1	
	Instructional Hours		**15**

V	**Oral & Written Communication (Unit I –IV)** **Listening** – Comprehension practice from Poetry, Prose, Online Voice Practice, observing/viewing E-content (with subtitles), Guest/Invited Lectures, Conference/Seminar Presentations & Tests, and DD National News Live, BBC, CNN, VOA etc **Speaking** – In Group Discussion Forum, participate in the Turn Taking, and Conversation Management, Debating, Defending/Mock Viva-Voice, Seminar Presentations on Classroom-Assignments, and Peer-Team-interactions. **Reading** – Different Reading Strategies in Poetry, Prose, Novel, Newspaper etc **Writing**– Dialogue/Conversation Writing, Advertisement Writing, and Creative Writing (autobiography, article etc,) for publication in Mass Media.	2
	Instructional Hours	**15**
	Total Hours	**75**

Books for study:

Unit I – V : Compiled by the PG & Research Department of English

Books for Reference:

1. CLIL (Content & Language Integrated Learning) – Module by TANSCHE

NOTE: (Text: Prescribed chapters or pages will be given to the students by the department and the college)

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Quiz	Total
8	8	10	8	8	8	50

Mapping

COS / POS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	H	H	M	M	H	H	-	-	-	-	-
CO2	H	M	H	H	M	H	H	H	-	-	-	-	L
CO3	H	M	H	M	H	H	H	H	-	-	-	L	L
CO4	H	H	H	M	H	H	H	H	-	-	-	L	-
CO5	H	M	H	H	H	H	H	H	-	-	-	-	L

H-High; M-Medium; L-Low

Course Designed by	Verified by HoD	Checked by	Approved by
Dr. M Devendran	Dr R Nalatha	Dr. K. S. Rajavinayaki Convenor CDC	30 MAR 2022

Course Code	Title		
21U3MBC203	Core Paper III – Microbial Diversity		
Semester : II	Credits : 4	CIA : 50 Marks	ESE :50 Marks

Course Objective:

The objective of this course is to make students understand the diversity of microbial world and systematic classification systems. The course will provide insights into study of microbes and distinguishing features associated with them based on morphological, chemical, structural and metabolic characteristics.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Learn criteria used for bacterial classification.
CO2	Describe classification of eubacteria and actinomycetes.
CO3	Understand the characters and significance of eubacteria and actinomycetes.
CO4	Know the characters and significance of fungi.
CO5	Explain characters and significance of algae.

Offered by: Microbiology

Course Content **Instructional Hours / Week : 4**

Unit	Description	Text Book	Chapter
I	**Taxonomy:** Principles – Modern approaches-Numerical-Genetic, Serotaxonomy and Chemotaxonomy.	1	19
		Instructional Hours	**16**
II	**Taxonomy of Eubacteria and Actinomycetes:** Detailed classification upto genus level with general characters of each group – Bergey's Manual and its importance.	1	20
		Instructional Hours	**12**
III	**Eubacteria and Archaebacteria:** Taxanomy of Photosynthetic Eubacteria and Archaebacteria- General characteristics.	1	20
		Instructional Hours	**12**
IV	**Taxonomy of Fungi** (Alexopolous): General Characteristics-Life Cycles of Mucor, Neurospora, Agaricus, Dictyostelium.	2	4
		Instructional Hours	**08**
V	**Taxanomy of Algae**: General Characters and its importance – Cholorophyta- Euglenophyta –Chrysophyta- Phaeophyta - Rhodophyta – Pyrrophyta-Taxonomy of Protozoa – Generalcharacters and its importance – Mastigophora, Rhizopoda, Ciliata, Sporozoa.	3	2
		Instructional Hours	**12**
		Total Hours	**60**

Text Book(s):

1.Joanne M.Willey, Linda M. Sherwood, Christopher J.Woolverton, **Prescott,Harley, and Klein's Microbiology**, 7th Edition, McGraw Hill Edition, 2008.

.2.Sullia S.B., Shantharam S., **General Microbiology**, 2nd Edition (Revised), Oxford University Press.2019.

3. Ashok Kumar Aswasthi, Text Book of Algae, Vikas Publishing house, 2015.

Unit I	:	Text book 1, Chapter 19 (471-494)
Unit II	:	Text book 1, Chapter 20 (503-515)
Unit III	:	Text book 1, Chapter 20(516-604)
Unit IV	:	Text book 2, Chapter 4(58-67)
Unit V	:	Text book 3, Chapter 2(47-58)

Reference Book(s):

1. Stainer R.Y. Ingraham J.L. Wheolis H.H and Painter P.R. **The Microbial World**, 5thedition. Eagle Works Cliffs N.J. Prentica Hall, 1986.

2. Gerard J. Tortora, Berdell R. Funke, Christine L. Case, Derek Weber, Warner Bair, **Microbiology: An Introduction**, 4th edition, Pearson Education, 2019.

3. Willey, J.M., Sherwood, L and Wool VertonC.J.**Prescott's Microbiology**. 8thedition, McGraw Hill, New York, 2011.

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Seminar	Total
8	8	10	8	8	8	50

Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	M	L	M	L	M	H	H	H	H	L	H
CO2	M	H	M	H	M	L	M	H	H	H	H	H	H
CO3	H	H	M	H	M	L	M	H	H	H	H	L	H
CO4	M	L	L	L	H	L	M	H	H	H	H	H	H
CO5	M	L	L	L	H	L	M	H	H	H	H	H	H

H-High; M-Medium; L–Low

Course Designed by	Verified by HOD	Checked by	Approved by
	30/3/22	Convener CDC	30 MAR 2022

Course Code	Title		
21U3MBP204	Core Paper IV– Lab in Fundamentals of Microbiology and Cell Biology		
Semester : I & II	Credits: 4	CIA : 50 Marks	ESE : 50 Marks

Course Objective:

To make the students to gain knowledge on the distribution, morphology and physiology of various microorganisms and to understand the laboratory skills, techniques, control of infectious microbes from various sources. Students can know microbiology related techniques like staining cultural characteristics and other techniques.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Develop knowledge on laboratory guideline, and various staining techniques and sterilization methods.
CO2	Understand the media preparation, culture techniques and preservation of microorganisms.
CO3	Acquire knowledge about measurement of microbial cell.
CO4	Comprehend knowledge on prokaryotic cell growth and its characteristics.
CO5	Analyze different stages of cell division and cell types.

Offered by: Microbiology

Course Content **Instructional Hours / Week: 5 & 5**

S. No.	Experiment
	Fundamentals of Microbiology
1	Laboratory precautions, basic Lab glass wares.
2	Microscopic techniques for study of cells - Bright field, Dark field, phase contrast & Fluorescence Microscopy.
3	Basic Lab instrumentation – Autoclave, Hot air oven, pH meter, Centrifuge, laminar air flow.
4	Methods of Sterilization – Principles and Methods – Physical Methods – Dry heat- Hot air Oven, Moist heat – Autoclave, Chemical methods – Alcohols, Aldehydes
5	Bacterial Staining – Simple, Grams, Acid fast, Spore, Capsule
6	Fungal Staining – KoH mount and LPCB mount
7	Isolation of bacteria and fungi from various samples
8	Culture media Preparation, Liquid and Solid Media, Types of Media –Simple, Defined, Complex, Enriched, Enrichment, Differential, Selective, transport and Anaerobic Media
9	Pure Culture Techniques –Pour plate, Spread Plate and Streak plate
10	Enumeration of Bacteria, fungi and Actinomycetes from Soil
11	Cultural Characteristics of Microorganisms
12	Maintenance and preservation of Microbes
13	Measurement of microbial cell load
14	Isolation of bacteria from samples by Standard Plate Count
15	Cultivation of Anaerobic Bacteria – Wright's tube and anaerobic jar method
16	Micrometry- Size and Shape of an Organism

Cell biology	
17	Structure of Prokaryotic and Eukaryotic cells- Isolation and growth of cells.
18	Cell motility - cilia, flagella of eukaryotes and prokaryotes
19	Cellular basis of differentiation and development-mitosis, gametogenesis and fertilization. Development in Drosophila and Arabidopsis
20	Different types of cells – Parenchyma, Collenchyma, Sclerenchyma, Epithelial cells
21	Mitosis & Meiosis
	Instructional Hours : 150

Text Book(s):

1. Rajan. S and Selvi Christy R. **Experimental Procedures in Life Sciences**. Anajanaa Book House, Chennai, 2015.
2. James G. Cappuccino and Chad Welsh. **Microbiology A Laboratory Manual**. Pearson Education Limited, 2017

Reference Book(s):

1. 2. Dubey RC and Maheshwari DK**., Practical Microbiology**. S Chand and Co. Ltd., New Delhi, 2002.
3. Gunasekaran P., **Laboratory Manual in Microbiology**. New Age International, 2007.
4. https://microbenotes.com/fields-of-microbiology/
5. https://bio.libretexts.org/Bookshelves/Microbiology/Book%3A_Microbiology_(Boundless)/1%3A_Introduction_to_Microbiology/1.3%3A_The_Science_of_Microbiology/1.3B_Applied Microbiology

Tools for Assessment (50 Marks)

Laboratory Performance			Test I (Mid sem.)	Test II (Model)	Observation note book	Total
Level of engagement in lab	Preparation	Result				
8	8	8	10	10	6	50

Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	H	M	H	H	H	M	H	H	H	L	L
CO2	H	H	H	L	M	H	H	M	H	H	M	L	L
CO3	M	H	M	L	L	L	L	L	M	L	L	L	M
CO4	H	M	L	L	M	L	H	M	H	H	H	L	M
CO5	H	M	L	L	M	L	L	H	H	H	H	L	M

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
	30/3/22	Convener CDC	30 MAR 2022

Course Code	Title		
21U3BYA202	Allied Paper II – Biochemistry II		
Semester : II	Credits : 3	CIA : 30 Marks	ESE : 45Marks

Course Objective:

The fate of dietary components after digestion and absorption constitutes intermediary metabolism. Knowledge of metabolism in the normal human being is a prerequisite to a sound understanding of abnormal metabolism underlying many diseases.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Know about the fundamentals of pH and buffer preparation.
CO2	Acquire the basic knowledge about analytic techniques.
CO3	Learn the basic functions, principles and concepts of centrifugations.
CO4	Explain on various metabolic pathways.
CO5	Describe on interrelationship of carbohydrates, fat and protein metabolism.

Offered by: Microbiology

Course Content **Instructional Hours / Week : 4**

Unit	Description	Text Book	Chapter
I	**Buffers**: Concept of acid base indicators, buffer systems of blood and body fluids. Components of the pH meter and the concept of pH.	1	3
		Instructional Hours	**12**
II	**Electrophoresis techniques**: Principles techniqueAGE, SDS-PAGE. Chromatography: Paper, TLC, molecular sieve and affinity chromatography: their applications.	1	40
		Instructional Hours	**12**
III	**Centrifugation techniques**: Basic principles of sedimentation, types of centrifugation, types of centrifuges.Colometric and spectroscopic techniques: Beer - Lambert's law, light absorption and its transmittance.	1	35
		Instructional Hours	**12**
IV	**Nucleic acid metabolism**: Purine Metabolism Pyrimidine Metabolism RNA Synthesis DNA Synthesis.	2	6
		Instructional Hours	**12**
V	**Amino acid and Protein metabolism**: Protein Catabolism Amino Acid Metabolism Urea Cycle Protein Synthesis Protein Metabolism and Nitrogen Economy.	2	21-22
		Instructional Hours	**12**
		Total Hours	**60**

Text Book(s):

1. Jain, J. L. **Fundamentals of Biochemistry**. New Delhi: S. Chand, 2004.
2. Gareja, H.P., Patel SV.,Golakiya BA. **Fundamentals of Biochemistry**. Atextbook International Book Distributing Co., 2008.

Unit I : Text Book 1, Chapter 3: 47-63

Unit II : Text Book 1, Chapter 40: 1381-1424

Unit III : Text Book 1, Chapter 35: 1027-1048

Unit IV : Text Book 2, Chapter 6: 134-158

Unit V : Text Book 2, Chapter 21-22: 384-442

Reference Book(s):

1. Lehninger, A. L., Nelson, D. L., & Cox, M. M. **Principles of Biochemistry**. New York: W.H.Freeman, 2013.
2. Victor W. Rodwell, David A. Bender, Kathleen M. Botham, Peter J. Kennelley, P. Antony Weil, **Harpers Biochemistry**. 31st Edition, New York: McGraw-Hill, 2018.
3. Chatterjee, M. N., &Shinde, R. **Textbook of Medical Biochemistry**. Jaypee Brothers Medical (P), New Delhi, 2013.
4. Deb, A. C. **Fundamentals of Biochemistry**. London: New Central Book Agency, 2011.

Tools for Assessment (30Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Seminar	Total
4	4	7	5	5	5	30

Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	L	L	M	M	L	H	M	L	H	L	L
CO2	H	M	M	H	M	L	L	H	H	M	H	L	L
CO3	H	H	M	L	M	L	L	H	M	L	M	L	L
CO4	H	M	L	H	M	L	L	H	L	H	L	L	M
CO5	M	H	M	H	M	L	M	H	H	H	L	L	L

H-High ;M-Medium; L-Low.

Course designed by	Verified by HoD	Checked by	Approved by
	Dr. M. Thangavel.	Dr. K. Selvaraya... CDC	30 MAR 2022

Course Code	Title		
21U3BYP203	Allied Paper III – Lab in Biochemistry		
Semester : II	Credits : 2	CIA : 25 Marks	ESE : 25 Marks

Course Objective:

The lab aims to develop the skills in biochemical analysis and to develop the skills of the students in Qualitative and Quantitative Analysis of biomolecules. The student is able to quantify the biochemical molecules. The students equip themselves with the basic biochemical tools and standard operation procedures.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Determine the absorption Maxima of different molecules and verify Beer's law.
CO2	Identify carbohydrates and amino acids present in the given unknown sample.
CO3	Asses DNA and Proteins in the specified sample.
CO4	Familiarize paper and thin layer chromatography techniques.
CO5	Separate macromolecules using column chromatography.

Offered by : Microbiology with Nanotechnology

Course Content **Instructional Hours/Week : 2 & 4 (I Sem & II Sem)**

S. No.	Experiment
1	Determination of absorption maxima (λmax) of small molecules and macromolecules
2	Verification of Beer's Law
3	Calculation, preparation of normal, molar and percentage solutions
4	Determination of molar extinction coefficient.
5	Qualitative analysis of carbohydrates
6	Qualitative analysis of amino acids
7	Colorimetric estimation DNA by diphenylamine method
8	Colorimetric estimation of proteins by Biuret/Lowry method
9	Paper chromatographic separation of amino acids
10	Thin layer chromatographic separation of amino acids
11	Column Chromatography
	Total hours 90

Text Book(s):

1. SadasivamS., Manickam A. **Biochemical Methods**, New Age International Pvt. Ltd.,2018.
2. Jayaraman J. **Laboratory Manual in Biochemistry**, New Age International Pvt. Ltd.,2011.

Reference Book(s):

1. David Plummer. **An Introduction to Practical Biochemistry**, 3rd edition, McGraw Hill Education, 2017.
2. Sharma DC.,Manminder Riyat, **Practical Medical Biochemistry**, Wolters Kluwer India Pvt. Ltd. 2018.

Tools for Assessment (25 Marks)

Laboratory Performance			Test I (Mid sem)	Test II (Model)	Observation note book	Total
Level of engagement in lab	Preparation	Result				
4	4	4	5	5	3	25

Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	L	L	L	L	L	H	L	L	M	L	L
CO2	H	M	L	L	M	M	L	M	L	M	L	L	L
CO3	H	H	L	H	L	M	L	H	H	H	L	L	M
CO4	M	L	L	L	L	L	L	M	L	M	L	L	L
CO5	H	H	M	L	M	M	M	H	L	L	L	L	L

H-High; M-Medium; L-Low.

Course designed by	Verified by HoD	Checked by	Approved by
	30/3/22 Dr. M. Thangavel.	Dr. R. Selvarayan. CDC	30 MAR 2022

Course Code	Title	
21U4HRC202	Ability Enhancement Compulsory Course - **Human Rights and Constitution of India**	
Semester : II	**Credits : 2**	**CIA : 50 Marks**

(Common to all UG Programmes)

Course Objective:

Understand the concept of human rights and the importance of Indian Constitution.

Course Outcomes:

CO1	Understand the principal aspects of human rights and duties in a broad sweep.
CO2	Acquire the knowledge about the Fundamental Duties and Rights of Indian Citizen
CO3	To know the rights of women and Children in India
CO4	Understand the structure and importance of Indian Constitution
CO5	Know the functions of Government and Election Commission of India

Course Content **Instructional Hours / Week : 2**

Unit	Description	
I	An Introduction to Human Rights : Values – Dignity, Liberty, Equality, Justice, Unity in Diversity - Human Rights – Meaning and features; Significance of the study - Classification of Human Rights - Rights and Duties – Correlation	
	Instructional Hours	**6**
II	Human Rights and Fundamental Rights - Fundamental Rights and Fundamental Duties- Directive Principles - Role of Judiciary in the protection of Human Rights- National Human Rights Commission *Activity : Case Study related to Human Rights*	
	Instructional Hours	**6**
III	Human Rights of Women and Children- Social Practice and Constitutional Safeguards – Female foeticide and infanticide-Physical assault and Harassment- Domestic violence- Conditions of Working Women *Activity : Conduct a Group Discussion on the above topics*	
	Instructional Hours	**6**
IV	**Constitution – Structure and Principles -** Meaning and importance of Constitution - Making of Indian Constitution –Sources - Salient features of Indian Constitution- Government of Union- Government of State-Features of judicial system in India	
	Instructional Hours	**6**
V	Federalism in India – Features - Local Government -Panchayat –Powers and functions -Election Commission –Organisation and functions-Citizen oriented measures – RTI – Provisions and significance *Activity : Seminar/ Role play related to Indian Constitution*	
	Instructional Hours	**6**
	Total Hours	**30**

Text Book:

1. **"Human Rights and Constitution of India",** Complied by Curriculum Development Cell, Nehru Artsand Science College.

Tools for Assessment (50 Marks)

Case Study and Report submission	Seminar / Role play	Group Discussion	Comprehensive test for 5×5 = 25 marks	Total
10	10	5	25	50

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	-	L	H	H	H	H	-	-	-	-	L
CO2	-	-	-	L	H	H	H	H	-	-	-	-	-
CO3	-	-	-	L	H	H	H	H	-	-	-	-	-
CO4	-	-	-	L	H	H	H	H	-	-	-	L	L
CO5	-	-	-	L	H	H	H	H	-	-	-	-	-

H-High; M-Medium; L-Low

Course Designed by	Verified by	Checked by	Approved by
30/3/2022	30/3/2022	Convenor CDC	30 MAR 2022

Course Code	Title	
21U4HVY201	Value Education : Human Values and Yoga Practice I	
Semesters : I & II	Credits : 2	CIA : 50 Marks

(Common to all UG Programmes)

Course Objective:

- To help the students appreciate the essential complementarily between 'values' and 'skills' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings.
- To prepare and distribute standardized Yoga teaching and training material with reference to institute health**.**

Course Outcomes:

CO1	To know the importance of Ethics to be followed in the Human life.
CO2	To inculcate a sense of respect towards harnessing values of life and spiritof fulfilling social responsibilities.
CO3	To gain knowledge about the values that develop life skills.
CO4	To understand and Practice Meditation & Surya Namaskar.
CO5	To understand and apply the knowledge for physical health and well being through Simple exercises.

Course Content **Instructional Hours / Week : 1 (For Semesters I and II)**

Unit	Description	
I	**Human Values –** Introduction - Definition of Ethics and Values - Character and Conduct - Nature and Scope of Ethics.	
	Instructional Hours	**6**
II	**Individual and Society** - Theories of Society - Social Relationships and Society - Empathy: Compassion towards other being - Environmental Ethics and Nature.	
	Instructional Hours	**6**
III	Cultural Education - Purity India - Patriotism - Time management. Greatness of Womanhood - Food is medicine- Individual peace -World Peace.	
	Instructional Hours	**6**
IV	**Power of Meditation**- Development of mind in stages - Mental Frequencies Methods for Concentration. Meditation Practices - Surya Namaskar.	
	Instructional Hours	**6**
V	**Simplified Physical Exercise**s – Kayakalpa Practices - Training for Potentialising the Mind.	
	Instructional Hours	**6**
	Total Hours	**30**

Text book:

1. **"Value Education I ",** compiled by Curriculum Development cell, Nehru Arts and Science College.

Tools for Assessment

25 marks	25 marks
Comprehensive test in Units I to III for 25 marks during CIA III of Sem. II	Perform 02 Yoga postures for Practical exam to be conducted during the mid. of Sem. II

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	-	H	L	M	H	H	-	-	-	-	-
CO2	-	-	-	L	M	H	M	H	-	-	-	-	L
CO3	-	-	-	L	M	H	S	H	-	-	-	-	L
CO4	-	-	-	L	L	H	M	H	-	-	-	-	-
CO5	-	-	-	L	L	H	M	H	-	-	-	L	-

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
30/03 (Dr. N. SARANYA)	30/03 (Dr. N. SARANYA)	Convenor CDC	30 MAR 2022

SEMESTER – III

Course Code	Title		
21U1TAM303	Part I – Tamil - III		
Semester : III	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

(Common to all UG Programmes)

Course Objective : தமிழ்க் காப்பியங்களின் வழி அறம் சார்ந்த சிந்தனைகளை உருவாக்குதல்

Course Outcomes :

ஊழு1	தமிழ் காப்பியங்களின் வழி மாணவர்களுக்கு அறம் சார்ந்த சிந்தனைகளை வளர்த்தல்.
CO2	பக்தி இலக்கியத்தை எடுத்துரைப்பதன் மூலம் சைவ வைணவ இலக்கியங்கள் மற்றும் ஆழ்வார்களின் பக்தித் திறத்தை மாணவர்களுக்கு எடுத்து உரைத்தல்
CO3	இலக்கணத் திறனை மாணவர்களிடம் மேம்பாடு அடையச் செய்தல்
CO4	தமிழர்களின் கலை வரலாற்றுத் திறனை மாணவர்களுக்கு அறியச் செய்தல்
CO5	தமிழ் இலக்கிய வரலாற்றுத் திறனை மாணவர்களுக்கு அறியச் செய்தல்

Offered by : தமிழ்த்துறை

Course Content **Instructional Hours / Week : 5**

Unit	Description
I	காப்பியங்கள் சிலப்பதிகாரம் ___ அடைக்கலக்காதை (மதுரைக்காண்டம் பகுதி ___ 15) மணிமேகலை ___ பீடிகைக்கண்டு பிறப்புணர்ந்த காதை பகுதி ___ 9) சீவகசிந்தாமணி ___ பூமகள் இலம்பகம் (பகுதி ___ 11 ___ 2347 ___ 2377 பாடல்கள்) கம்பராமாயணம் ___ சுந்தரகாண்டம் (கடல்தாவுப் படலம் 1 ___ 10 பாடல்கள்)
	Instructional Hours 15
II	சைவ, வைணவ இலக்கியங்கள் பெரியபுராணம் ___ குங்கிலியக்கலியநாயனார் புராணம் (பாடல் எண் ___ 836 ___ 870) தேவாரம் ___ திருநல்லூர்ப் பெருமணம் (பாடல் எண் ___ 4137 ___ 4146) திருமங்கையாழ்வார் ___ பெரியதிருமொழி நாலாயிரத் திவ்வியப்பிரபந்தம் ஆண்டாள் திருப்பாவை ___ (பாடல் எண் ___ 474 ___ 483)
	Instructional Hours 15
III	மொழித்திறன் உவமைஅணி உருவகஅணி சொற்பொருள் பின்வருநிலையணி நூல் வரலாறு ___ முதல் நூல், வழி நூல், சார்பு நூல் பத்துக் குற்றம்இ பத்து அழகு
	Instructional Hours 15
IV	தமிழர்க் கலை வரலாறு பழமொழிகள் விடுகதைகள் நம்பிக்கைகள் தெய்வங்கள் விளையாட்டுக்கள்
	Instructional Hours 15
V	இலக்கிய வரலாற்றுத்திறன் காப்பியத்தின் தோற்றமும் வளர்ச்சியும் பக்தி இலக்கியத்தின் தோற்றமும் வளர்ச்சியும் சைவம் தமிழுக்கு செய்த தொண்டு தமிழக நாட்டுப்புறவியல் வரலாறு வைணவம் தமிழுக்கு செய்த தொண்டு
	Instructional Hours 15
	Total Hours 75

பாடத்தொகுப்பு

1. இளங்கலை முதலாம் ஆண்டு தமிழ் மாணவர்களுக்குரிய பாடநூல் "நெடும் புனல்" தொகுப்பு: தமிழ்த்துறை, நேரு கலை மற்றும் அறிவியல் கல்லூரி, கோயம்புத்தூர் - 105

பார்வை நூல்கள்

1. சிலப்பதிகாரம் ,உ.வே.சாமிநாத ஐயர், அடியார்க்குநல்லார் உரையுடன் - (ஏழாம்பதிப்பு) சென்னை— 01.
2. மணிமேகலை, திருஞானசம்பந்தர் உரை , கதிர்ப்பதிப்பகம், சென்னை -02
3. சீவகசிந்தாமணி (மூலமும் உரையும்) — ஆசிரியர் குழு- சாரதா பதிப்பகம், சென்னை - 600014.
4. கம்பராமாயணம்,(மூலமும் உரையும்) - வை.மு.கோபால கிருஸ்ணமாச் சாரியார் —உமா பதிப்பகம்,சென்னை -600001.
5. நாலாயிரத் திவ்யப் பிரபந்தம் புலவர் த.திருவேங்கட இராமனுஜதாசன், உமா பதிப்பகம், சென்னை-600001.
6. திருஞானசம்பந்தர் தேவாரம் (1 2 3 திருமுறை) புலவர் பி.ரா.நடராசன், முதல் பதிப்பு :2004 பெரியபுராணம்(மூலமும் உரையும்)
7. சிவதமிழ் செல்வர் திருமுறை செம்மல்இ உமா பதிப்பகம், சென்னை-600001. நாட்டுப்புறவியல் ஓர் ஆய்வு : டாக்டர் சு.சக்திவேல் விஜயா பதிப்பகம், சென்னை
8. தமிழண்ணல் - புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை— 625 001. நன்னூல்: எழுத்ததிகாரம், கதிர்ப் பதிப்பகம், சென்னை -02.

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Seminar	Assignment	Group project	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	-	M	H	H	H	-	-	-	-	-
CO2	-	-	M	-	M	L	H	M	-	-	-	-	-
CO3	-	-	H	-	M	L	M	H	-	-	-	-	L
CO4	-	-	M		H	H	H	M	-	-	-	L	-
CO5	-	-	H	-	H	M	M	H	-	-	-	-	L

H-High; M-Medium; L-Low;

Course Designed by	Verified by	Checked by	Approved by
30/3/22 (Dr. A. Sridevi)	30/3/22 (Dr. A. Sridevi)	Convenor CDC	30 MAR 2022

Course Code	Title		
21U1HIN303	PART – I : HINDI - III		
Semester : III	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

(Common to all UG Programmes)

पाठ्यक्रम का उद्देश्य :

1. चुन दा कविताओं के माध्यम से हहिंदी कविता की उत्पवि और विकास को समझ ा।.
2. सिंकल में उपलब्ध कराए गए सिोिम मू ोंं का उपयोग करते हुए कविता की सराह

ा। पाठ्यक्रम के पररणाम :

CO1	मुक्त छंद और कविता के पारंपररक रूपों में अंतर्निहित सामान्य तकनीकों को समझें।
CO2	व्यक्तिगत अनुभिों की पिचान करें क्िनका उपयोग कविताएँ लिखते समय ककया ि ा सकता ि ै।
CO3	कविता की मूि शब्दाि ी और व्याि ि ारर क तत्ि ोंं को समझें।
CO4	भाषण और ि ेखन में व्याकरण और शब्दाि ी के उपयोग को प्रभावित करने ि ाि े कारकों

Offered by : Hindi Department

अध््य विषयिस्तु **न देशात्मक घिंटे / सप्ताह: 5**

इकाई	विरण	
I	नाटक – सकु बाई (नाहदरा ि ि ीर बब्बर)	
	न देशात्मक घिंटे	**25**
II	प्राचीनकाव्य: कबीर के दोि े (12 दोि ा) , सूरदास के पद (4 पद) (काव्य तरंग)	
	न देशात्मक घिंटे	**10**
III	आधुर्नक काव्य: अभी न ि ोगा मेरा अन्त(र्नरा ि ा) , मुक्त (अरुणकमि) , मनुष्यता (मैथि ि ीशरण गुप्त) , पंद्रिअगस्त(ि ीरेन डंगिाि) , ि ालियांि ाि ा बाग में बसंत (सुभद्राकु मारी चौि ान)	
	न देशात्मक घिंटे	**20**
IV	अिंकार : अि ि अिंकार और शब्द अिंकार	
	न देशात्मक घिंटे	**10**
V	गदयांश ि ेखन, संक्षिप्तीकरण , ि ाक्य शुदथध , शब्द शुदथध , अनेक शब्द के लिए एक शब्द	
	न देशात्मक घिंटे	**10**
	कु ल घंटे	**75**

पाठय पुस्तक :

1. सकु बाई (नाहदरा ि ि ीर बब्बर) - ि ाणी प्रकाशन
2. काव्य सुमन - राजपाल एंड सन्स
3. काव्य तरंग- सुमित्रा प्रकाशन , इल्लाहाबाद
4. Bharatdarshan.co.nz

संदर्भ ग्रंथ :

1. ओंकार नाि िमाि , सामान्यहिंदी अररिंत प्रकाशनइंडडया लिलमटेड
2. श्री रामदेि, व्याकरण प्रदीप, ि ोक भारती प्रकाशन, इिाि ाबाद
3. डॉ। एन. ई. विश्ि नाथ अय्यर, नूतन गडया संग्रह, सुमित्रा प्रकाशन, इलाहाबाद
4. www.webdunia.com
5. www.bhashaindia.com

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Project	Total
8	8	10	8	8	8	50

Mapping

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	-	L	M	M	-	-	-	-	-	L
CO2	-	-	M	-	L	M	M	-	-	-	-	-	-
CO3	-	-	M	-	M	H	-	-	-	-	-	-	L
CO4	-	-	H	-	-	M	L	-	-	-	-	L	-
CO5	-	-	M	-	-	-	L	-	-	-	L	L	-

H-High; M-Medium; L-Low

Course Designed by	Verified by	Checked by	Approved by
S. Suvarnalatha	S. Suvarnalatha	Convenor CDC	
30.3.22	30.3.22		30 MAR 2022

Course Code	Title		
21U1MAL303	Part – I : Malayalam – III		
Semester : III	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

(Common to all UG Programmes)

Course Objective : കവിതാ സാഹിതയ പരിചയത്തോടൊപ്പം പുതു കവിതകടെ കുറിച്ച് അവത്bോധവും ആസവാദനവും ഉയർതുക. വിദയാർത്ഥികൾക്ക് മാതൃകയാവുന്ന സമൂഹതിടെ ഉന്നത വയക്തിതവങ്ങടെ വിദയാർത്ഥികൾക്ക് പരിചയടപ്പടുതുക.

Course Outcomes:

CO1	കവിതയിലൂടെയുള്ള സംത്വദനം
CO2	പ്രകൃതിയുടെ നിസവാർത്ഥമായ പ്രവർതനങ്ങൾ
CO3	അധയാപക വിഭാഗതിനിടയിൽ അവകാശ ത്bോധം ഉണ്ടാക്കുന്നു
CO4	സമൂഹതിന് മുെയത്bോധമുണ്ടാക്കുന്ന പ്രവർതനങ്ങൾ
CO5	സമൂഹതിൽ അധയാപനതിന്ടെ പ്രാധാനയം

Offered by : Malayalam Department

Course Content **Instructional Hours/Week: 5**

Unit	Description	
I	നവീന കവിത - പുതു കവിതകൾ	
	Instructional Hours	**15**
II	നവീന കവിത - പുതു കവിതകൾ	
	Instructional Hours	**15**
III	ജീവചരിത്രം: ഓർമ്മകൾ ചന്ദനഗന്ധം ത്പാടെ	
	Instructional Hours	**15**
IV	ജീവചരിത്രം: ഓർമ്മകൾ ചന്ദനഗന്ധം ത്പാടെ	
	Instructional Hours	**15**
V	ജീവചരിത്രം: ഓർമ്മകൾ ചന്ദനഗന്ധം ത്പാടെ	
	Instructional Hours	**15**
	Total Hours	**75**

പാഠപുസ്തകങ്ങൾ :

1. 1. നവീന കവിത (പുതു കവിതകൾ) - ടനഹ്റു ത്കാടെജ് മെയാെ വിഭാഗം എഡിറ്റു ടചയ്ത 10 കവിതകൾ .
2. ജീവചരിത്രം : ഓർമ്മകൾ ചന്ദനഗന്ധം ത്പാടെ bി. സരസവതി - ഡി.സി.bുക്സ് ത്കാട്ടയം

സഹായകഗ്രന്ഥങ്ങൾ :

1. മെയാെ കവിതാപഠനങ്ങൾ - സച്ചിദാനന്ദൻ ,മാതൃഭൂമി bുക്സ്, ത്കാഴിത്ക്കാട്
2. കവിതാ സാഹിതയ ചരിപ്ം - ത്ഡാ.എം.ൊീൊാവതി ത്കരെ സാഹിതയ അക്കാദമി, തൃശൂർ
3. ആ ധുനിക തമെയാെ കവിതയിൽ എൻ. അജയകുമാർ , പഠന സംഘം, ചങ്ങനാത്േരി
4. ആത്മകഥാ സാഹിതയം മെയാെതിൽ - നsുവട്ടം ത്ഗാപാെകൃഷ്ണൻ, ഭാഷാ ഇൻസ്റ്റിറ്റയൂട്ട്, തിരുവനന്തപുരം
5. ആത്മകഥാസാഹിതയം - ജയകുമാർ വിജയാെയം ഭാഷാ ഇ സ്റ്റിറ്റയൂട്ട്

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Group Project	Total
8	8	10	8	8	8	50

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	M	M	L	-	-	-	-	-	-	-
CO2		-	M	H	L	M	-	-	-	-	-	-	-
CO3	-	-	L	M	H	M	-	-	-	-	-	L	L
CO4	-	-	L	-	-	H	-	-	-	-	-	-	L
CO5	-	-	H	-	M	L	-	-	-	-	-	L	-

H-High; M-Medium; L-Low;

Course designed by	Verified by	Checked by	Approved by
Rajani 30/3/22 RAJANI.N	Rajani 30/3/22 RAJANI.N	Dr. K. Selvamani Convenor CDC	30 MAR 2022

Course Code	Title		
21U1FRN303	Part - I : French - III		
Semester : III	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

(Common to all UG Programmes)

Course Objective :

Acquisition of standard French through fundamental French grammar.

Course Outcomes:

Students will be able to

CO1	Recall the tenses
CO2	Describe someone or an object
CO3	Write official letters and learn new vocabulary
CO4	Learn nominalization and relative pronom (que and qui)
CO5	Learn degrees of comparison and practice translation

Offered by : French Department

Course Content **Instructional Hours / Week : 5**

Unit	Description	
I	La langue française en action	
	Instructional Hours	**15**
II	Aller à la rencontre des autres	
	Instructional Hours	**15**
III	Enrichir son réseau	
	Instructional Hours	**15**
IV	Vivre l'information	
	Instructional Hours	**15**
V	Interroger le passé	
	Instructional Hours	**15**
	Total Hours	**75**

Text Book :

1. Saison 2 Méthode de Français – Marie-Noëlle Cocton, Anouchka De Oliveira, Dorothée Dupleix

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Group Project	Total
8	8	10	8	8	8	50

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	-	-	L	M	L	-	-	-	-	-
CO2	-	-	H	-	-	L	M	-	-	-	-	-	-
CO3	-	-	M	-	-	M	-	-	-	-	-	-	L
CO4	-	-	M	-	-	-	-	L	-	-	-	L	L
CO5	-	-	H	-	-	M	M	L	-	-	-	L	-

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by
30/3/22 Ms. Abirami. M	30/3/22 Ms. Abirami. M	Convener CDC	30 MAR 2022

Course Code	Title		
21U2ENG303	Part II – English III		
Semester : III	Credits : 4	CIA : 50 Marks	ESE : 50Marks

(Common to All UG Programmes)

Course Objective:

To enable the students to learn the different genres of literature and gain a better understanding of the English language.

Course Outcomes:

CO1	Execute moral, ethical and literary merits and relate it to the society.
CO2	Exhibit a comprehensive knowledge of poetry and execute life skills and human values through it.
CO3	Develop reading strategies with enriched vocabulary, through short story.
CO4	Identify the use of English language through the study of Grammar and use them in specific contexts.
CO5	Interpret their understanding of English works in LSRW mode

Offered by : English department

Course Content **Instructional Hours / Week : 5**

Unit	Description	Text Book	Chapter
I	**Prose** J.B. Priestley – Travel by Train R. K. Narayan - Headache E. M. Forster - Tolerance	1	1-3
	Instructional Hours		**15**
II	**Poetry** William Blake - The School Boy Rudyard Kipling - If Sarojini Naidu – The Queen's Rival	1	4-6
	Instructional Hours		**15**
III	**Short Stories** O. Henry - After Twenty Years Edgar All an Poe-Tell-Tale Heart Frank R. Stockton-The Lady or The Tiger?	1	7-9
	Instructional Hours		**15**
IV	Herman Melville – Mo by Dick (Abridged Version)	1	10-13
	Instructional Hours		**15**

V	**Oral & Written Communication (Unit I – IV) Listening**– Comprehension practice from Poetry, Prose, Online Voice Practice, observing / viewing E-content (with subtitles), Guest / Invited Lectures, Conference / Seminar Presentations & Tests, and DD National News Live, BBC, CNN, VO A etc **Speaking** – In Group Discussion Forum, participate in the Turn Taking, and Conversation Management, Debating, Defending/Mock Viva Voce, Seminar Presentations on Classroom-Assignments, and Peer-Team-interactions. **Reading**–Different Reading Strategies in Poetry, Prose, Novel, Newspaper etc **Writing**–Modals, Concord, E-Mail & Report Writing, Spotting the Errors and How to avoid them, Sentence Completion, Prepositions, Idioms and Phrases, Collocation.	1	14-17
		Instructional Hours	**15**
		Total Hours	**75**

Books for study:

Unit I–V : Compiled by the Department of English

Books for Reference:

1. CLIL (Content& Language Integrated Learning) – Module by TANSCHENOTE:
   (Text : Prescribed chapter sorpages will be given to the students by the department)

Tools for Assessment (50 Marks)

CIAI	CIA II	CIA III	Assignment	Seminar	Reading	Total
8	8	10	8	8	8	50

Mapping

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	H	H	M	M	H	H	-	-	-	L	L
CO2	H	M	H	H	M	H	H	H	-	H	-	-	H
CO3	H	M	H	M	H	H	H	H	-	-	M	H	-
CO4	H	H	H	M	H	H	H	H	-	-	-	-	H
CO5	H	M	H	H	H	H	H	H	L	L	-	-	H

H: High, M: Medium , L : Low

Course Designed by	Verified by HoD	Checked by	Approved by
30/3/22 Dr. M. Devendran	Dr. [illegible] Malatha.	Convenor CDC	30 MAR 2022

Course Code	Title		
21U3MBC305	Core Paper V – Microbial Physiology and Metabolism		
Semester: III	Credits: 4	CIA : 50 Marks	ESE: 50 Marks

Course Objective:

To provide the student with an overall vision of the operation of the different processes that allow growth of prokaryotic cells as well as their adaptation to a changing environment.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Know the growth characteristics of the microorganisms which require different nutrient for growth.
CO2	Recognize the associated mechanisms of energy generation for their survival.
CO3	Distinguish the chemoheterotrophic metabolism- anaerobic respiration and fermentation.
CO4	Improve knowledge on different metabolic pathways in microorganisms.
CO5	Understand the key concept of microbial physiology.

Offered by: Microbiology

Course Content **Instructional Hours / Week: 4**

Unit	Description	Text Book	Chapter
I	**Microbial Growth and nutrient uptake:** Definitions of growth, Batch culture, Continuous culture, generation time and specific growth rate. Effect of solute and water activity on growth. Effect of oxygen concentration on growth. Nutritional categories of microorganisms. Passive and facilitated diffusion. Primary and secondary active transport, concept of uniport, symport and antiport Group translocation. Iron uptake.	2	1, 3
	Instructional Hours		**12**
II	**Chemoheterotrophic Metabolism - Aerobic Respiration:** Concept of aerobic respiration, sugar degradation pathways i.e. EMP, ED, Pentose phosphate pathway TCA cycle. Electron transport chain: components of respiratory chain, comparison of mitochondrial and bacterial ETC, electron transport phosphorylation, uncouplers and inhibitors.	1	8 & 9
	Instructional Hours		**12**
III	**Chemoheterotrophic Metabolism - Anaerobic respiration and fermentation:** Anaerobic respiration with special reference to dissimilatory nitrate reduction (Denitrification; nitrate /nitrite and nitrate/ammonia respiration; fermentative nitrate reduction). Fermentation - Alcohol fermentation and Pasteur effect; Lactate fermentation (homofermentative and heterofermentative pathways), concept of linear and branched fermentation pathways.	2	8
	Instructional Hours		**12**
IV	**Chemolithotrophic and Phototrophic Metabolism:** Introduction to aerobic and anaerobic chemolithotrophy with an example each. Hydrogen oxidation (definition and reaction) and methanogenesis (definition and reaction). Introduction to phototrophic metabolism - groups of phototrophic microorganisms, anoxygenic vs. oxygenic photosynthesis with reference to photosynthesis in green bacteria and cyanobacteria. **Nitrogen Metabolism:** Introduction to biological nitrogen fixation. Ammonia assimilation. Assimilatory nitrate reduction.	1	10 &12, 14
	Instructional Hours		**12**
V	**Advances in microbial physiology**: Determination of bacterial growth curve, effect of temperature & pH on microbial growth, biochemical test - acid and gas production, starch hydrolysis, lipid hydrolysis. Starvation of C and P.	3	7

Instructional Hours	**12**
Total Hours	**60**

Text Book(s):

1. Kim B. H.. Gadd G.M., **Bacterial Physiology and Metabolism**. Cambridge University Press, Cambridge, 2008.
2. Albert G. Moat, John W. Foster, Michael P. Spector., **Microbial Physiology**, Wiley – Liss, Inc., New York, 4th Edition, 2003.
3. Alfred E. Brown, Heidi R. Smith, **Benson's Microbiological Applications: Laboratory Manual in General Microbiology**, McGraw-Hill Education, 14th Edition, 2017.

Unit I : Text Book 2, Chapter: 1 (19-26) 3 (35-41)
Unit II : Text Book 1, Chapter: 8 (351-365) & 9 (368-393)
Unit III: Text Book 2, Chapter: 8 (252 - 345)
Unit IV: Text Book 1, Chapter: 10(354-379) & 12 (434-446); 14 (475 – 502)
Unit V : Text Book 3, Chapter: 7: (185-193)

Reference Book(s):

1. Robert K. Poole., **Advances in Microbial Physiology**, Elsevier Academic Press, New York, Volume 49, 2004.
2. Cohen, G. N., **Microbial Biochemistry**, Springer, New York, 3rd Edition, 2014.
3. Rose A.H., **Chemical Microbiology: An Introduction to Microbial Physiology**, Butterworth & Co., USA, 3rd Edition, 2014.
4. Daniel R. Caldwell, **Microbial Physiology & Metabolism**, Wm. C. Brown, Germany, 1995.
5. https://sites.google.com/site/microbialphysiologyoddsem/Teaching-Contents
6. https://web.iitd.ac.in/~amittal/2007_Addy_Enzymes_Chapter.pdf
7. http://nsdl.niscair.res.in/jspui/bitstream/123456789/803/1/CarbonMetabolism.pdf

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Class Performance	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	L	M	M	M	M	H	H	M	L	L	H
CO2	H	M	M	M	M	M	H	H	M	M	L	L	H
CO3	H	M	H	M	M	H	H	H	H	M	L	L	H
CO4	H	M	M	M	M	M	M	H	H	H	M	L	H
CO5	H	M	M	H	H	H	H	H	M	H	M	L	H

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by

Dr. N. THANGAVEL

Convener
CDC

30 MAR 2022

Course Code	Title		
21U3CNA304	Allied Paper IV : Fundamentals of Computer Applications		
Semester: III	Credits: 3	CIA : 30 Marks	ESE:45 Marks

Course Objective

To make the students understand the basic concepts of Information Technology and MS office Application.

Course Outcomes:

CO1	Understand the essential concepts of Information Technology
CO2	Define document, formatting in word
CO3	Understand worksheet and workbook
CO4	Demonstrate slide presentation
CO5	Examine the methods of creating a presentation

Offered by: Computer Science

Course Content **Instructional Hours / Week: 3**

Unit	Description	Text Book	Chapter
I	**The Computer Era- An Introduction:** Introduction to Information concepts and processing – Data - Information – Need for Information – Human being as information processor - Need for Computerization – Information technology- Components of information technology – hardware – software – data – user – storage – communication	1	1
	Fundamentals of Computer System: What is a Computer? – Characteristics of a computer- Intangible benefits	1	2
Instructional Hours			**9**
II	**Creating documents with Word:** Creating blank file – Saving a file – file formats. **Formatting:** Character formatting – formatting techniques- the font group – the font dialog box – page setup basics – Table setup basics – Inserting picture from a file	2	4, 5, 8, 9
Instructional Hours			**9**

III	**Using Excel Worksheets and Work Book:** Understanding workbooks and worksheets – moving around a worksheet – Entering text – entering date – modifying cell content – applying number formatting. **Essential worksheet and cell range:** Learning the fundamentals of excel worksheet – working with rows and columns – understanding cells and range – copying or moving ranges	2	12,13,14
	Instructional Hours		**9**
IV	**Introducing formulas and functions:** Understanding formula basics – entering the formula – editing the formula – Basic counting formula – summing formula – **Getting started making charts** : What is a Chart? – Creating a Chart - Working with charts – Understanding chart types.	2	15,17, 18
	Instructional Hours		**9**
V	**Creating a Presentation, Slides and Text:** Starting a new presentation – Closing and reopening presentation – creating new slides – managing Slides . **Working with table and Charts** : Creating tables, Understanding Charts and chart types	2	21,23
	Instructional Hours		**9**
	Total Hours		**45**

Text Book(s):

1. Chetan Srivastava, "**Fundamentals of Information Technology**", Kalyani Publishers, New Delhi, Edition 2002.
2. John Walkenbach, Herb Tyson, et al., "Office 2007 Bible", Wiley India Pvt. Ltd, 2008

Unit I : Text Book 1, Chapter 1 (1-6), Chapter 2 (7 – 30)

Unit II: Text Book 2, Chapter 4 (81 – 84, 87 - 90) – 5 (112 – 123), 8 (159 – 170, 173 – 179), 9 (181- 189, 205-209)

Unit III: Text Book 2, Chapter 12 (277-281) – 13(289,290, 297-299), 14(303-327)

Unit IV: Text Book 2, Chapter 15 (337 – 348), 17(387-391), 18(411-423)

Unit V : Text Book 2, Chapter 21 (469 – 472,484-491,497 - 500), 23 (551-554, 573-577, 584)

Reference Book(s) :

1. John Walkenbach "**Excel 2007 Bible",** Wiley Publications, 2007
2. Amy Romanoff, Sherry Bonelli, "**Microsoft Office 2000 Complete Refernce"**, BPB Publication, New Delhi.
3. Sanjay Saxena "**MS Office 2007 in a Nutshell**", Vikas Publishing House, Noida, 2001.
4. Dinesh Maidasani, "**Learning Computer Fundamentals, Ms Office and Internet & Web Tech"** , Firewall Media, 2005

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Class Participation	Assignment	Seminar	Total
4	4	7	5	5	5	30

Mapping of CO and PO

PO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	M	H	H	M	H	-	-	-	-	M
CO2	M	M	M	M	H	M	M	H	-	-	-	-	L
CO3	H	H	M	H	M	M	H	M	-	-	-	-	M
CO4	M	H	L	M	H	H	M	H	-	-	-	-	L
CO5	M	M	H	H	M	H	H	M	-	-	-	-	M

H-High; M-Medium; L-Low.

Course Designed by	Verified by HoD	Checked by	Approved by
M.SENTHILKUMAR	Dr. M. JANVITHA	Convenor CDC	30 MAR 2022

Course Code	Title		
21U4MBS301	Skill Based Paper I – Fundamentals of Bioinformatics		
Semester: III	Credits: 3	CIA : 30 Marks	ESE: 45 Marks

Course Objective:

To provide a system level understanding of complex interactions within biological systems and to model the biological systems employing computational and mathematical concepts.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Develop knowledge on basic concepts of bioinformatics and its significance in Biological data analysis.
CO2	Gain knowledge about various biological databases that provide information about nucleic acids and protein.
CO3	Get expose to computational methods, tools and algorithms employed for biological data Interpretation.
CO4	Understand the structural organization, structural properties and various techniques employed in the structure determination of biological macromolecules – DNA and protein.
CO5	Describe about protein folding, RNA and its significance.

Offered by: Microbiology

Course Content **Instructional Hours / Week: 3**

Unit	Description	Text Book	Chapter
I	**Definition of Bioinformatics**: Scope applications and limitations. Biological databases – Types of Databases, pitfalls and information Retrieval from biological databases.	1	1
	Instructional Hours		**05**
II	Database of metabolic pathways, Mode of data storage - File formats - FASTA, Genbank and Uniprot, Data submission & retrieval from NCBI, EMBL, DDBJ, Uniprot, PDB.	3	4
	Instructional Hours		**10**
III	**Sequence Alignment:** Global Alignment, Local Alignment, parametric and Multiple Alignment, Profile. **Phylogeny:** Introduction, Molecular clock, additive distance trees, Parsimony, Heuristics.	2	7, 8
	Instructional Hours		**10**
IV	**Genome organization and analysis:** Diversity of Genomes: Viral, prokaryotic & eukaryotic genomes Genome, transcriptome, proteome, 2-D gel electrophoresis, Maldi Toff spectroscopy.	2	19
	Instructional Hours		**10**
V	**Structural Bioinformatics:** Protein Structure basics. Protein Secondary and Tertiary Structure Prediction. RNA structure Prediction.	3	6
	Instructional Hours		**10**
	Total Hours		**45**

Text Book(s):

1. Gautam B. Singh, **Fundamentals of Bioinformatics and Computational Biology**, Springer Cham Heidelberg, New York, 2015.
2. Vittal R. Srinivas, **Bioinformatics: A Modern Approach**, PHI Learning Private Limited, New Delhi, 2005.
3. Venkatarajan Subramanian Mathura and Pandjassarame Kangueane, **Bioinformatics: A Concept Based Introduction**, Springer, New York, 2009.

Unit I : Text Book 1, Chapter 1: 37-122.
Unit II : Text Book 3, Chapter 4: 39-61.
Unit III: Text Book 2, Chapter 7: 65-101, Chapter 8: 102-121.
Unit IV: Text Book 2, Chapter 19: 213-224.
Unit V : Text Book 3, Chapter 6: 63-75.

Reference Book(s):

1. Teresa K. Attwood and David J. Parry-Smith, **Introduction to Bioinformatics**, Prentice Hall. Pearson Education Limited, England, 1999.
1. Stephen Misener and Stephen A. Krawetz, **Bioinformatics – Methods and Protocols,** Humana Press Inc. New Jersy, 2000.
2. https://nptel.ac.in/content/storage2/courses/102103044/pdf/mod6.pdf

Tools for Assessment (30 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Class Performance	Total
4	4	7	5	5	5	30

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	M	M	M	H	H	L	M	L	L	M
CO2	H	M	M	H	M	H	H	H	M	L	L	L	H
CO3	H	H	H	H	H	M	H	H	H	H	L	L	M
CO4	M	H	M	M	M	H	H	H	H	H	M	-	H
CO5	H	H	H	H	H	H	H	H	M	H	H	H	H

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
	30/3/22 Dr. N. THANGAVEL	Convenor CDC	30 MAR 2022

Course Code	Title	
21U4NM3BT1	Part IV – BASIC TAMIL - I	
Semester: III	Credits: 2	CIA : 50 Marks

(Common to all UG Programmes)

Course Objective: jkpo; nkhopiaf fw;gjpy; – nkhopj;jwid tsHj;jy;

Course Outcomes:

CO1	jkpo; vOj;Jf;fs; mwpKfk nra;jy kw;Wk; thrpj;jy Mfpatw;wpd gad;ghL;iL mwpar nra;jy.
CO2	gpwnkhop fw;wy MHtk J}zLy
CO3	gpwnkhop mwpTj jpwd Nkk;gLr nra;jy.
CO4	thHj;ij mikf;Fk jpwd; ngwr; nra;jy;.
CO5	ifnaOj;Jj;jpwd ngwr; nra;jy;.

Offered by : jkpo;j;Jiw

Course Content **Instructional Hours / Week: 2**

Unit	Description	
I	jkpo; nkhopapd; mbg;gilf; $Wfs	
	1. vOj;Jf;fs - capH vOj;Jf;fs 2. nka vOj;Jf;fs 3. capHnka vOj;Jf;fs	
	Instructional Hours	**10**
II	nrhy; mikj;jy	
	1. XH vOj;J xU nkhop 2. ,uz;L Kjy; le;J vOj;Jr; nrhw;fs; 3. jkpo; khjq;fs ngah;> foikfspd ngaH 4. tz;zq;fs ngaH 5. nrhy; Mf;fk;	
	Instructional Hours	**5**
III	njhLuikg;G	
	1. vOtha 2. nrag;gLnghUs 3. gadiy	
	Instructional Hours	**5**
IV	Fwpg;G vOJjy	
	1. njhLuikg;G 2. gj;jp mikg;G	
	Instructional Hours	**5**
V	gio ef;Fjy	
	1. xw;Wg;gpio 2. thf;fpag gio	
	Instructional Hours	**5**
	Total Hours	**30**

ghLj;njhFg;G :

,sq;fiy jkpo; khztHfSf;Fhpa ghL E}y; **"mhpr;Rtb"**
njhFg;G: jkpo;j;Jiw NeU fiy mwptpay; fy;Y}hp> Nfhak;Gj;J}H.

ghH¡it E}y;fs;

1. gtze;j KdptH> ed;D}y G+ypA+Hf;Nfrpfd; ciwrhyjh gjpg;gfk> nrd;id – 40.
2. njhy;fhg;gpak> fNzrlaH gjpg;G> cyfj jkpohuha;r;rp epWtdk> nrd;id – 113.
3. m.fp.gue;jhkdhH – ey;yjkpo vOjNtz;Lkh? my;yp epiyak> nrd;id – 007.

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Writing Skills	Reading Skills	Translation Knowledge	Total
8	8	10	8	8	8	50

Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	-	H	M	H	H	-	-	-	-	-
CO2	-	-	H	-	M	M	L	H	-	-	-	-	-
CO3	-	-	H	-	L	M	M	H	-	-	-	-	L
CO4	-	-	M	-	L	M	H	M	-	-	-	L	L
CO5	-	-	H	-	M	M	H	H	-	-	-	L	-

H-High; M-Medium; L-Low;

Course Designed by	Verified by	Checked by	Approved by
30/3/22 (Dr. A. Sridevi)	30/3/22 (Dr. A. Sridevi)	Convener CDC	30 MAR 2022

Course Code	Title	
21U4NM3AT1	Part IV – Advanced Tamil - I	
Semester : III	Credits : 2	ESE : 50 Marks

(Common to all UG Programmes)

Course Objective : GJf;ftpij cUthf;Fk jpwd tsHj;jy. nkhopj;jpwd; Nkk;gLj;jy

Course Outcomes :

CO1	GJfftpij cUthf;Fk jpwd; tsHjjy;
CO2	njhLH kw;Wk; gj;jpfspy gpioapd;wp vOjr nra;jy
CO3	nkhopiag gpioapd;wpg Ngr> vOJk jpwdngwr nrajy
CO4	fbjk vOJjy kw;Wk; nkhopawpitg ngWjy.
CO5	gilgghf;fjjpwd mwpTngwr nrajy.

Offered by : jkpo;j;Jiw

Course Content **Instructional Hours / Week : 2**

Unit	Description	
I	GJf;ftpij	
	1. ghujpahH–GJikgngz 2. ghujpjhrd - ,UzLtPL	
	Instructional Hours	**10**
II	gpio ef;Fjy	
	1. thHj;ijg gpio ePf;fk; 2. njhLH gpio ePf;fk; 3. gj;jp vOjr nra;jy	
	Instructional Hours	**5**
III	,yf;fzg gapw;rp mspj;jy	
	1. njhifepiyj njhLH 2. njhfhepiyj njhLH 3. MFngaH> MFngaH tiffs	
	Instructional Hours	**5**
IV	fbjk vOJjy	
	1. ghuhLLf fbjk 2. ed;wpf fbjk 3. miog;Gf fbjk 4. mYtyff fbjk;	
	Instructional Hours	**5**
V	,yf;fpa tuyhW	
	1. GJf;ftpijapd Njhw;wKk; tsHr;rpAk; 2. ghujpahH- Fwpg;G tif. 3. ghujpjhrd - Fwpg;G tif.	
	Instructional Hours	**5**
	Total Hours	**30**

ghLj;njhFg;G

,sq;fiy Kjyhk Mz;L jkpo; khztHfSf;Fhpa ghlE}y; "jpuLL"
njhFg;G: jkpo;j;Jiw NeU fiy kw;Wk; mwptpay; fy;Y}hp> Nfhak;Gj;J}H - 105

ghh;it E}y;fs

1. ghujpahH – ghujpahH ftpijfs> mgpuhkpgjpg;gfk>7- gpnfhbkuj; njU> nrd;id– 013
2. gtze;jpKdtH–ed;D}y G+ypA+Hf;Nfrpfd ci rhujh gjpg;gfk> nrdid-040
3. jkpozzy - GjpaNehf;fpy jkpo ,yf;fpa tuyhW>kPdhLrp Gj;jf eiyak> kJiu–001.
4. m.fp. gue;jhkdhH–ey;yjkpo vOj Ntzlkh? my;ypepiyak> nrdid–600 007.
5. fh..Nfh.Ntq;fLuhkd;- jkpo ,yf;fa tuyhW jkpokz gjpg;gfk - ehkf;fy;.
6. khztH jkpo ,yf;fzk - GytH.ftpaofd vk;.V.>R+Lhkzp gpuRuk;> nrdid–083.

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	M	-	M	L	L	M	-	-	-	-	-
CO2	-	-	H	-	M	H	M	H	-	-	-	-	-
CO3	-	-	H	-	L	L	H	H	-	-	-	-	L
CO4	-	-	H	-	M	L	M	H	-	-	-	L	L
CO5	-	-	M	-	M	L	M	H	-	-	-	L	-

H-High; M-Medium; L-Low;

Course Designed by	Verified by	Checked by	Approved by
(Dr. A Sridevi)	(Dr. A. Sridevi)	Convenor CDC	30 MAR 2022

Course Code	Title	
21U4NM3CAF	Non Major Elective : Consumer Affairs	
Semester : III	Credits : 2	ESE : 50 Marks

(Common to all UG Programmes)

Course Outcomes:

On successful completion of the course, the students will be able to

CO1	Know their rights and responsibilities as a consumer
CO2	Gain knowledge about Legal framework of protecting consumer rights
CO3	Understand the procedure about redressal of consumer complaints
CO4	Learn about Consumer related regulatory agencies and norms
CO5	Comprehend business firms, interface with consumers

Course Content **Instructional Hours / Week : 2**

Unit	Description	Text Book
I	**Conceptual Framework** **Consumer and Markets:** Concept of Consumer, Nature of markets: Liberalization and Globalization of markets with special reference to Indian Consumer Markets, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP), Fair Price, GST, labeling and packaging along with relevant laws, Legal Metrology.	1
	Consumer Complaining Behaviour: Alternatives available to Dissatisfied Consumers; Complaint Handling Process	1
	Instructional Hours	**6**
II	**The Consumer Protection Law in India** **Objectives and Basic Concepts:** Consumer rights and UN Guidelines on consumer protection, Consumer goods, defect in goods, spurious goods and services, deficiency in service, unfair trade practice.	1
	Instructional Hours	**6**
III	**Grievance Redressal Mechanism under the Indian Consumer Protection Law** Who can file a complaint? Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy available; Temporary Injunction, Offences and penalties.	1
	Instructional Hours	**6**
IV	**Role of Industry Regulators in Consumer Protection –** industry self-regulation (ISR), Protection policies, Consumer Protection Agencies i. Telecommunication: TRAI ii. Food Products: FSSAI iii. Insurance : IRDA and Insurance Ombudsman	1
	Instructional Hours	**6**

V	**Contemporary Issues in Consumer Affairs** **Consumer Movement in India:** Formation of consumer organizations and their role in consumer protection, Misleading Advertisements and sustainable consumption, National Consumer Helpline, Comparative Product testing.	1
	Quality and Standardization: Voluntary and Mandatory standards; Role of BIS, Indian Standards Mark (ISI), Ag-mark, Hallmarking, Licensing and Surveillance.	1
	Instructional Hours	**6**
	Total Hours	**30**

Text book

1. "Consumer Affairs", Compiled by Department of Business Administration, Nehru Arts and Science College.

Suggested Readings

1. Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and H.K. Awasthi. (2007) Consumer Affairs, Universities Press.
2. Choudhary, Ram Naresh Prasad (2005). Consumer Protection Law Provisions and Procedure, Deep and Deep Publications Pvt Ltd.
3. G. Ganesan and M. Sumathy. (2012). Globalisation and Consumerism: Issues and Challenges, Regal Publications
4. Suresh Misra and Sapna Chadah (2012). Consumer Protection in India: Issues and Concerns, IIPA, New Delhi
5. Rajyalaxmi Rao (2012), Consumer is King, Universal Law Publishing Company
6. Girimaji, Pushpa (2002). Consumer Right for Everyone,Penguin Books.

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	-	–	–	M	H	H	M	-	-	-	-	-
CO2	L	-	–	–	M	H	H	M	-	-	-	L	-
CO3	L	-	–	–	M	H	M	M	-	-	-	-	L
CO4	L	-	–	–	M	H	H	M	-	-	-	-	-
CO5	L	-	–	–	M	H	H	M	-	-	-	L	L

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
30/3/22 Dr. T. SUDHA	30/3/22 Dr. M. THANGAVEL	Dr. K. Selvavinayaki CDC	30 MAR 2022

Course Code	Title	
21U4NM3GTS	Non Major Elective : Gandhian Thoughts	
Semester : III	Credits : 2	ESE : 50 Marks

(Common to all UG Programmes)

Course Objective:

To make the Students understand the philosophies of Gandhiji and fulfill their duties and responsibilities towards the society.

Course Outcomes:

On successful completion of the course, the students will be able to

CO1	Aware about the significance of Gandhian thought
CO2	Understand the applicability of Gandhian methods in the contemporary economic and social demines.
CO3	Analyze the area of truth, non-violence and peace.
CO4	Familiarize with the view of Gandhiji on women
CO5	Delineate the framework of democracy in Gandhian perspective

Course Content **Instructional Hours/Week : 2**

Unit	Description	Text Book
I	**Educational Philosophy of Gandhiji:** Definitions on Education - What is True Education? - Gandhiji's New Scheme of Education - Wardha Scheme of Education - Main Aims of Gandhian Education - Why Gandhiji's Scheme of Education was Called 'Basic Education?' - Features of the Wardha Scheme of Education - Features of Basic Education - The Methodology of Basic Education - The Content of Basic Education - Routine Work of a Basic School	**1**
	Instructional Hours	**6**
II	**Gandhian Concept of Correlation of Studies -** Technique of Correlation - The Place of Teacher in Basic Education - Merits of Basic Education - Educational Scenario after Independence - Influences of Gandhiji on Education Commissions - Basic Schools in the Present Society - Education for Peace – A Gandhian View - Why Basic Education is called a Holistic Model	**1**
	Instructional Hours	**6**
III	**Gandhiji's View on Truth and Non-Violence :** Gandhiji's Words about Truth - Meaning of Truth, Truth is God - Truth and God - The Importance of Truth in Human Life - Absolute and Relative Truth - Realisation of the Self - Liberation.	**1**
	Instructional Hours	**6**
IV	**Mahatma Gandhi's Views on Women :** Status of Women in Pre Independence India - Gandhi's Perception of Women - Role of Women in Family – Perception of Gandhi - Value of Equality - Women in Politics - Gandhiji's Vision to Abolish Social Evils against Women - Role of Women as Envisaged by Gandhi.	**1**
	Instructional Hours	**6**

V	**Gandhiji's View on Democracy :** Problem of Majority and Minority – Democracy, Gandhian strategies for democratic decentralization, **Gram Swaraj:** City and Village - Gram Swaraj - Critique of Industrialisation - Critique of Machinery, Participatory Democracy Swarajyam Grama Rajya and Ramarajya.	**1**
	Instructional Hours	**6**
	Total Hours	**30**

Text Book(s):

1. "Gandhian Thoughts", Compiled by Nehru Arts and Science College.

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	-	-	L	H	H	L	-	-	-	-	-
CO2	-	-	-	-	–	H	H	L	-	-	-	-	-
CO3	-	-	-	-	–	H	H	L	-	-	-	-	-
CO4	-	-	-	-	–	H	H	L	-	-	-	-	L
CO5	-	-	-	-	–	H	H	L	-	-	-	-	L

H-High; M-Medium; L-Low;

Course Designed by	Verified by HOD	Checked by	Approved by
P. 30/3/22 (Dr.P.NATHIYA)	P. 30/3/22 (Dr.P.NATHIYA)	Convenor CDC	30 MAR 2022

Course Code	Title	
21U4NM3WRT	Non Major Elective : Women's Rights	
Semester : III	Credits : 2	ESE : 50Marks

(Common to all UG Programmes)

Course Objective:

To facilitate the awareness about the social, economical, political, intellectual or cultural contributions of Women in India.

Course Outcomes:

CO1	Aware of basic constitutional rights
CO2	Gain awareness on Political rights
CO3	Understand individual and familial rights
CO4	Grasp the provisions for Women's Rights in India
CO5	Develop an understanding of the Protection Mechanisms for women

Course Content **Instructional Hours / Week : 2**

Unit	Description	Text book	Chapter
I	**Constitutional Rights of Women in India**: Indian constitution relating to women - Fundamental rights - Directive principles of state policy - right to equality - rights against exploitation - cultural and educational rights - the right to constitutional remedy - University Declaration of Human Rights - Enforcement of Human Rights for Women and Children - Role of Cells and Counseling Centers - Legal AID cells, Help line, State and National level Commission	4	2
	Instructional Hours		**6**
II	**Political Rights of Women in India:** Political Rights of Women in India - Electoral process - women as voters - candidates and leader - pressure group, 73rd and 74th amendment and representation of women in local self-government – women in Rural and urban local bodies - Reservation of women - party ideologies and women's issues.	5	1
	Instructional Hours		**6**
III	**Women's Rights: Access to Justice** Introduction–Criminal Law–Crime Against Women Domestic Violence – Dowry Related Harassment and Dowry Deaths - Molestation – Sexual Abuse and Rape Loopholes in Practice– Law Enforcement Agency	3	**7**
	Instructional Hours		**6**
IV	**Women's Rights** Violence Against Women – Domestic Violence The Protection of Women from Domestic Violence Act, 2005, The Marriage Validation Act, 1982 - The Hindu Widow Re-marriage Act, 1856- The Dowry ProhibitionAct,1961	3	5
	Instructional Hours		**6**

V	**Special Women Welfare Laws** Sexual Harassment at Work Places, Rape and Indecent Representation, The Indecent Representation (Prohibition) Act, 1986, Immoral Trafficking, The Immoral Traffic (Prevention) Act, 1956 - Acts Enacted for Women Development and Empowerment, Role of Rape Crisis Centers. Protection of Children from sexual Offences Act 2012	3	9
	Instructional Hours		**6**
	Total Instructional Hours		**30**

Text Books:

1. Nitya Rao **Good Women do not Inherit Land** Social Science Press and OrientBlackswan2008
2. International Solidarity Network **Knowing Our Rights** An imprint of KaliforWomen2006
3. P. D. Kaushik **"Women Rights"** Book well Publication 2007 UN Centre for Human Rights, Discrimination against Women (Geneva: World Campaign for Human Rights,1994).
4. Agnes, Flavia. (1992). "Give us "Give us This Day Our Daily Bread: Procedures and Case Law on Maintenance". Majlis, Bombay.
5. Agnes, Flavia. (1999). "Law and Gender Inequality: The Politics of Women"s Rights in India". OUP, New Delhi

Reference Books:

1. Aruna Goal **Violence Protective Measures for Women Development and Empowerment,** Deep and Deep Publications Pvt.2004
2. Monica Chawla **Gender Justice**, Deep and Deep Publications Pvt. Ltd. 2006
3. Preeti Mishra **Domestic Violence Against Women,** Deep and Deep Publications Pvt.2007
4. Clair M.Renzetti, JeffreyL. Edleson, Raquel Kennedy Bergen, Source Book on **Violence Against Women** Sage Publications 2001

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	L	-	-	H	H	L	-	-	-	-	-
CO2	-	-	L	-	-	H	H	L	-	-	-	-	-
CO3	-	-	L	-	-	H	H	L	-	-	-	-	-
CO4	-	-	L	-	-	H	H	L	-	-	-	-	L
CO5	-	-	L	-	-	H	H	L	-	-	-	-	L

Course Designed by	Verified by HOD	Checked by	Approved by
P. 30/3/22 (Dr.P. Nathiya)	P. 30/3/22 (Dr.P. Nathiya)	Convenor CDC	30 MAR 2022

SEMESTER IV

Course Code	Title		
21U1TAM404	Part I – Tamil - IV		
Semester : IV	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

(Common to all UG Programmes)

Course Objective : சங்ககால மக்களின் வாழ்வியல் வாயிலாக பண்பாட்டுக் கூறுகளை உணர்த்துதல்

Course Outcomes :

CO1	பதினெண்மேற்கணக்கு நூல்களில் எட்டுத்தொகை வழி அற இலக்கிய சிந்தனைகளை வளர்த்தல்
CO2	பதினெண்மேற்கணக்கு நூல்களில் பத்துப்பாட்டு வழி அற இலக்கிய சிந்தனைகளை வளர்த்தல்
CO3	பதினெண்கீழ்க்கணக்கு நூல்களின் வழி அற இலக்கிய சிந்தனைகளை வளர்த்தல்
CO4	தமிழ் நாவல்களின் வழி சமுதாய சிந்தனைகளை மாணவர்களுக்கு எடுத்துரைத்தல்
CO5	இலக்கணம், தமிழ் இலக்கிய வரலாற்றுத் திறனை மாணவர்களுக்கு மேம்படுத்துதல்

Offered by : j kpo;j;Jiw

Course Content **Instructional Hours / Week : 5**

Unit	Description	
I	எட்டுத்தொகை நற்றிணை ___ பாடல் (21 ___ 25) அகநானூறு ___ குறிஞ்சி ___ பெருங்குன்றுக்கிழார் ___ நெய்தல் அம்மூவனார் ___ பாலை ___ பெருந்தலைச்சாத்தனார் குறுந்தொகை-நெய்தல் (56) சிறைக்குடி ஆந்தையார் குறிஞ்சி ___ வெள்ளிவீதியார்(58) குறிஞ்சி___ கடுந்தோட்கரவீரன் (69) புறநானூறு ___ பாடல் எண் 390 ___ அதியமான் நெடுமான் அஞ்சியை ஔவையார் பாடியது	
	Instructional Hours	**15**
II	பத்துப்பாட்டு திருமுருகாற்றுப்படை___நக்கீரர் ___ (1 ___ 100 பாடல் வரிகள்) மதுரைக்காஞ்சி ___ மாங்குடிமருதனார் ___ (1 ___ 69 பாடல் வரிகள்) குறிஞ்சிப்பாட்டு ___ கபிலர் ___ (1 ___ 103 பாடல் வரிகள்) மலைப்படுகடாம் (கூத்தராற்றுப்படை) (1 ___ 53 பாடல் வரிகள்) பெருங்குன்றூர் பெருங்கௌசிகனார்	
	Instructional Hours	**15**
III	அற இலக்கியங்கள் நான்மணிக்கடிகை ___ விளம்பிநாகனார் (1 ___ 10 பாடல்கள்) இனியவைநாற்பது ___ பூதஞ்சேந்தனார்)(1 ___ 10 பாடல்கள்) களவழிநாற்பது ___ (பொய்கையார்) (11 ___ 20 பாடல்கள்) ஆசாரக்கோவை ___ (பெருவாயினமுள்ளியார்) (1 ___ 10 பாடல்கள்)	
	Instructional Hours	**15**
IV	நாவல் அலைவாய்க்கரையில் - இராஜம்கிருஷ்ணன் மிளிர்கல் - இரா. முருகவேல்	
	Instructional Hours 15	**15**
V	இலக்கணம், தமிழ் இலக்கிய வரலாறு முதற்பொருள் கருப்பொருள் உரிப்பொருள் பதினெண் கீழ்கணக்கு நூல்கள் புதினத்தின் தோற்றமும் வளர்ச்சியும்	
	Instructional Hours	**15**
	Total Hours	**75**

பாடத்தொகுப்பு
இளங்கலை முதலாம் ஆண்டு தமிழ் மாணவர்களுக்குரியபாடநூல ”நெடும் புனல்”
தொகுப்பு: தமிழ்த்துறை, நேரு கலை மற்றும் அறிவியல் கல்லூரி, கோயம்புத்தூர் - 105
பார்வை நூல்கள்
1. சங்கஇலக்கியங்கள் - எட்டுத்தொகை, பத்துப்பாட்டுஇ கழக வெளியீடு, திருநெல்வேலி.
தென்னிந்திய சைவ சித்தாந்த நூற்பதிப்புக் கழகம், சென்னை ___ 018.
2. தமிழண்ணல் - புதியநோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை-001.
போ.வே. சோமசுந்தரனார்(உரை), பத்துப்பாட்டு, சைவ சித்தாந்த நூற்பதிப்புக் கழகம் சென்னை-01
3. எஸ்.கௌமாரீஸ்வரி (தொகுப்பாசிரியர்) பதினெண்கீழ்க்கணக்கு நூல்கள் மூலமும் உரையும்
அலைவாய்க்கரையில் - இராஜம்கிருஷ்ணன் - நியூசெஞ்சூரியன் புக்ஹவுஸ், சென்னை
மிளிர்கல் - இரா. முருகவேல் - ஐம்பொழில் பதிப்பகம், சென்னை

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Seminar	Assignment	Group project	Total
8	8	10	8	8	8	50

Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	-	H	M	H	H	-	-	-	-	-
CO2	-	-	H	-	H	M	H	H	-	-	-	-	-
CO3	-	-	H	-	M	M	H	H	-	-	-	-	L
CO4	-	-	H	-	M	H	M	L	-	-	-	L	L
CO5	-	-	H	-	M	L	M	H	-	-	-	-	-

H-High; M-Medium; L-Low;

Course Designed by	Verified by	Checked by	Approved by
30/3/22 (Dr. A. Srilekha)	30/3/22 (Dr. A. Srilekha)	Convenor CDC	30 MAR 2022

Course Code	Title		
21U1HIN404	PART – I : HINDI - IV		
Semester : IV	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

(Common to all UG Programmes)

पाठ्यक्रम का उद्देश्य : 1 साक्षरता प्रशंसा और विश्लेषण के सौंदर्य, सांस्कृततक और सामाजिक पहलुओं के प्रतत छात्रों को संि◌ेदनशील बनाना |

2 उन्हें विभिन्न कालों के प्रख्◌ात लेखकों के हहंदी कथा साहहत्र् के बेहतरीन नमूने उपलब्ध कराना |

पाठ्यक्रम के परिणाम :

CO1	हहंदी गद्र् लेखन में छात्रों को विभिन्न प्रकार के विचारों और शैभलर्◌ो◌ं से पररचचत कराना	
CO2	उनकी सोच और लेखन कौशल को विकभसत करने में उनकी मदद करने के भलए	
CO3	रचनात्मक लेखन कौशल हाभसल करने के भलए	
CO4	हहंदी शब्दाि◌ली का अच्छा ज्ञान प्राप्त करने के भलए	
CO5	पाठ्क्रम आधुतनक साहहत्र् के बारे में ि◌ानने में मदद करता है।

Offered by : Hindi Department

अध्यन विषयिस्तु **ननदेशात्मक घंटे / सप्ताह: 5**

इकाई	वि◌ि◌ण	
I	आपका बंटी : उपन्र्◌ास (मुन्न ि◌ंडारी)	
	ननदेशात्मक घंटे	**25**
II	कथा माला : लौटना और लौटना (मृदुला गगग) ,गगल्लू (महादेवी वमाग) ,ममता (जयशंकर प्रसाद) ,आदमी का बच्चा (यशपाल), अपना पराया (जैनेंद्र कु मार)	
	निर्देशात्मक घंट	**10**
III	आधुननक काल : आधुननक हहंदी साहहत्य और समकालीन हहंदी साहहत्य सामान्यपररचय , प्रवृनतयां और कवव	
	निर्देशात्मक घंट	**20**
IV	सामान्य ननबंध : आधुननक शशक्षा प्रणाली , मोबाइल का दुष्पररणाम आधुननक युवा पीढी , आधुननक संचार क्◌ा◌ंनत , साहहत्र् समाि◌ का दपयण है	
	ननदेशात्मक घंटे	**10**
V	शसनेमा समीक्षा : पद्मावत	
	ननदेशात्मक घंटे	**10**
	कु ल घंटे	**75**

पाठय पुस्तक :

1. आपका बंटी : उपन्ा्ास (मुन्निंडारी) राधा कृ ष्णप्रकाशन, हदल्ली
2. कहानी कंु ज , गोववद प्रकाशन , मथुरा
3. हर हाल बेगाने - मृदुला गगग , राजपाल एंड संस , हदल्ली
4. मेरा पररिार , लोकिारत प्रकाशन, इलाहाबाद

संदर्ग **ग्रंथ :**

1. संि् चौहान , समकालीन हहंदी साहहत्् विचार और विि ाद , आशा ककतावें
2. श्री रामदेव, व्याकरण प्रदीप, लोकर्ारती प्रकाशन, अलाहाबाद
3. डॉ वासुदेव नंदन प्रसाद, आधुननक हहंदी व्याकरण और रचना, र्ारती र्वन प्रकाशक
4. **ओंकाि नाथ ि्ाा , सामान्य हहंदी , अरिहंत प्रकाशन भाित लिलमटेड**

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Project	Total
8	8	10	8	8	8	50

Mapping

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	-	L	M	L	-	-	-	-	-	-
CO2	-	-	M	-	L	M	H	-	-	-	-	-	-
CO3	-	-	M	-	M	H	M	-	-	-	-	-	L
CO4	-	-	H	-	-	M	-	-	-	-	-	-	L
CO5	-	-	M	-	-	-	-	-	-	-	-	L	L

H-High; M-Medium; L-Low

Course Designed by	Verified by HoD	Checked by	Approved by

30 MAR 2022

Course Code	Title		
21U1MAL404	Part - I : Malayalam - IV		
Semester : IV	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

Course Objective: സിനിമ എന്ന മാധ്യമത്തിന്റെ വിവിധ് തലങ്ങറെ ആഴത്തിൽ മനസ്സിലാക്കാൻ കഴിയുന്നു. കകരെത്തിന്റെ നാകടാടി വിജ്ഞാനീയറത്ത കുെിച്ചുള്ള ഞെിവ് ലഭിക്കുന്നു.

Course Outcomes:

CO1	തിരക്കഥയിറല സംഭാഷണത്തിന്റെ പ്രസക്തി
CO2	മനക്കരുത്തിലൂറട വീട്ടിറല എലലാ അംഗങ്ങറെയും ദുുഃഖം ഞെിയിക്കാറത മംഗെകർമ്മം നടത്തുന്നു.
CO3	കുടുംബത്തിന്റെ തകരുന്ന മൂലയറത്ത ഉയർത്തുന്നു
CO4	നാടൻ കലകെിറല വിജ്ഞാനം
CO5	നാടൻ കലയിറല വിശുദ്ധി

Offered by : Malayalam Department

Course Content **Instructional Hours/Week: 5**

Unit	Description	
I	തിരക്കഥ - ഭരതം	
	Instructional Hours	**15**
II	തിരക്കഥ - ഭരതം	
	Instructional Hours	**15**
III	തിരക്കഥ - ഭരതം	
	Instructional Hours	**15**
IV	നാട്ടെിവുകുെറട ഉള്ളെകെികലക്ക്	
	Instructional Hours	**15**
V	നാട്ടെിവുകുെറട ഉള്ളെകെികലക്ക്	
	Instructional Hours	**15**
	Total Hours	**75**

രാഠരുസ്തകങ്ങൾ :

1. ഭരതം – തിരക്കഥ - കലാഹിതദാസ് - മാതൃഭൂമി
2. നാട്ടെിവുകുെറട ഉള്ളെകെികലക്ക് (5 കലഖനങ്ങൾ) - വട്ടപ്പെമ്പിൽ രീതാംബരൻ - കകരെ ഭാഷാ ഇൻസ്റ്റിറ്റ്യൂട്ട്, തിരുവനന്തരുരം

സഹായകപ്ഗ്രന്ഥങ്ങൾ :

1. കഥയും തിരക്കഥയും കMാ.ആർ.വി.എം.ദിവാകരൻ
2. മലയാെ സിനിമയും സാഹിതയവും - മധു ഇെവങ്കര
3. ഒരു സിനിമ എങ്ങറന ഉണ്ടാകുന്നു. - റക.റക. ചപ്രൻ

4. കഥാക് കലാർ നിഘണ്ടു - കമാ.എം.വി. വിഷ്ണുനമ്പൂതിരി, മാ.സി.ബുക്സ് കകാട്ടയം
5. കഥാക് കലാർ രഠനം - കമാ.രാഘവൻ രയ്യനാട്, കകരെി ബുക്സ്
6. നാട്ടെിവുകൾ- കമാ. എം.വി. വിഷ്ണുനമ്പൂതിരി, മാ.സി.ബുക്സ് കകാട്ടയം

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Group Project	Total
8	8	10	8	8	8	50

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	M	L	L	-	-	-	-	-	-	-
CO2	-	-	L	M	H	-	-	-	-	-	-	-	-
CO3	-	-	M	L	L	H	-	-	-	-	-	-	L
CO4	-	-	-	M	L	-	-	-	-	-	-	-	L
CO5	-	-	M	-	L	H	-	-	-	-	-	L	L

H-High; M-Medium; L-Low;

Course designed by	Verified by	Checked by	Approved by
30/3/22 RAJANI.N	30/3/22 RAJANI.N	Convenor CDC	30 MAR 2022

Course Code	Title		
21U1FRN404	Part - I : French - IV		
Semester : IV	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

(Common to all UG Programmes)

Course Objective:

This Course equips the Students to use advanced Grammar in the French Language.

Course Outcomes:

Students will be able to

CO1	Learn Gerondif, Subjonctif, relative pronom (ou and don't)
CO2	Differentiate futur simple and futur proche
CO3	Know to express emotions and learn la cause and consequence
CO4	Learn le but and le passif
CO5	Practice translation and comprehend passage

Offered by: French Department

Course Content **Instructional Hours/Week : 5**

Unit	Description	
I	Explorer l'inconnu	
	Instructional Hours	**15**
II	Gouter l'insolite	
	Instructional Hours	**15**
III	Consommer autrement	
	Instructional Hours	**15**
IV	S'engager pour une pause	
	Instructional Hours	**15**
V	Repenser le quotidien	
	Instructional Hours	**15**
	Total Hours	**75**

Text Book:

1. Saison 2 Méthode de Français – Marie-Noëlle Cocton, Anouchka De Oliveira, Dorothée Dupleix

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Group Project	Total
8	8	10	8	8	8	50

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	H	-	M	-	L	L	-	-	-	-	-
CO2	-	-	H	-	-	-	M	-	-	-	-	-	-
CO3	-	-	H	-	M	-	M	L	-	-	-	-	-
CO4	-	-	H	-	M	-	S	-	-	-	-	-	L
CO5	-	-	H	-	-	-	S	L	-	-	-	-	L

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by
30/3/22 Ms. Abirami M	30/3/22 Ms. Abirami M	30/3/22 Dr. K. Selvavinayaki Convenor CDC	30 MAR 2022

Course Code	Title		
21U2ENG404	Part II - English - IV		
Semester : IV	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

Course Objective:

To equip the students with Language Skills and develop interest in and appreciation of literature.

Course Outcomes:

CO1	Understand the values of life reflected in the prescribed prose
CO2	Learn to interpret poem based on contextual evidence.
CO3	Enhance imaginative and communication skills through short stories.
CO4	Understand the performing art through drama.
CO5	Acquire proficiency in English for global competency.

Offered by : English department

Course Content **Instructional Hours / Week : 5**

Unit	Description	Text Book	Chapter
I	**Prose** Francis Bacon – Of Adversity Dr. Radhakrishnan- Character is Destiny Oliver Goldsmith – An Account of West Minster Abbey	1	1 - 3
	Instructional Hours		**15**
II	**Poetry** Sarojini Naidu – The Soul's Prayer Emily Dickinson- Death in the Opposite House William Blake – London	1	4-6
	Instructional Hours		**15**
III	**Short Stories** W. Somerset Maugham - Mr. Know - All Edgar All an Poe - The Purloined Letter Ruskin Bond – The Thief Story	1	7-9
	Instructional Hours		**15**
IV	**Drama** William Shakespeare – As You Like It	1	
	Instructional Hours		**15**

V	**GRAMMAR AND COMPOSITION** **Oral & Written Communication (Unit I – IV) Listening** – Comprehension practice from Poetry, Prose, Online Voice Practice, observing / viewing E-content (with subtitles), Guest / Invited Lectures, Conference / Seminar Presentations & Tests, and DD National News Live, BBC, CNN, VO Aetc **Speaking** – In Group Discussion Forum, participate in the Turn Taking, and Conversation Management, Debating, Defending / Mock Viva-Voce, Seminar Presentations on Classroom - Assignments, and Peer-Team-interactions. **Reading** – Different Reading Strategies in Poetry, Prose, Novel, Newspaper etc **Writing** – Clauses – Conditional, Relative, Restrictive, Non-Restrictive, Denotation and Connotations Précis Writing, One word substitution.	1	
	Instructional Hours		**15**
	Total Hours		**75**

Books for study:

Unit I – V : Compiled by the Department of English

Books for Reference:

1. CLIL(Content & Language Integrated Learning)–Module by TANSCHENOTE:

(Text : Prescribed chapter sorpages will be given to the students by the department)

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Presentation	Total
8	8	10	8	8	8	50

Mapping

POS / COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	H	H	M	M	H	H	-	-	-	-	-
CO2	H	M	H	H	M	H	H	H	-	-	-	-	-
CO3	H	M	H	M	H	H	H	H	-	-	-	-	-
CO4	H	H	H	M	H	H	H	H	-	-	-	-	**L**
CO5	H	M	H	H	H	H	H	H	-	-	-	**L**	**L**

H: High, M: Medium , L : Low

Course Designed by	Verified by HoD	Checked by	Approved by
Dr. M. Dhanabagyam	Dr R Malathi	Convenor CDC	30 MAR 2022

Course Code	Title		
21U3MBC406	Core Paper – VI Microbial Genetics and Molecular Biology		
Semester: IV	Credits: 4	CIA : 50 Marks	ESE: 50 Marks

Course Objective:

To make the students understand on mechanism of gene transfer, recombination, regulation and expression.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Understand how DNA and RNA replication and protein synthesis occurs in a cell.
CO2	Elucidate the gene transfer mechanisms in prokaryotes and understand the biology of bacteriophages.
CO3	Have a conceptual knowledge about the mechanism of gene regulation.
CO4	Discuss the molecular mechanisms underlying mutations, detection of mutations and their repair mechanisms.
CO5	Apply knowledge on basic genetics and molecular techniques in microbiology.

Offered by: Microbiology

Course Content **Instructional Hours / Week: 4**

Unit	Description	Text Book	Chapter
I	**DNA replication, transcription and translation:** Nucleic acid as genetic information carrier: Experimental evidence. DNA structure current concepts. DNA replications-bidirectional replication, semi conservative, semi discontinuous, various models of DNA replication including rolling circle. Mechanism of transcription (Prokaryotes) – RNA Polymerase and the transcription unit, translation (Prokaryotes).	1	1
Instructional Hours			**12**
II	**Gene transfer mechanisms:** Transformations, Transductions, conjugation and Transfection, mechanisms and applications. Plasmids: F factor description and their use in genetic analysis. Bacteriophage: Lyticphages-T4. Lysogenic phage – lambda ϕX174: uses in microbial genetics.	1	3
Instructional Hours			**12**
III	**Gene regulation:** Negative regulation – *E. coli* lac operon (structural, operator, promoter and repressor genes), Positive regulation – *E. coli* trp operon; Regulation by small molecules e.g. ppGpp and cAMP Post-translational processing (removal of fmet from polypeptide; ribosome editing: protein folding); Gene silencing (RNAi):An introduction and its application.	2	16-20
Instructional Hours			**12**
IV	**Gene mutation and repair:** Molecular nature of mutations. Mutagens. Spontaneous mutation. DNA damage and repair: type of DNA damage (deamination, oxidative damage, alkylation, pyridine dimers). Repair mechanisms –methyl directed mismatch repair, very short patch repair, nucleotide excision repair, base excision repair, recombination repair, SOS system.	2	26
Instructional Hours			**12**
V	**Methods in genetics and molecular biology:** Isolation of mutants by replica plating technique - isolation, separation and estimation of nucleic acids - competent cell preparation and transformation - gene transfer by conjugation. AMES Test, Carcinogen	3	3

	identification, Mutation gene mapping.		
Instructional Hours			**12**
Total Hours			**60**

Text Book(s):

1. Lori A.S. Snyder, **Bacterial Genetics and Genomics**, CRC Press, 2020.
2. David P. Clark, Nanette Pazdernik, Michelle McGehee, **Molecular Biology**, Academic Press, 3rd Edition, 2018.
3. Saxena J., M. Baunthiyal, I. Ravi, **Laboratory Manual of Microbiology, Biochemistry and Molecular Biology**, Scientific Publishers, 2012.

Unit I : Text Book 1, Chapter 1: 5 - 43.
Unit II : Text Book 1, Chapter 3: 45- 62.
Unit III: Text Book 2, Chapter 16-20: 581 - 690.
Unit IV: Text Book 2, Chapter 26: 832 - 894.
Unit V : Text Book 3, Chapter 3: 248 - 310.

Reference Book(s):

1. Watson, J. D., Baker T.A., Bell, S. P., Gann, A., Levine, M., and Losick, R., **Molecular Biology of the Gene,** Cold Spring Harbour Lab. Press, Pearson Pub., 7th edition, 2017.
2. De Robertis, E.D.P. and De Robertis, E.M.F., **Cell and Molecular Biology**, Lippincott Williams and Wilkins, Philadelphia, 8th edition, 2006.
3. https://www.easybiologyclass.com/molecular-biology-online-tutorials-lecture-notes-study-materials/

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Class Performance	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	M	L	H	M	H	M	L	M	M	M
CO2	H	H	M	M	M	M	M	H	H	M	L	M	M
CO3	H	M	M	H	H	H	H	H	H	M	L	L	M
CO4	H	H	H	H	H	H	H	H	H	L	L	L	M
CO5	H	H	H	H	H	M	H	H	H	L	H	M	M

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
	3-12-21 DR.M.THANGAVEL	Convenor CDC	30 MAR 2022

Course Code	Title		
21U3MBP407	Core Paper VII – Lab in Microbial Physiology, Genetics and Molecular Biology		
Semester: III & IV	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Course Objective:

To teach a variety of techniques used in physiology, genetics and molecular biology research, while conducting discovery-based research.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Outline the key concept of microbial physiology.
CO2	Relate the knowledge on isolation and separation of DNA and RNA.
CO3	Examine quantification methods for DNA and RNA.
CO4	Apply knowledge on techniques in gene transfer.
CO5	Analyse basic concept of mutation.

Offered by: Microbiology

Course Content **Instructional Hours / Week: 3&4**

S. No.	Description
Microbial Physiology	
1	Growth curve and determination of generation time in *E. coli* and yeast.
2	Factors affecting growth - temperature and pH
3	Demonstration of the thermal death time and decimal reduction time of *E. coli*
4	Microbial physiology of various bacteria - Biochemical test - Acid and gas production, Starch hydrolysis, Lipid hydrolysis, IMViC test, Catalase test, H_2S production, Oxidase test and Urease test
Molecular Biology	
5	Isolation of antibiotic resistance mutant by replica plating.
6	Isolation of DNA from bacteria and yeast
7	Estimation of DNA – diphenyl method
8	Electrophoretic separation of DNA
9	Isolation of RNA
10	Estimation of RNA
11	Electrophoretic separation of RNA
Microbial Genetics	
12	Preparation of competent cells
13	Gene transfer by conjugation
14	AMES Test
15	Isolation of petite mutant.
	Instructional Total Hours 105 Hours

Text Book(s):

1. James G. Cappuccino, Chad T. Welsh, **Microbiology: A Laboratory Manual**, Pearson Higher Education & Professional Group, 2017.
2. Stefan Surzycki, **Basic Techniques in Molecular Biology**, Springer, 2012.
3. Janice Speshock, **Microbiology Lab Manual**, Kendall Hunt Publishing Company, 2020.

Reference Book(s):

1. Susan Carson, Sue Carson, Heather Miller. **Molecular Biology Techniques: A Classroom Laboratory Manual**, Elsevier, 2012.
2. Sue Carson, Heather B. Miller, Melissa C. Srougi**, Molecular Biology Techniques: A Classroom Laboratory Manual**, Academic Press, 4th edition, 2019.

Tools for Assessment (50 Marks)

Laboratory Performance			Test I (Mid sem.)	Test II (Model)	Observation note book	Total
Level of engagement in lab	Preparation	Result				
8	8	8	10	10	6	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	M	M	M	M	H	M	L	M	M	M
CO2	H	H	H	H	M	M	H	H	H	l	L	M	H
CO3	H	H	M	M	H	H	H	H	H	M	L	L	H
CO4	H	H	H	M	M	H	M	H	H	L	L	L	H
CO5	H	H	H	H	M	H	H	H	M	M	M	L	H

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
	3-12/22		

DR. M. THANGAVEL

Convenor CDC

30 MAR 2022

Course Code	Title		
21U3MTA405	Allied Paper V – Biostatistics		
Semester : IV	Credits : 3	CIA : 30 Marks	ESE: 45 Marks

Course Objective:

This course introduces the basic Statistical concepts that are applied in Biosciences to enable the students to learn the Statistical measures and their applications.

Course Outcome:

CO1	Describing the method of data collection and presentation
CO2	Memorizing different Measures of Central Tendency and Measures of Dispersion
CO3	Distinguishing different Statistical situations using Sampling Techniques
CO4	Executing one way and two way analysis using Analysis of Variance
CO5	Constructing the equation of a Trend Line using Regression analysis

Offered by: Mathematics

Course Content **Instructional Hours / Week : 4**

Unit	Description	Text Book	Chapter
I	**Introduction to Biostatistics:** Definition – Application – Characteristics – Limitation - Data collection – Classification - Tabulation and frequency distribution.	1	1,3
	Sampling Techniques - Diagrammatic and Graphical Representation of data.	2	2,3
	Instructional Hours		**12**
II	Measures of Central tendency: Mean Median and Mode**.**	2	4
	Measures of dispersion**:** Range, Standard deviation - Co-efficient of variation.	2	5
	Instructional Hours		**12**
III	**Sampling Techniques:** Introduction - Methods of Sampling – Sampling and Non–Sampling errors.	2	2
	Hypothesis Tests: Standard Error – Tests of Significance based on Large samples, ‘t’, ‘F’ and Chi square Tests.	1	12-15
	Instructional Hours		**12**
IV	**Analysis of Variance:** One way and Two way Classifications.	2	9
	Experimental Design – Introduction – Basic Concepts and Principles - Completely Randomized Design (CRD) -	2	10

	Randomized Complete Block Design(RCBD).		
	Instructional Hours		**12**
V	**Correlation:** Introduction – Types of correlation - Scatter diagram – Karl Pearson's co-efficient of Correlation – Coefficient of determination – Spearman's Rank Correlation.	1	8
	Regression Analysis - Regression Coefficients – Properties - Linear Regression.	1	9
	Instructional Hours		**12**
	Total Hours		**60**

Text Books:

1. Dr. P.N. Arora and Dr. P.K. Malhan, **Biostatistics,** Himalaya Publishing House., Revised Edition, 2006
2. Irfan Ali Khan and Atiya Khanum, **Fundamentals of Biostatistics, Ukaaz publications,** Second Revised Edition, 2004

Unit I : Book 1, Chapter 1, Section: 1.1, 1.3 to 1.9, 1.11 to 1.13, Chapter 3.
Book 2, Chapter 2 and 3.

Unit II: Book 2, Chapter 4, Section: 4.1 to 4.4
Chapter 5, Section: 5.1, 5.2, 5.3.1, 5.3.3

Unit III: Book 2, Chapter 2.
Book 1, Chapter 12-15

Unit IV: Book 2, Chapter 9, Section: 9.3 to 9.3.5
Book 2, Chapter 10, Section: 10.1 to 10.4.2.3

Unit V: Book 1, Chapter 8 and 9

Reference Books:

1. John Wiley W.W, **Biostatistics: A foundation for Analysis in health sciences**, 6th Edition, 1995

Tools for Assessment (30 Marks)

CIA I	CIA II	Model	Seminar	Class Participation	Periodical Quizzes	Total
4	4	7	5	5	5	30

Mapping

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	H	H	H	H	H	-	-	-	-	-
CO2	H	M	L	M	H	H	H	H	-	-	-	-	-
CO3	H	M	L	H	H	H	H	H	-	-	-	-	L
CO4	H	H	L	H	H	H	H	H	-	-	-	-	L
CO5	H	M	L	H	H	H	H	H	-	-	-	-	L

H - High; M - Medium; L - Low.

Course Designed by	Verified by HOD	Checked by	Approved by
30/3/22 DHANALAKSHMI.M	30/3/22 T. CHANDRAPUSHPAM	30/3/22 Convenor CDC	30 MAR 2022

Course Code:	Title :		
21U3CNR406	Allied Paper VI : MS Office Practical		
Semester: IV	Credit: 2	CIA : 25 Marks	ESE: 25 Marks

Course Objective:

To enable the students to learn and gain knowledge about MS Office

Course Outcomes:

CO1	Understand the functions of Word, Excel and Power point.
CO2	Apply built in functions and formulas in Excel.
CO3	Use chart representation for data
CO4	Employ various test using Microsoft Excel
CO5	Summarize the model of Power Point presentation

Offered by : Computer Science

Course Content **Instructional Hours / Week: 02**

S. No.	List of Practical
1	Create a Ms – Word document to prepare your resume
2	Create a MS – Word Table to prepare student Mark list
3	Calculate the Mean, Median and Mode for the given data using Microsoft Excel Worksheet.
4	Find the Range, Quartile Deviation, Standard Deviation and Co-efficient of Variance for the given data using Microsoft Excel Worksheet.
5	Find Pearson product moment correlation coefficient for the given data using Microsoft Excel Worksheet.
6	Find t-test, f-test and Chi-square test for the given data using Microsoft Excel Worksheet.
7	Create a MS - Power point presentation to demonstrate Chart
8	Prepare a PowerPoint presentation. Presentation should contain 5 slides with proper heading and content (use picture, Table, Charts)

Tools for Assessment (25 Marks)

Application of Logic	e-Program Creativity	e- Program Debugging	Test 1	Test 2	Observation Note Book	Total
4	4	4	5	5	3	25

Mapping CO and PO

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	M	H	H	M	H	-	-	-	-	M
CO2	M	M	M	M	H	M	H	M	-	-	-	-	L
CO3	H	H	M	H	M	M	M	H	-	-	-	-	M
CO4	M	H	L	M	H	H	H	M	-	-	-	-	L
CO5	M	M	H	H	M	H	M	H	-	-	-	-	M

H-High; M-Medium; L-Low.

Course Designed by	Verified by HoD	Checked by	Approved by
M. SENTHILKUMAR		Convenor CDC	30 MAR 2022

Course Code	Title		
21U4MBS402	Skill Based Paper II – Biofertilizers and Biopesticides		
Semester: IV	Credits: 3	CIA: 30 Marks	ESE: 45 Marks

Course Objective:

Students will impart knowledge on microorganisms as an alternative to synthetic fertilizers and pesticides to increase the soil fertility and disease and pest control in agriculture is gaining prominence.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Acquire knowledge on bacterial biofertilizers for sustainable agriculture.
CO2	Demonstrate the use of cyanobacteria and Azolla in wetland crop improvement.
CO3	Recognize the protagonist of mycorrhizae in crop improvement.
CO4	Investigate the tools for cultivation of phosphate solubilizer.
CO5	Identify an alternative source for synthetic pesticides.

Offered by: Microbiology

Course Content **Instructional Hours / Week: 4**

Unit	Description	Text Book	Chapter
I	**Bacterial biofertilizers:** General account of the microbes used as biofertilizers for various crop plants and their advantages over chemical fertilizers. Isolation, characteristics, types, inoculum production and field application - *Rhizobium, Azotobacter, Azospirillum* and *Frankia*.	1	3
	Instructional Hours		**12**
II	**Algal biofertilizers:** Isolation, characteristics, types, inoculum production and field application of Cyanobacteria (Blue Green Algae) and Azolla: Azolla and *Anabaenaazollae* association, nitrogen fixation, factors affecting growth, blue green algae and Azolla in rice cultivation.	2	11
	Instructional Hours		**12**
III	**Fungal biofertilizers:** Mycorrhizae – ecto and endomycorrhiza. Concept of Mycorrhiza, VAM - Isolation, characteristics, preparation, mass production and field application.	2	3
	Instructional Hours		**12**
IV	**Phosphate Solubilizers:** Phosphate solubilizing microbes – Isolation, characterization, mechanism of phosphate solubilization, mass inoculum production, field application.	3	1 & 2, 9 & 10
	Instructional Hours		**12**
V	**Biopesticides:** History and concept, Definition, Classification, Concept, scope, production and field application - *Bacillus thuringiensis, Trichoderma viride* and Baculovirus. Biosafety. Advantages of biopesticides over synthetic pesticides.	4	4-7
	Instructional Hours		**12**
	Total Hours		**60**

Text Book(s):

1. Panda H., **Manufacture of Biofertilizer and Organic Farming**. Asia Pacific Business Press Inc., Deli, 2011.

2. Kaushik B. D., Deepak Kumar, Md. Shamim. **Biofertilizers and Biopesticides in Sustainable Agriculture**. Apple Academic Press. 2020.
3. Khan, M. S., A. Zaidi and J. Musarrat. **Phosphate Solubilizing Microorganisms.** Springer, Cham. 2014
4. Saleem, F. and A. R. Shakoori. **Development of Bioinsecticide**, Lap Lambert Academic Publishing GmbH KG, 2012.

Unit I: Text Book 1, Chapter 3: 43-62
Unit II: Text Book 2, Chapter 11: 221-236.
Unit III: Text Book 2, Chapter 3: 43-70
Unit IV: Text Book 3, Chapter 1 & 2: 1-62.
Text Book 3, Chapter 9 & 10: 207-256.
Unit V: Text Book 4, Chapter 4-7: 47-130.

Reference Book(s):

1. Deshmukh, A. M., P. P. Dixit and R. M. Khobragade. **Handbook of Biofertilizers and Biopesticides**. Oxford Book Co., Jaipur, India, 2007.
2. Giri, B., Ram Prasad, Qiang-Sheng Wu and Ajit Varma. **Biofertilizers and Sustainable Agriculture**, Springer Nature Switzerland, 2019.
3. Aggarwal SK. **Advanced Environmental Biotechnology**, APH publication, 2005.
4. https://www.slideshare.net/vanithagopal/biofertilizer-40950247
5. https://www.slideshare.net/santoshpathak817/biopesticides-50835900

Tools for Assessment (30 Marks)

CIA I	CIA II (Online)	CIA III	Assignment	Quiz	Class Performance	Total
4	4	7	5	5	5	30

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	M	H	H	L	M	H	H	H	H	M	M	H
CO2	H	H	H	H	M	M	H	M	H	L	L	L	H
CO3	H	L	M	L	M	M	H	H	H	H	M	M	H
CO4	H	H	M	H	M	M	H	H	H	H	L	M	H
CO5	H	H	M	M	L	M	H	H	H	L	M	L	H

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
	30/3/22		
	Dr.M.THANGAVEL	Dr. R. Sabhanayagam Convenor CDC	30 MAR 2022

Course Code	Title	
21U4NM4GEN	Non Major Elective : General Awareness	
Semester : IV	Credits : 2	ESE : 50 Marks

(Common to all UG Programmes)

Course Objective:

Enable the students to learn General knowledge and prepare for different competitive exams.

Course Outcomes:

CO1	Determine Verbal Aptitude , Numerical Aptitude and Logical Reasoning
CO2	Recall basic Science, history , Tamil , Computer , Commerce concepts which would help to crack competitive Examinations
CO3	Acquire time Management skills to attempt competitive Examinations
CO4	Develop Aptitude and problem solving skills
CO5	Gain Knowledge about Current Affairs

Course Content **Instructional Hours / Week : 2**

S. No.	Topics
1.	Verbal Aptitude
2.	Numerical Aptitudeand Logical Reasoning
3.	Abstract Reasoning
4.	Tamil and Other Literature
5.	General Science and Technology
6.	Computer
7.	Economics and Commerce
8.	History and Freedom Struggle
9.	Sports
10.	Current Affairs
	Total Hours : 30

Text Book: “General Awareness”, compiled by Nehru Arts and Science College, Coimbatore

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	-	-	H	-	-	L	-	-	-	-	M
CO2	H	L	-	-	H	-	-	L	M	M	M	M	M
CO3	H	L	-	-	H	-	-	L	-	-	-	-	H
CO4	H	L	-	-	H	-	-	L	-	M	-	-	H
CO5	H	L	-	-	H	-	-	L	L	L	L	H	H

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
30/3/22 Dr. K. REENA	30/3/22 T. CHANDRADVSHPAM	30/3/22 Dr. K. Selvavinayaki Convenor CDC	30 MAR 2022

Course Code	Title	
21U4HVY402	Value Education : Human Values and Yoga Practice II	
Semesters : III & IV	Credits : 2	CIA : 50 Marks

(Common to all UG Programmes)

Course Objective:

To help the students appreciate the essential complementarily between 'values' and 'skills' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings. To prepare and distribute standardized Yoga teaching and training material with reference to institute health**.**

Course Outcomes:

CO1	To understand the values of Self-realization and Harmony
CO2	To transform as a positive personality and understand the importance of healthy mind
CO3	To know the ways for eradication of worries.
CO4	To learn and practice Asanas in day to day life.
CO5	To understand the benefits of Yogasanas for physical and mental well-being.

Course Content **Instructional Hours/Week : 1**

Unit	Description	Chapter
I	**Self-realization and Human Values**-Self-realization and Harmony-Rules and Regulations-Rights and Duties-Good and Obligation-Integrity and Conscience. **Obligation to Family**-Trust and Respect-Codes of Conduct-Citizens Charter-Emotional Intelligence.	
	Instructional Hours	**6**
II	**Character Formation Towards Positive Personality**: Truthfulness, Constructivity, Sacrifice, Sincerity, Self Control, Altruism, Tolerance,	
	Instructional Hours	**6**
III	**Eradication of worries** - Maintaining youthfulness – Greatness of friendship– Refinement of worries-Neutralization of anger-Intelligent quotient(IQ),Emotional quotient(EQ),Spiritual Quotient (SQ)	
	Instructional Hours	**6**
IV	**Standing Posture**: Tadasana, Padahastasana, Virabhadrasana; Sitting posture: Ustrasana, Ardha Matsyendrasana, Paschimottanasana.	
	Instructional Hours	**6**
V	**Supine posture**: Sarvangasana, Halasana, Chakrasana. **Prone posture**: Bhujangasana, shalabhasana; Dhanurasana; **Balancing postures**: Vrikshasana, Natarajasana, Utkatasana; Pranayama: Bhastrika, Bhramari, NadiShodhan.	
	Instructional Hours	**6**
	Total Hours	**30**

Textbook:

1. **"Value Education II ",** compiled by Curriculum Development cell, Nehru Arts and Science College.

Tools for Assessment

25 marks	25 marks
Comprehensive test in Units I to III for 25 marks during CIA III of Sem. II	Perform 02 Yoga postures for Practical exam to be conducted during the mid of Sem. II

Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	-	H	L	M	H	H	-	-	-	-	-
CO2	-	-	-	L	M	H	M	H	-	-	-	L	-
CO3	-	-	-	L	M	H	H	H	-	-	-	-	L
CO4	-	-	-	L	L	H	M	H	-	-	-	-	L
CO5	-	-	-	L	L	H	M	H	-	-	-	L	L

H-High; M-Medium; L-Low;

Course Designed by	Verified by HOD	Checked by	Approved by
N. Saranya 30/3/2021 (Dr. N. SARANYA)	N. Saranya 30/3 (Dr. N. SARANYA)	Convener CDC	30 MAR 2022

SEMESTER V

Course Code	Title		
21U3MBC508	Core Paper VIII–Environment and Agricultural Microbiology		
Semester: V	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Course Objective:

To provide the fundamental knowledge about the various scopes on Environmental and Agricultural Microbiology and their concepts.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Understand how DNA replication, RNA and protein occurs.
CO2	Elucidate the gene transfer mechanisms in prokaryotes and understand the biology of bacteriophages.
CO3	Have a conceptual knowledge about the mechanism of gene regulation.
CO4	Discuss the molecular mechanisms underlying mutations and detection of mutations and DNA damage and repair mechanisms.
CO5	Apply knowledge on basic genetics and molecular techniques in microbiology.

Offered by: Microbiology

Course Content **Instructional Hours / Week: 4**

Unit	Description	Text Book	Chapter
I	**Microbial ecosystem and nutrient cycle:** General ecological concepts-ecosystem and habitats, species diversity in microbial habitats (population, community, species richness, species abundance). Terrestrial environment: Soil profile and soil microflora, Aquatic Environment: Microflora of fresh water and marine habitats, Atmosphere: Aeromicroflora and dispersal of microbes. Role of microorganisms in nutrient cycling (Carbon, nitrogen, phosphorus and Sulphur).	1,2	20, 2
Instructional Hours			**12**
II	**Microbial interactions and applications:** Mutualism, commensalism, antagonism, competition, parasitism, predation, decomposition, bio-mining, nitrogen fixation (symbiotic), bio-fertiliser sand bio-pesticides. Disease in plants.	2, 3	7, 4
Instructional Hours			**12**
III	**Microorganisms and pollution:** General aspects of pollution, pollution by pathogenic microorganisms, pollution by oxygen demanding carbonaceous material, mineral pollutants, heat pollution, pollution by recalcitrant chemicals, oil pollution, Xenobiotics.	2	16-20
Instructional Hours			**12**
IV	**Waste Management:** Outlines of solid waste management: sources and types of solid waste, methods of solid waste disposal (composting and sanitary landfill). Liquid waste management: composition and strength of sewage (BOD and COD), Primary, secondary (oxidation ponds, trickling filter, activated sludge process and septic tank) and tertiary sewage treatment.	2	26
Instructional Hours			**12**

V	**Methods in genetics and molecular biology:** Isolation of mutants by replica plating technique - isolation, separation and estimation of nucleic acids - competent cell preparation and transformation - gene transfer by conjugation.	3	3
Instructional Hours			
Total Hours			**60**

Text Book(s):

1. Madigan, Bender, Buckley, Sattley, Stahl. **Brock Biology of Microorganisms**, 15th Edition, Perason, 2021.
2. Vijaya Ramesh K. **Environmental Microbiology**, MJP Publishers, 2017.
3. Grant WD., Long PF. **Environmental Microbiology**, Springer, 2013.

Unit I : Text Book 1, 2; Chapter 20 (651-698), 2 (23-49).
Unit II : Text Book 2, 3; Chapter 7 (239-309), 4 (68-92).
Unit III: Text Book 2, Chapter 16-20: 581 - 690.
Unit IV: Text Book 2, Chapter 26: 832 - 894.
Unit V : Text Book 3, Chapter 3: 248 - 310.

Reference Book(s):

1. Watson, J. D., Baker T.A., Bell, S. P., Gann, A., Levine, M., and Losick, R., **Molecular Biology of the Gene,** Cold Spring Harbour Lab. Press, Pearson Pub., 7th edition, 2017.
2. De Robertis, E.D.P. and De Robertis, E.M.F., **Cell and Molecular Biology**, Lippincott Williams and Wilkins, Philadelphia, 8th edition, 2006.
3. https://www.easybiologyclass.com/molecular-biology-online-tutorials-lecture-notes-study-materials/

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Class Performance	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	L	L	M	L	L	L	L	M	M	L	M	H
CO2	L	L	L	M	L	M	L	M	L	L	M	H	M
CO3	L	M	M	L	L	M	L	L	L	L	M	L	M
CO4	M	L	L	L	L	L	L	L	M	L	L	M	L
CO5	L	L	L	L	L	L	L	L	L	M	H	L	M

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
Dr. K. Franklin Noah	Dr. M. THANGAVEL	Convenor CDC	30 MAR 2022

Course Code	Title		
21U3MBC509	Core Paper IX – Industrial Microbiology		
Semester: V	Credits: 4	CIA :50Marks	ESE:50Marks

Course Objective:

To assimilate knowledge across industry and microbiology discipline.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Develop knowledge and awareness of the basic principles and concepts of fermentation.
CO2	Interpret the sources, media and fermentor design and types.
CO3	Use research-based knowledge on downstream processing.
CO4	Understand the ecology and factors of industrially important microorganisms.
CO5	Apply the knowledge of production of extract of products.

Offered by: Microbiology

Course Content **Instructional Hours / Week: 4**

Unit	Description	Text Book	Chapter
I	**History and Fermentor:** Introduction, Historical background, Fermentor - principle, types - design - mode of operation - instrumentation and control - sterilization of fermentor - aseptic inoculation method.	1	1,2
Instructional Hours			**12**
II	**Industrially important microorganisms:** Screening methods for Industrial microbes, Media formulation, Strain Improvement, Prevention Techniques.	1,2	2, 4
Instructional Hours			**12**
III	**Fermentation Process:** Submerged and Solid-state Fermentation. Batch, Continuous & Fed-Batch Fermentation	2	10, 11
Instructional Hours			**12**
IV	**Microbial production of Industrial products:** Beverages, Vitamins - Riboflavin, cyanocobalamin. Enzymes (protease, amylase). antibiotics (penicillin, streptomycin), Single cell protein (Bakers yeast, spirulina) Mushroom production – (Oyster and Button mushroom) Immobilization of cell and enzymes.	1	15,16
Instructional Hours			**12**
V	**Downstream processing**: Recovery and purification of fermentations products (intracellular and extracellular), cell disruption, precipitation, filtration, centrifugation, solvent recovery, chromatography, Ultra filtration and drying.	1	3

Instructional Hours	12
Total Hours	60

Text Book(s):

1. Casida LE Jr. **Industrial Microbiology**, 5th edition, Wiley Eastern Ltd., New Delhi. 1993.
2. Stanbury, P.F., Whitaker, A. and Hall, S.J. **Principles of Fermentation Technology**, 2nd Edn. Pergamon Press, Oxford, 1999.

Unit I : Text Book 1, Chapter 1, 2 1-114.
Unit II : Text Book 1, Chapter 2: 117-218.
Text Book 2, Chapter 4: 93-145
Unit III: Text Book 2, Chapter 10: 277-308, Chapter 11: 313-327
Unit IV: Text Book 1, Chapter 15-16: 175-218.
Unit V : Text Book 1, Chapter 3: 219-416

Reference Book(s):

1. Crueger W and Crueger A. **Biotechnology: A Text Book of Industrial Microbiology**, 2nd edition. Panima Publishing Corporation, New Delhi. 2000.
2. Glazer NA and Nikaido H. **Microbial Biotechnology: Fundamentals of Applied Microbiology**. 2nd edition, Cambridge University Press. 2007.
3. Waites MJ, Morgan, NL, Rockey JS, and Higton G. **Industrial Microbiology: An Introduction**, Blackwell Science, London. 2001
4. https://bio.libretexts.org/Bookshelves/Microbiology/Book%3A_Microbiology_(Boundless)/17%3A_Industrial_Microbiology
5. http://www.lcwu.edu.pk/ocd/cfiles/Biotechnology/Maj/Biotech-402/Industrial_Microbiology-An-Introduction-0632053070-Wiley_compressed.pdf
6. https://microbiologynotes.org/category/industrial-microbiology/

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Model Presentation	Total
8	8	10	8	8	8	50

Mapping:

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	L	M	L	L	M	L	L	M	L	L	M
CO2	L	M	L	L	L	M	L	M	L	M	L	L	M
CO3	L	L	M	M	L	M	L	M	H	H	M	L	L
CO4	M	L	L	M	L	L	M	L	H	M	H	M	L
CO5	L	M	L	L	L	M	L	L	M	L	H	M	H

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
Dr. J. Jan R Noah (Dr. K. Franklin Noah)	Dr. N. THANDAVEL	Convenor CDC	30 MAR 2022

Course	Title		
21U3MBC510	Core Paper X– Medical Microbiology and Immunology		
Semester: V	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Course Objective:

The candidates will understand the concepts of normal flora organisms' microbial diseases, antimicrobial agents and immune cells, and immune response and immunological disorders

Course Outcome:

On successful completion of this course the students will be able to

CO1	Relate an understanding of the basic principles of Medical Microbiology
CO2	Interpret of microorganisms and their relevance of infectious diseases
CO3	Know about morphology and pathogenesis of parasites and their treatment.
CO4	Assimilate information on significant role of immune organs, cells, Antigens & Antibodies
CO5	Know about Complements, MHC and Gain knowledge on autoimmune diseases

Offered by: Microbiology

Course Content **Instructional Hours/ Week: 5**

Unit	Description	Text Book	Chapter
I	**Introduction to Medical Microbiology** - Commensal and Pathogenic Microbial Flora in Humans - Diagnosis – Collection, Transport and Processing of clinical specimens. Serology and Molecular Diagnosis. Antibiogram test.	1	6
	Bacteriology: Gram positive organisms - Morphology, cultural characteristics, pathogenicity, laboratory diagnosis and treatment of *Staphylococcus aureus, Streptococccus pyogenes, Bacillus anthracis, Mycobacterium tuberculosis*. **Gram negative organisms**-Morphology, cultural characteristics, pathogenicity, laboratory diagnosis and treatment of *E. coli, Salmonella typhi, Vibrio cholerae, Pseudomonas aeruginosa, Neiserria gonorrhoea*.	2	24, 25, 27, 29. 32, 36, 39, 40, 42
Instructional Hours			**15**
II	**Virology:** Laboratory diagnosis of Viral infections. Morphology, cultural characteristics, pathogenicity, laboratory diagnosis and treatment of Herpes simplex viruses (HSV I & II), Hepatitis Viruses (A& B), Polio virus, Rabies Virus and HIV.	3	33,35,36,39 ,42
	Mycology: Laboratory diagnosis of fungal infections. Antifungal testing. Morphology, cultural characteristics, pathogenicity, laboratory diagnosis and treatment of superficial mycoses-Dermatophytes. Subcutaneous - mycosis-Sporotrichosis.	2 & 5	2,73,74 & 75
Instructional Hours			**15**
III	**Parasitology:** Laboratory techniques in parasitology. Examination of faeces for ova and cysts –Concentration methods. Blood smear examination for parasites. Morphology, Life cycle, Pathogenicity and laboratory	4	21, 3, 4, 5, 10, 17

	diagnosis of *Entamoeba histolytica, Trichomonas vaginalis, Plasmodium malariae, Taenia solium and Ascaris lumbricoides.*		
Instructional Hours			**15**
IV	**A Historical Perspective of Immunology**- Innate and Adaptive immunity; Cells and organs of immune system.	6	1,2
	Antigens - Characteristics of an antigen (Foreignness, Molecular size and Heterogeneity); Haptens; Epitopes (T & B cell epitopes); T-dependent and T-independent antigens; Adjuvants. **Antibodies** - Structure, Types, Functions and Properties of antibodies; Antigenic determinants on antibodies (Isotypic, allotypic, idiotypic); Monoclonal and Chimeric antibodies.	7	11, 12
Instructional Hours			**15**
V	**Complement System** - Components of the Complement system; Activation pathways (Classical, Alternative and Lectinpathways); Biological consequences of complement Activation. **Major Histocompatibility Complex** - Structure and Functions of MHC I & II molecules; Antigen processing and presentation (Cytosolic and Endocytic pathways)	6	6, 8
	Auto Immune Diseases- Types and mechanisms. Hypersensitivity reactions - types, Antibody mediated (Type-I, Type II, Type III) and Cell mediated (Type- IV).	7	18,19
Instructional Hours			**15**
VI	Contemporary Issue – COVID – 19 (Seminar will be Conduct)		
Total Hours			**75**

Text Book(s):

1. Mahon, C. R., Lehman, D. C., andManuselis, G**. Textbook of Diagnostic Microbiology**. Maryland Heights, MO: Saunders Elsevier, 2015.
2. Murray, P. R. **Basic Medical Microbiology**. Philadelphia: Elsevier, 2018.
3. Brooks, G. F.Jawetz, **Melnick and Adelbergs Medical Microbiology**. New York. McGraw-Hill Medical, 2007.
4. Anaissie, E. J. **Clinical Mycology**. Churchill Livingstone: Elsevier, 2009.
5. Paniker, C. K. **Textbook of Medical Parasitology**. New Delhi: Jaypee Brothers Medical (P), 2007.
6. Kuby. **Immunology**. 7th Edition. W. H. Freeman and Company. New York, 2013.
7. Paniker, C. K., and Ananthanarayan, R. **Ananthanarayan and PanikersTextbook of Microbiology**. Himayatnagar, Hyderabad: Orient Longman, 2005.

Unit I: Text Book 1, Chapter 6 (111 - 124)
Text Book 2 Chapter 24 (163-171), 25 (172 - 179), 29 (205 - 210), 32 (227 - 239), 36 (257 - 263), 39 (274 - 286), 40 (287 - 294), 42 (301 - 306), 27 (191 - 196)

Unit II: Text Book 3, Chapter 33 (467 - 475), 35 (507 - 525), 36 (531 - 533), 39 (577 - 590), 42 (619 - 625)
Text Book 2 & 5 Chapter 75 (519 - 521), 74 (516 - 518), 73 (513 - 514) & 2 (14 - 28)

Unit III: Text Book 4, Chapter 21(221-232), 3(14-28), 4(36-39), 5(65-95), 10(147 - 150), 17(188 - 193)

Unit IV: Text Book 6, Chapter 1 (1 - 14)

Text Book 6, Chapter 2 (27 - 64)
Text Book 7 Chapter 11 (80 – 83)
Text Book 7 Chapter 12 (84 – 91)
Unit V: Text Book 6, Chapter 6 (187 - 224)
Text Book 6, Chapter 8 (161 - 298)
Text Book 7 Chapter 18, 19 (159 - 171)

Reference Book(s):

1. Tizard IR. **Immunology: An Introduction.** Saunders College Publishers, USA. 4th Edition. 1995.
2. Riott IM. **Essentials of Immunology**, ELBS and Black Well Scientific Publishers, London. 1988.
3. Tille, P. M. (2017). **Bailey & Scotts Diagnostic Microbiology**. St. Louis, MO: Elsevier.
4. https://www.msdmanuals.com/en-in/home/infections/diagnosis-of-infectious-disease/diagnosis-of-infectious-disease
5. https://microbenotes.com/category/immunology/

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Model Presentation	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	L	M	L	L	L	M	L	M	H	M	H	H
CO2	L	M	L	L	L	M	L	L	M	H	M	L	H
CO3	L	L	L	M	L	M	L	L	H	H	L	M	H
CO4	M	L	L	M	L	M	L	L	L	M	M	H	M
CO5	H	L	L	M	L	M	L	L	L	M	L	H	H

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
Dr. K. Franklin Noah	Dr. M. THANGAVEL	Convenor CDC	30 MAR 2022

Course Code	Title		
21U4MBS503	Skill Based Paper III – Management of Human Microbial Diseases		
Semester : V	Credits: 3	CIA :30 Marks	ESE:45 Marks

Course Objective:
This course helps to Diagnosis of Human Microbial diseases.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Identify microbial diseases detection by diagnostic kits
CO2	Describe the concept of health, disease, Infection and pathogen.
CO3	Disseminate knowledge on different systemic diseases.
CO4	Understand Treatment using antibiotics.
CO5	Explicate General preventive measures.

Offered by: Microbiology

Course Content **Instructional Hours / Week:3**

Unit	Description	Text Book	Chapter
I	**Diagnosis of Human Microbial diseases:** Various serological and molecular methods for diagnosis of microbial diseases. Detection by diagnostic kits based on ELISA, Immunofluorescence, Agglutination tests, PCR, DNA probes (illustrate each with one example). RT-PCR for COVID.	1	47
Instructional Hours			**9**
II	**Human Microbial Diseases:** Definition and concept of health, disease, Infection and pathogen. Types of human microbial diseases and their transmission, causative agents and symptoms of human microbial diseases: Respiratory microbial diseases, gastrointestinal microbial diseases.	1	47
Instructional Hours			**9**
III	**Microbial Diseases :** Nervous system diseases, skin diseases, eye diseases, urinary tract diseases, sexually transmitted diseases, mosquito borne disease, Microbial mediated cancers and Nosocomial infections. Recent outbreaks of human microbial diseases (SARS/ Swine flu/Ebola) – causes, spread and control	1	48
Instructional Hours			**9**
IV	**Therapeutics of Microbial diseases**: Treatment using antibiotics: Mechanism of action of antibiotics belonging to different classes: beta lactam antibiotics (penicillin, cephalosporins), quinolones, polypeptides and aminoglycosides. Judicious use of antibiotics, importance of completing antibiotic regimen, Concept of DOTS, emergence of antibiotic resistance, current issues of MDR/XDR microbial strains	2	66
Instructional Hours			**9**
V	**Prevention of Microbial Diseases**: General preventive measures, Importance of personal hygiene, environmental sanitation and methods to prevent the spread of infectious agents transmitted by direct contact, food, water and insect vectors. Vaccines: Importance, types, vaccines available against microbial diseases, vaccination schedule (compulsory and preventive) in the Indian context.	1	67
Instructional Hours			**9**

Total Hours	45

Text Book(s):

1. Ananthanarayan R. and Paniker C.K.J. Textbook of Microbiology. 8th edition, University Press Publication 2009.

2. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. Jawetz, Melnick and Adelberg's Medical Microbiology. 26th edition. McGraw Hill Publication 2013.

Unit I: Text Book 1, Chapter 47 753-784.
Unit II : Text Book 1, Chapter. 47 753-784
Unit III: Text Book 1, Chapter 48 785-814
Unit IV: Text Book 2, Chapter 66 628-630
Unit V : Text Book 1, Chapter 67 631-639.

Reference Book(s):

1. Tille P Bailey's and Scott's Diagnostic Microbiology, 13th edition 2013.

2. Mosby.Collee JG, Fraser, AG, Marmion, BP, Simmons A Mackie and Mccartney Practical Medical Microbiology, 14th edition, Elsevier 2007.

3. Goering R., Dockrell H., Zuckerman M. and Wakelin D. Mims' Medical Microbiology. 4th edition. Elsevier 2007.

4. Willey JM, Sherwood LM, and Woolverton CJ. Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education 2013.

5. Madigan MT, Martinko JM, Dunlap PV and Clark DP. Brock Biology of Microorganisms. 14th edition. Pearson International Edition 2014

Tools for Assessment (30 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Class Performance	Total
4	4	7	5	5	5	30

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	L	M	M	L	L	L	M	L	M	L	M
CO2	H	H	L	M	M	L	L	L	L	M	L	M	L
CO3	H	M	L	M	L	M	L	L	L	M	L	M	M
CO4	H	M	L	M	L	L	M	L	L	L	M	H	M
CO5	M	M	L	M	L	M	L	L	M	L	L	M	M

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
	30/3/22		

DR. M. THANGAVEL

Convenor CDC

31 MAR 2022

SEMESTER VI

Course Code	Title		
21U3MBC611	Core Paper XI – Recombinant DNA Technology		
Semester: VI	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Course Objective:

Students can acquire knowledge on the gene manipulation and tools used for construction of gene cloning. The students can understand and learn about the transformation techniques and recombinant product development.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Distinguish the milestones of genetic engineering and DNA modifying enzymes.
CO2	Formulate the ideas on usage of cloning vectors.
CO3	Device methods for transformation of DNA.
CO4	Understand about the PCR, DNA sequencing and blotting techniques.
CO5	Learn about various recombinant product development and their uses.

Offered by: Microbiology

Course Content **Instructional Hours / Week: 4**

Unit	Description	Text Book	Chapter
I	**Gene Manipulation:** Definition and Applications. Milestones in genetic engineering and biotechnology. Restriction endonucleases, nomenclature, types, mode of action and its application.	1	3
	DNA modifying enzymes and their applications: DNA polymerases. Terminal deoxy nucleotidyl transferase, kinases and phosphatases and DNA ligases.	3	4
Instructional Hours			**12**
II	**Cloning Vectors**: Definition and Properties. **Plasmid vectors**: pBR and pUC series. **Expression vector:** Bacteriophage lambda and M13 based vectors. **Yeast Vector:** Shuttle vector, cosmid vector & YAC.	4	6
	DNA library & screening: cDNA library, Cloning strategies, linkage adaption, homeopoitic system, screening of recombinants.	2	7
Instructional Hours			**12**
III	**Transformation of DNA:** Physical: biolistic method (gene gun), electroporation, microinjection. Chemical: liposome, PEG. Biological: Viral and *Agrobacterium* mediated delivery.	3	5
Instructional Hours			**12**
IV	**PCR & DNA Sequencing:** Types, principles and application of PCR. Blotting techniques - Southern, Northern and Western. RAPD - Rapid Amplification of cDNA ends. DNA sequencing: Chain termination method, automated sequencing, pyro sequencing and shotgun sequencing. Cloning – steps, screening of recombinants.	2	8
Instructional Hours			**12**
V	**Products of recombinant DNA technology**: Products of human therapeutic - insulin, hGH, antisense molecules. Bt transgenic – cotton and brinjal. Gene therapy, recombinant vaccines and protein engineering.	3	15-17
Instructional Hours			**12**
Total Hours			**60**

Text Book(s):

1. Sandy B Primrose, Richard Twyman and Robert H Old. **Principles of Gene Manipulation,** Wiley-Blackwell Publications, 7th Edition, 2013.
2. David P. Clark and Nanette J. Pazdernik. **Molecular Biology**, Academic Press, 2013.
3. T. A. Brown, **Gene cloning and DNA Analysis – An Introduction**, Blackwell Publishing, 8th Edition. Blackwell Publishing Ltd., 2020.
4. J.W. Dale, M. Von Schantz and Plant, N. **From Genes to Genomes: Concepts and Applications of DNA Technology**. John Wiley & Sons. 2012.

Unit I : Text Book 1, Chapter 3:26-42;
Text Book 3, Chapter 4: 53-81.
Unit II : Text Book 4, Chapter 6: 65-96.
Text Book 2, Chapter 7: 195-225.
Unit III: Text Book 3, Chapter 5: 83-99.
Unit IV: Text Book 2, Chapter 8:228-243
Unit V : Text Book 3, Chapter 15-17: 301-374.

Reference Book(s):

1. A. Brown, **Genomes III**. 4thEdition, Garland Science Publishing, 2017.
2. Klug, Cummings, Spencer, Palladino, Killan, **Concepts of Genetics**, 12th Edition Pearson Education, Inc., 2018.
3. Leland H. Hartwell, Leroy Hood, Michael L. Goldberg Ann E. Reynolds, Lee M. Silver, **Genetics – From Genes to Genomes**, 4thEdition, McGraw-Hill, Publishing, 2016.
4. https://genomebiology.biomedcentral.com/articles/10.1186/s13059-018-1586-y
5. https://www.slideshare.net/DeepakKumar2053/assignment-on-recombinant-dna-technology-and-gene-therapy

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Class Performance	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	M	M	H	M	H	H	M	H	L	M
CO2	H	H	M	H	M	H	M	H	H	L	M	L	M
CO3	H	H	H	M	H	H	M	H	H	M	H	L	M
CO4	H	H	M	M	M	M	M	H	H	L	L	L	L
CO5	H	H	H	H	M	H	M	H	M	L	L	M	M

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
	25/3/22 Dr.M.THANGADURAI	Convenor CDC	30 MAR 2022

Course Code	Title		
21U3MBC612	Core Paper XII – Food and Dairy Microbiology		
Semester: VI	Credits: 4	CIA: 50 Marks	ESE: 50

Course Objective:

To understand and enable the students to isolate the microorganisms, methods of preservation of foods, Pasteurization, processing methods in the field of food and dairy microbiology.

Course Outcome:

On successful completion of the subject, students will able to

CO 1	Understand the history of food microbiology and various parameters affecting microbial growth
CO 2	Gain knowledge on food preservation techniques
CO 3	Diagnose specific types of microbial spoilage during various food shelf life stages in dairy field
CO 4	Know about the use of microorganisms in food industries for public health benefits
CO 5	Gain knowledge on various Enforcement and control Agencies for food products

Offered by: Microbiology

Course Content **Instructional Hours / Week: 4**

Unit	Description	Text Book	Chapter
I	Microorganism involved in Food: Common Food borne Pathogen- Bacteria, Mold and Significance Of microorganisms in Foods. Types of food: Fruits and fruit products, Vegetables and vegetable products.	2 3	1 5
	Parameters Affecting Microbial Growth: Intrinsic, Extrinsic. Lactic antagonism and hurdle concept	2	3
	Instructional Hours		**12**
II	Methods of food preservation	1	5
	Use of high temperatures, freezing, ionizing Radiation, , **Microwave processing and aseptic packaging**	1	6
	Use of chemicals preservatives - organic acids, sulphur-dioxide, salts and high sugar concentration	3	4
	Instructional Hours		**12**
III	Food borne diseases	3	7
	Staphylococcal, *E. coli*, Salmonellosis, shigellosis, Listerial infections. Food in toxification *Clostridium botulinum*, *Clostridium perfringens* Brucella association with food.	3	7
	Fungal toxins, Aflatoxins Alternaria Toxins, Toxigenic Phytoplanktons and viruses.	3	8
	Instructional Hours		**12**
IV	**Microbiology of Raw Milk:** Introduction, initial Microflora of raw milk, Total raw milk bacterial count- Spc method. **Microorganism present in raw milk:** Thermoduric microflora, Psychrotrophic microflora, Coliform bacteria.	4	8

	Fermented and Microbial Food Cheese, Yogurt (curd), Bread	1	22
	Spoilage of food (Skimmed Milk, Canned food, Vegetables, fruits, fish, poultry product, meat and meat products)	2	9
	Aseptic packing of food. QC check of milk	3	4
	Antimicrobial activity of Lactic acid bacteria	3	9
	Instructional Hours		**12**
V	**Enforcement and control Agencies** Food quality, food safety, food adulteration, International agencies, FDA, HACCP, FSSIA,	1	11
	Microbiological criteria for food, Protocols for CCP Deviations	3	11
	Instructional Hours		**12**
	Total Hours		**60**

Text Book(s):

1. Frazier. W.C and D.C Westhoff. (1978). Food Microbiology. 3rd Ed. Tata Macgraw Hill publishing Co., New Delhi.
2. Adams. M. R and M. D Moss. (1995). Food Microbiology. New Age International limited.
3. Adams. M. R and M. D Moss. Maurice O Mass (2008). Food Microbiology.3rd ed, RSC publishing International limited.
4. Richard Robinson.K,(2002) Dairy Microbiology Hand book 3rd edition by John Wiley and Sons, Inc., New York.

Unit I: Text Book 3, Chapter 1, 3 pp 20-48
Text Book 3, Chapter 5 pp 150-154.
Unit II : Text Book 1& 3 Chapter 4, 6 pp 99- 107
Unit III Text Book 3, Chapter7,8 pp 198-205, 274
Unit IV: Text Book 1,2 Chapter 22, 9. pp 39- 78
Unit V :Text Book 1, Chapter 11 pp39-78
Text Book 3, Chapter 11:429-432

Reference Book(s):

1. Roday. S. (1998). Food Hygeine and Sanitation. Tata Mcgraw Hill Publications.
2. Pradeep Parihar and Leena Parihar.(2015). Dairy Microbiology. Agrobios (INDIA).
3. Jay.J.M,, Loessener M.J and Golden.D.A. (2005). Modern Food Microbiology,spinger.
4. http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/food_and_nutrition/02._food_safety_and_quality_control/21._international_and_national_food_regulatory_agencies/et/7359_et_et.Pdf

Tools for Assessment (50Marks)

CIA I	CIA II	CIA III	Seminar	Assignment	Quiz	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	L	H	L	M	L	L	M	M	L	L	M
CO2	M	H	L	M	L	L	L	L	L	M	H	L	M
CO3	M	M	L	H	M	L	M	L	L	M	L	M	L
CO4	L	H	L	M	L	M	L	L	M	M	L	L	M
CO5	H	M	M	L	L	M	L	M	L	M	H	M	L

H - High; M- Medium; L- Low.

Course designed by	Verified by HoD	Checked by	Approved by

Dr. N. THANGAVEL

Convenor
CDC

Course Code	Title		
21U3MBP613	Core Paper XIII– Lab in Environmental, Agricultural and Food Microbiology		
Semester: V & VI	Credits: 4	CIA :50 Marks	ESE:50 Marks

Course Objective:

To assimilate knowledge across Environment, agricultural and food microbiology discipline.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Get hands on exposure, knowledge and awareness of the basic tests in soil, food and water analysis.
CO2	Interpret the analysis of soil microorganisms and isolate bacteria and fungi.
CO3	Acquire knowledge about the milk and their testing measurements.
CO4	Understanding of the knowledge of medically important immunological procedures.
CO5	Acquire knowledge about updated recent analysis methods.

Offered by: Microbiology

Course Content **Instructional Hours / Week: 5 & 5**

S. No.	Experiment
1	Microbial sampling of air from various sources – indoor , outdoor, hospital environment
2	Analysis of water samples – Biological parameters: i). Determination of dissolved oxygen, ii) Determination of BOD, iii) Determination of COD. iv) Bacteriological examination of water by - SPC,
3	Water analysis by MPN technique – presumptive coliform test – confirmed coliform test and completed coliform test.
4	Isolation of microorganisms from soil (bacteria and fungi).
5	Isolation of *Rhizobium* from root nodule of legumes.
6	Isolation of microbes from crops infected with bacterial diseases and fungal diseases
7	Isolation and identification of Rhizobium from root nodules.
8	Isolation of blue green algae and their microscopic observation.
9	Microscopic examination of VAM infection.
10	Microbiological examination of foods. i) Isolation and enumeration of bacteria and fungi from fresh and spoiled fruits
11	Detection of bacterial spoilage of canned food
13	Assessment of milk quality by methylene blue reduction test
14	Isolation of bacteria from spoiled milk and dairy products
15	Performance of phosphatase test for pasteurized milk.
	Instructional Hours : 150

Text Book(s):

1. Rajan S and Selvi Christy R. **Experimental Procedures in Life Sciences**. Anajanaa Book House, Chennai, 2015.
2. James G Cappuccino and Natalie Sherman. **Microbiology - A Laboratory Manual** (4th edition).The Benjamin publishing company, New York. 2016.

3. Okafor, N. **Environmental Microbiology of Aquatic & Waste Systems**. 1st edition, Springer,New York, 2011.

Reference Book(s):

1. James G. Cappuccino and Chad Welsh. **Microbiology A Laboratory Manual**. Pearson Education Limited, 2017.
2. Dubey RC and Maheshwari DK. (2002). **Practical Microbiology**. S Chand and Co. Ltd., New Delhi, 2002.
3. AnejaK.R. **Experiments in Microbiology, Plant Pathology and Biotechnology**. New Age International (P) Limited Publishers, 2010.
4. Gunasekaran P. **Laboratory Manual in Microbiology**. New Age International, 2007.
5. https://microbenotes.com/fields-of-microbiology/
6. https://bio.libretexts.org/Bookshelves/Microbiology/Book%3A_Microbiology_(Boundless)/1%3A_Introduction_to_Microbiology/1.3%3A_The_Science_of_Microbiology/1.3B_Applied_Microbiology

Tools for Assessment (50 Marks)

Laboratory Performance			Test I (Mid sem)	Test II (Model)	Observation note book	Total
Level of engagement in lab	Preparation	Result				
8	8	8	10	10	6	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	H	H	L	M	L	L	M	M	L	M	M
CO2	M	H	H	M	H	H	H	H	L	M	H	M	M
CO3	M	M	H	H	M	L	M	L	L	M	M	M	L
CO4	L	H	H	M	L	M	L	L	M	M	H	L	M
CO5	H	M	M	L	L	M	L	M	L	M	H	M	L

H-High; M-Medium; L-Low

Course designed by	Verified by HoD	Checked by	Approved by
		Convenor CDC	

Dr. M. THANGAVEL

Course Code	Title		
21U3MBP614	Core Paper XIV – Lab in Industrial, Immunology and Medical Microbiology		
Semester: V & VI	Credits: 4	CIA :50Marks	ESE:50Marks

Course Objective:

To assimilate knowledge across Industrial, immunological and Medical discipline.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Get hands on exposure, knowledge and awareness of the basic tests in Industrial Microbiology
CO2	Acquire knowledge about updated recent analysis methods.
CO3	Acquire knowledge about the milk and their testing measurements.
CO4	Understanding of the knowledge of medically important immunological procedures.
CO5	Understanding of the knowledge and testing in medical microbiology

Offered by: Microbiology

Course Content **Instructional Hours / Week: 5 & 5**

S. No.	Experiment
Industrial Microbiology	
1.	Production of Wine
2.	Immobilization of yeast cell using sodium alginate
3.	Alcohol fermentation by *Saccharomyces cerevisiae*
4.	Starch (Amylase), casein (Protease) and lipid (Lipase) hydrolyses tests
Immunology	
5.	ABO Blood grouping and Rh typing
6.	WIDAL Test
7.	RPR and CRP
8.	ASO and pregnancy test
9.	Total and differential blood cell count by haemocytometer
10.	Radial and Double immunodiffusion

11.	Demonstration of ELISA, SDS PAGE, Western Blotting
Medical Microbiology	
12.	Isolation, identification of following pathogens from clinical samples: *E. coli, Salmonella spp., Pseudomonas spp., Proteus spp., Klebsiella spp., Staphylococcus spp, Streptococcus spp.*
13.	*Isolation of Clinically important Fungi – Candida albicans (Germ Tube Technique)*
14.	Antibiotic sensitivity testing of the isolates (for Gram negative and Gram Positive)
15.	Examination of stool for ova/cyst by direct/ concentration method
	Instructional Hours : 150

Text Book(s):

1. Rajan S and Selvi Christy R. **Experimental Procedures in Life Sciences**. Anajanaa Book House, Chennai, 2015.
2. James G Cappuccino and Natalie Sherman. **Microbiology - A Laboratory Manual** (4th edition).The Benjamin publishing company, New York. 2016.

Reference Book(s):

1. James G. Cappuccino and Chad Welsh. **Microbiology A Laboratory Manual**. Pearson Education Limited, 2017.
2. Dubey RC and Maheshwari DK. (2002). **Practical Microbiology**. S Chand and Co. Ltd., New Delhi, 2002.
3. AnejaK.R. **Experiments in Microbiology, Plant Pathology and Biotechnology**. New Age International (P) Limited Publishers, 2010.
4. Gunasekaran P. **Laboratory Manual in Microbiology**. New Age International, 2007.
5. https://microbenotes.com/fields-of-microbiology/
6. https://bio.libretexts.org/Bookshelves/Microbiology/Book%3A_Microbiology_(Boundless)/1%3A_Introduction_to_Microbiology/1.3%3A_The_Science_of_Microbiology/1.3B_Applied_Microbiology

Tools for Assessment (50 Marks)

Laboratory Performance			Test I (Mid sem.)	Test II (Model)	Observation note book	Total
Level of engagement in lab	Preparation	Result				
8	8	8	10	10	6	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	L	L	M	L	M	L	M	M	L	H	L	M
CO2	M	H	L	M	L	H	L	L	L	M	L	M	L
CO3	L	M	L	M	L	H	L	M	M	H	M	H	M
CO4	M	H	L	M	L	M	L	L	M	H	M	L	L
CO5	L	M	L	H	L	M	L	L	H	M	M	L	M

H-High; M-Medium; L-Low

Course designed by	Verified by HoD	Checked by	Approved by

Dr. M. THANGAVEL

Convenor
CDC

Course Code	Title		
21U4MBZ604	Skill Based Paper IV – Lab in rDNA Technology		
Semester: VI	Credits: 3	CIA : 30 Marks	ESE : 45 Marks

Course Objective:

Students can get hands on experience on variety of techniques in genetics and molecular biology research.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Acquire knowledge on isolation and purification of DNA from bacteria.
CO2	Interpret the quantity and purity of DNA and RNA.
CO3	Understand the techniques to ligate DNA into cloning vectors.
CO4	Get hands on training on bacterial transformation and PCR
CO5	Analyse the DNA fragments by hybridization and finger printing.

Offered by: Microbiology

Course Content **Instructional Hours / Week: 4**

S. No.	Description
1	Restriction digestion of DNA.
2	Purification of digested DNA by column chromatography.
3	Ligation of DNA fragment with cloning vector.
4	Plasmid DNA purification / Miniprep.
5	Polymerase chain reaction (Demo)
6	Southern hybridization.
7	DNA finger printing.
8	SDS-PAGE.
9	RAPD.
10	Electroporation.
	Instructional Total Hours 60 Hours

Text Book(s):

1. Rajan and Selvi Christy. Text book of Experimental Procedures in Life Science. Anjanaa Publisher, 2010.
2. Michael R. Green and J. Sambrook. Molecular cloning: A laboratory manual, Cold spring harbor laboratory press, 4th edition, 2014.
3. Fletcher, L., E. Goss, P. Phelps, A. Wheeler and S. O'Grady. Introduction to Biotechnology: Laboratory Manual. Austin Community College, Biotechnology Department, 2011.

Reference Book(s):

1. Sue Carson, Heather Miller, Melissa Srougi, D. Scott Witherow. Molecular Biology Techniques: A classroom laboratory manual. Elseiver, 2019.
2. Aneja, K. R. Experiment sin Microbiology, Plant Pathology and Biotechnology. New Age International (P) Limited Publisher, 2014.
3. Hasan, N.A. Laboratory Manual of Basic Molecular Biology Techniques. Research Gate, 2021.

Tools for Assessment (30 Marks)

Laboratory Performance			Test I (Mid sem.)	Test II (Model)	Observation note book	Total
Level of engagement in lab	Preparation	Result				
4	4	7	5	5	5	30

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	M	H	H	H	H	M	H	L	H
CO2	H	H	M	M	M	M	H	H	M	M	H	L	H
CO3	H	H	L	M	H	M	M	H	H	L	H	L	M
CO4	M	H	H	H	H	M	H	H	H	H	H	L	M
CO5	H	H	M	L	M	H	H	H	H	M	L	L	H

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
	25/3/22 Dr.M.THANGADURAI	Convenor CDC	30 MAR 2022

ELECTIVES

Course Code	Title		
21U3MBE501	Discipline Specific Elective Paper – I Group A - Microbial Biotechnology		
Semester: V	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Course Objective:

To empower the students with knowledge on microbial products and give insight on fermentation process.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Understand the concepts of microbial fermentation technology.
CO2	Describe about different types of fermentation and its uses.
CO3	Design and development of different types of fermenter.
CO4	Interpret on the aeration and agitation principles on fermentation process.
CO5	Apply the knowledge on product development by using industrially important microbes.

Offered by: Microbiology

Course Content **Instructional Hours / Week: 4**

Unit	Description	Text Book	Chapter
I	**Fermentation: An overview:** Brief history of fermentation – Fermentation: general concepts, Applications of fermentation; Range of fermentation process - Microbial biomass, enzymes, metabolites, recombinant products, transformation process; Component parts of a fermentation process.	1	1-2
	Instructional Hours		**12**
II	**Types of fermentations:** Aerobic and anaerobic fermentation, Submerged and solid state fermentation; Factors affecting submerged and solid state fermentation; Substrates used in SSF and its advantages; Culture media - types, components and formulations. Sterilization: Batch and continuous sterilization.	2	2-5
	Instructional Hours		**12**
III	**Process development:** Optimization of a process, Classical and statistical methods of optimization, Immobilization: different matrices, whole cell and enzyme immobilization; Scale up of bioprocess General concept of a fermenter: Batch, fed-batch and continuous fermentation.	2 3	2 1
	Instructional Hours		**12**
IV	**Aeration and agitation:** Effect of aeration and agitation on fermentation, Oxygen requirement and oxygen supply, Oxygen transfer kinetics; Determination of KLa value; Effect of agitation and microbial biomass on KLa value; Newtonian and non-Newtonian fluids; Foam and antifoams, their effect on oxygen transfer; Fermentation economics.	3	5

Instructional Hours			**12**
V	**Applications of Microbial Biotechnology:** Microorganisms as source of novel compound production. Biopolymer and bioplastics, algal biotechnology, bioweapons, and bioshields. Microbes as biocontrol agents (Baculoviruses, *Beauveria bassiana*, *Bacillus thuringiensis*, *Bacillus sphaericus*, *Bacillus popilliae*); Microbe derived inhibitors.	1	13
Instructional Hours			**12**
Total Hours			**60**

Text Book(s):

1. Uma Shankar Singh and Kiran Kapoor, Microbial Biotechnology, Oxford Book Company, 2010.
2.Stanbury, P.F., Whitaker and Hall, A.S.J., Principles of Fermentation Technology. Butterworth-Heinemann, 2016.
3.Vogel, H.C. Todaro, C.L. and Todaro C.C., Fermentation and Biochemical Engineering. Handbook: Principles, Process Design and Equipment. Noyes Publications, 3rd Edition, 2014.

Unit I : Text Book 1, Chapter :1-2: 1-38.
Unit II : Text Book 2, Chapter 2-5: 21-333.
Unit III: Text Book 2, Chapter 2: 13-31.
Text Book 3, Chapter 1: 1-24.
Unit IV: Text Book 3, Chapter 5: 181-241.
Unit V : Text Book 1, Chapter 13:275-306.

Reference Book(s):

1. Harzevilli, F.D. and H. Chen. Microbial Biotechnology: Progress and Trends. CRC Press, 2017.
2. Arnold L. Demain, Julian E. Davies, Richard H. Baltz. Manual of Industrial Microbiology and Biotechnology. American Society of Microbiology, 2010.
3. Yuan Kun Lee, Microbial Biotechnology: Principles and Applications, World Scientific, 2006.
4. https://nptel.ac.in/courses/102/106/102106086/
5. https://nptel.ac.in/content/storage2/courses/102103013/pdf/mod7.pdf

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Class Performance	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	L	M	L	M	M	L	M	M	L	L	M
CO2	L	M	M	L	L	L	M	M	M	L	M	M	L
CO3	M	M	L	H	L	M	H	M	M	H	M	H	M
CO4	L	M	H	H	M	L	M	L	M	H	M	L	L
CO5	M	H	H	H	L	L	M	M	M	M	H	L	M

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
	25/3/22	Convenor CDC	30 MAR 2022

Dr.M.THANGAVEL

Course Code	Title		
21U3MBE502	Discipline Specific Elective – I – Group B - Soil Microbiology		
Semester: V	Credits: 4	CIA : 50 Marks	ESE: 50 Marks

Course Objective:
To understand the vital role, microbial process, applications and interaction of microorganisms in agriculture field and also in various hosts

Course Outcomes:

CO 1	Gain knowledge on soil type and the factors that limit microbial growth in soil.
CO 2	Gain knowledge on microbial decomposition and bio-remediation processes.
CO 3	Gain knowledge on biogeochemical cycles, bio-fertilizers, and bio-Insecticides.
CO 4	Learn the application of microbial ecological principles for industrial, environmental, agriculture or public health benefits
CO 5	Gain practical knowledge about the important processes pertaining to soil and agricultural microbiology.

Offered by: Microbiology
Course Content **Instructional Hours / Week: 4**

Unit	Description	Text Book	Chapter
I	Introduction to soil microbiology – properties of soil(structure, texture & formation).Types and significance of soil microbes– bacteria, fungi, algae, protozoa, nematodes, actinomycetes, viruses. Factors affecting microbial population. Rhizosphere and non-rhizosphere regions.	1	27
Instructional Hours			**12**
II	Microbial decomposition: Bioconversion of organic wastes – sugarcane waste - coir pith composting - Principles and Applications- conversion process. Anaerobic composting of sewage sludge.	3	11-12
Instructional Hours			**12**
III	Biogeochemical cycle: Carbon, Phosphorus and Nitrogen. Biological nitrogen fixation – Symbiotic and non-symbiotic nitrogen fixer, Root nodule formation - Nitrogenase and Hydrogenase. Biofertilizer - *Rhizobium*, *Azotobacter*, Cyanobacteria, *Azolla*, VAM - Mass multiplication and crop response. Phosphate solubilizing bacteria Biopesticide - Classification, mode of action - Bacterial insecticides (Bacillus thuringiensis) and Viral insecticides (NPV) and Fungal: *T. viride*, PGPR.	2	5
Instructional Hours			**12**
IV	Plant pathology: symptoms, characters of pathogens and control measures: Bacterial diseases - Citrus canker, Blight of rice. Fungal diseases - Red rot of sugarcane, Tikka leaf spot of ground nut. Viral diseases - TMV, Vein clearing disease of Bhendi (*Abelmoschus esculentus*).	2	8
Instructional Hours			**12**

V	Enumeration of bacteria from rhizosphere and non-rhizosphere region. Cultivation of free-living and symbiotic N_2 fixing bacteria. Isolation of cellulose degrading organisms. Isolation of phosphate solubilizing bacteria.	1	19
Instructional Hours			**12**
Total Hours			**60**

Text Book(s):

1. Jeff Hardin, Gregory Paul Bertoni, Lewis J. Kleinsmith - **Becker's world of the cell**, Pearson Benjamin Cummings, 8th edition, 2012.
2. Verma P.S., Agarwal V.K., **Cell Biology, Genetics, Molecular Biology, Evolution and Ecology**, S. chand& Company Ltd., 2005.
3. James D. Watson, **Molecular Biology of the Gene**, Cold Spring Harbor Laboratory Press, 7th edition, 2013.

Unit I : Text Book 1, Chapter 27: 213 -377.
Unit II : Text Book 3, Chapter 11-12: 341-377.
Unit III: Text Book 2, Chapter 5: 81-95.
Unit IV: Text Book 2, Chapter 8: 91-108.
Unit V : Text Book 1, Chapter 19: 549-690

Reference Book(s):

1. Janet Iwasa, Wallace Marshall, **Karp's Cell and Molecular Biology: Concepts and Experiments**, John Wiley & Sons, Inc., 8th edition, 2016.
2. Watson, J. D., Baker T.A., Bell, S. P., Gann, A., Levine, M., and Losick, R., **Molecular Biology of the Gene,** Cold Spring Harbour Lab. Press, Pearson Pub., 6th edition, 2008.
3. De Robertis, E.D.P. and De Robertis, E.M.F., **Cell and Molecular Biology**, Lippincott Williams and Wilkins, Philadelphia, 8th edition, 2006.

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Class Performance	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	L	M	L	L	L	L	M	L	M	L	M
CO2	H	M	L	M	L	L	L	M	L	M	M	L	M
CO3	H	M	L	H	L	M	L	L	M	L	L	M	L
CO4	M	H	L	H	L	M	M	L	L	M	M	L	M
CO5	H	M	L	H	L	L	L	M	H	M	L	L	M

H-High; M-Medium; L-Low

Course designed by	Verified by HoD	Checked by	Approved by
Dr. K. Franklin Noah	Dr. M. THANGAVEL	Convener CDC	30 MAR 2022

Course Code	Title		
21U3MBE503	Discipline Specific Elective Paper I Group C – Advances in Microbiology		
Semester: V	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Course Objective:

To provide a platform to learn various advanced developments in different areas of Microbiology.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Distinguish gene families from gene complexes.
CO2	Describe the biodiversity of any environment by analyzing of the genetic material encompassed in it.
CO3	Discuss the cellular and molecular basis of immune responses to pathogens through a critical analysis.
CO4	Acquire knowledge the areas that make up synthetic biology.
CO5	Practice using metagenomics for investigating microbial communities.

Offered by: Microbiology

Course Content **Instructional Hours/Week: 4**

Unit	Description	Text Book	Chapter
I	**Evolution of Microbial Genomes:** Salient features of sequenced microbial genomes, core genome pool, flexible genome pool and concept of pan genome, Horizontal gene transfer (HGT), Evolution of bacterial virulence - Genomic islands, Pathogenicity islands (PAI) and their characteristics.	1	9
Instructional Hours			**12**
II	**Metagenomics:** Brief history and development of metagenomics, Understanding bacterial diversity using metagenomics approach, Prospecting genes of biotechnological importance using metagenomics, Basic knowledge of viral metagenome, metatranscriptomics, metaproteomics and metabolomics.	2	11
Instructional Hours			**12**
III	**Molecular Basis of Host-Microbe Interactions:** Epiphytic fitness and its mechanism in plant pathogens, Hypersensitive response (HR) to plant pathogens and its mechanism, Type three secretion systems (TTSS) of plant and animal pathogens, **Biofilms:** types of microorganisms, molecular aspects and significance in environment, health care, virulence and antimicrobial resistance.	2	2
Instructional Hours			**12**
IV	**Systems and Synthetic Biology:** Networking in biological systems, Quorum sensing in bacteria, Co-ordinated regulation of bacterial virulence factors, Basics of synthesis of polio virus in Laboratory, Future implications of synthetic biology with respect to bacteria and viruses.	1	12

Instructional Hours			**12**
V	Extraction of metagenomic DNA from soil: Understand the impediments in extracting metagenomic DNA from soil- PCR amplification of metagenomic DNA using universal 16s ribosomal gene primers - Case study to understand how the poliovirus genome was synthesized in the laboratory - Case study to understand how networking of metabolic pathways in bacteria takes place.	3	2
Instructional Hours			**12**
Total Hours			60

Text Book(s):

1. Fraser CM, Read TD and Nelson KE. Microbial Genomes, Humana Press, 2010.
2. Bull AT. Microbial Diversity and Bioprospecting, ASM Press, 2004.
3. Sangdun C. Introduction to Systems Biology, Humana Press, 2008.

Reference Books

1. Klipp E, Liebermeister W. Systems Biology – A Textbook, Wiley –VCH Verlag, 2009.
2. Caetano-Anolles G. Evolutionary Genomics and Systems Biology, John Wiley and Sons, 2010.
3. Madigan MT, Martink JM, Dunlap PV and Clark DP. Brook's Biology of Microorganisms, 14th Edition, Pearson-Bejamin Cummings, 2014.
4. Wilson BA, Salyers AA Whitt DD and Winkler ME. Bacterial Pathogenesis- A molecular Approach, 3rd Edition, ASM Press, 2011.
5. Bouarab K, Brisson and Daayf F. Molecular Plant-Microbe interaction CAB International, 2009.
6. Voit EO.A First Course in Systems Biology, 1st Edition, Garland Science, 2012.
7. Miller RV and Day MJ. Microbial Evolution- Gene establishment, survival and exchange, ASM Press, 2004.

Unit I : TextBook1, Chapter 9, Page 143 – 154.
Unit II : TextBook 2, Chapter 11, Page 109 – 19.
Unit III: TextBook 2, Chapter 2, Page 154 – 159.
Unit IV: Text Book 1, Chapter 12, Page 197 – 212.
Unit V : Text Book 3, Chapter 2, Page 14 – 36.

Tools for Assessment (50Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Class Performance	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	L	L	L	M	L	M	M	H	L	M	H
CO2	M	L	L	H	L	M	L	L	L	M	M	L	H
CO3	H	L	L	H	M	L	L	L	L	M	L	H	M
CO4	M	L	L	L	L	M	L	M	L	M	L	L	H
CO5	H	L	L	M	M	L	M	L	L	M	L	M	L

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
	30/3/22	Convenor CDC	

Dr. M. THANGAVEL

31 MAR 2022

Course Code	Title		
21U3MBE604	Discipline Specific Elective Paper II Group A - Biosafety and Intellectual Property Rights		
Semester: VI	Credits: 4	CIA : 50 Marks	ESE: 50 Marks

Course Objective:

This course helps to adhere to the ethical practices appropriate to the discipline at all times, adopt safe working practices relevant to the industries and in research field.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Identify potential hazardous biological materials and the risks associated with them.
CO2	Describe the biosafety regulations and ethical concepts in biotechnology.
CO3	Disseminate knowledge on patents, patent regime in India and abroad.
CO4	Understand the patent process and recognize the parts of a patent document and their significance.
CO5	Explicate patent agreements.

Offered by: Microbiology

Course Content **Instructional Hours / Week: 4**

Unit	Description	Text Book	Chapter
I	**Biosafety:** Introduction; biosafety issues in biotechnology; Primary Containment for Biohazards. Types and Hazards, disposal of waste.	1	8
	Instructional Hours		**12**
II	**Biosafety Guidelines**: Biosafety guidelines and regulations (National and International); GMOs/LMOs- Concerns and Challenges; Role of Institutional Biosafety Committees (IBSC), Environmental release of GMOs; Risk Analysis, Assessment, management and communication	1	11,12
	Instructional Hours		**12**
III	**Introduction to Intellectual Property**: Patents, Types, Trademarks, Copyright & Related Rights, Industrial Design and Rights, Traditional Knowledge, Geographical Indications- importance of IPR – patentable and non-patentables – patenting life – legal protection of biotechnological inventions.	2	1
	Instructional Hours		**12**
IV	**Grant of Patent and Patenting Authorities**: Types of patent applications: Ordinary, PCT, Conventional, Divisional and Patent of Addition; An introduction to Patent Filing Procedures; Patent licensing and agreement; Patent infringement- meaning, scope, litigation, case studies, Rights and Duties of patent owner.	1	4,5
	Instructional Hours		**12**
V	**Agreements and Treaties**: AERB/RSD/RES guidelines for using radioisotopes in laboratories and precautions. GATT, TRIPS Agreements; Role of Madrid Agreement; Hague Agreement; WIPO Treaties; Budapest Treaty on international recognition of the deposit of microorganisms; UPOV & Brene conventions; Patent Co-operation Treaty (PCT); Indian Patent Act 1970 &	3	2

	recent amendments.		
Instructional Hours			**12**
Total Hours			**60**

Text Book(s):

1. Goel D & Prashar S., **IPR, Biosafety and Bioethics**. Pearson, 2013.
2. Parashar, Shomini, **IPR, Biosafety & Bioethics**, 2013.
3. Sree Krishna V, **Bioethics and Biosafety in Biotechnology**, New age international Pvt., Ltd., Publishers, 1st Edition, 2007

Unit I : Text Book 1, Chapter 8: 129-137.
Unit II : Text Book 1, Chapter 11: 167-172. Chapter 12: 175-180.
Unit III : Text Book 2, Chapter 1: 1-21.
Unit IV : Text Book 1, Chapter 4: 62-82, Chapter 5: 84-100.
Unit V : Text Book 3, Chapter 2: 19-71.

Reference Book(s):

1. Bare Act, **Indian Patent Act 1970 Acts & Rules**, Universal Law Publishing Co. Pvt. Ltd., New Delhi, 2007
2. Kankanala C., **Genetic Patent Law & Strategy**, 1st Edition, Manupatra Information Solution Pvt. Ltd., New Delhi, 2007.
3. Mittal, D.P., **Indian Patents Law**, Taxmann, Allied Services (P) Ltd, 1999.
4. Singh K K., (2015). **Biotechnology and Intellectual Property Rights: Legal and Social Implications**, Springer India, 2015.
5. Senthil Kumar Sadhasivam and Mohammed Jaabir, M. S., **IPR, Biosafety and Biotechnology Management**. Jasen Publications, Tiruchirappalli, India, 2008.

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Seminar	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	L	M	L	L	L	M	M	H	L	M	L
CO2	L	M	L	L	L	H	M	L	L	L	M	H	M
CO3	L	H	L	M	L	L	H	L	L	M	L	M	M
CO4	M	H	L	M	L	L	M	M	M	M	L	L	M
CO5	L	M	M	H	M	M	H	L	L	M	L	L	M

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
	30/3/22 Dr.M.THANGAVEL	Convenor CDC	31 MAR 2022

Course Code	Title		
21U3MBE605	Discipline Specific Elective Paper II Group B - Plant Pathology		
Semester: VI	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Course objective:

The objectives of the Plant Pathology are the study on: the living entities that cause diseases in plants; the non-living entities and environmental conditions that cause disorders in plants; the mechanisms by which the disease causing agents that produce diseases; the interactions between the disease causing agents.

Course Outcome:

On successful completion of this course the students will be able to

CO1	Understand about the early development of plant diseases.
CO2	Recognize the etiological agents of diseases.
CO3	Familiarize students with the basic plant disease spread and control of plant diseases.
CO4	Gain knowledge on processes of infection and colonization of the host by the pathogen.
CO5	Describe aspects of integrated pest management and recognize the etiological agents of diseases.

Offered by: **Microbiology**

Course Content **Instructional Hours/Week:4**

Unit	Description	Text Book	Chapter
I	**Introduction and history of plant pathology:** The herbalists, the systematists, beginning of the modern period, Doctrine of spontaneous generation, discovery of Bordeaux mixture, plant pathology in 20th century, genetics of the host and pathogen, environment in relation to plant disease, nature of disease resistant, biochemistry and physiology of diseased host plant, molecular biology of pathogenesis and induced systemic resistance, tissue culture in plant pathology, history and development of plant pathology in India.	2	2
Instructional Hours			**12**
II	**Pathogenesis:** Penetration and entry by plant pathogens, pre-penetration, entry through natural openings, direct penetration, entry through wounds, wounds caused by other fungus, wound caused by nematodes, entry through root hairs and buds, development inside host tissues.	2	3
Instructional Hours			**12**
III	**Plant disease epidemiology:** Introduction, theories of epidemic development, development of disease in time, development of disease in space, fitting disease progress curves to epidemiological data, the role of the pathogen, sources of inoculum, vectors, the role of the host, host-plant distribution, the effect of host resistance on inoculums	1	3

	multiplication, the role of the environment, the soil, the atmosphere.		
Instructional Hours			**12**
IV	**Host Pathogen Interaction: Microbial Pathogenicity-** Virulence factors of pathogens: enzymes, toxins (host specific and non specific) growth regulators, virulence factors in viruses (replicase, coat protein, silencing suppressors) in disease development. **Genetics of Plant Diseases –** Concept of resistance (R) gene and avirulence (avr) gene; gene for gene hypothesis, types of plant resistance: true resistance – horizontal and vertical, apparent resistance. **Defense Mechanisms in Plants -** Concepts of constitutive defense mechanisms in plants, inducible structural defenses (histological cork layer, abscission layer, tyloses, gums), inducible biochemical defenses [hypersensitive response (HR), systemic acquired resistance (SAR), phyto alexins, pathogenesis related (PR) proteins, plant bodies, phenolics, quinones, oxidative bursts].	2	4-6
Instructional Hours			**12**
V	**Plant Disease Management:** Cultural practices for disease management - pathogen free propagation material, removal of infected plants, soil treatment, hygiene, crop rotation, fertilization, quarantine, chemical plant disease control-fungicides, biological control of plant diseases. **Important plant diseases giving emphasis on its etiological agent, symptoms, epidemiology and control measures -** Important diseases caused by fungi White rust of crucifers *Albugo candida*, Downy mildew of onion – *Peronospora destructor*, Late lack stem rust of wheat –*Pucciniagram* inistritici, Looses mut of wheat – *Ustila gonuda*. Wilt of tomato – *Fusarium oxysporum* f.sp. *lycopersici*. Important diseases caused by viruses: Papaya ring spot.	3 4	15-17 6-8
Instructional Hours			**12**
Total Hours			**60**

Text book (S):

1. Richard N. Strange, **Introduction to Plant Pathology**, John Wiley & Sons Ltd., 2006.
2. MehrotraRS., Ashok Aggarwal. **Fundamentals of Plant Pathology**, McGraw Hill Education India Pvt., Ltd., 2013.
3. Anne Marte Tronsmo, David B. Collinge, Annika Djurle., **Plant Pathology and Plant Diseases**,CAB international, 2020.
4. Sambamurthy, **Text Book of Plant Pathology**, 1st Edition, I.K. International Pvt., Ltd., 2010.

Unit I: Text book 2, Chapter 2: 12-33
Unit II:Text book 2, Chapter 3: 34-46
Unit III: Text book 1, Chapter 3: 61-84
Unit IV: Text book 2, Chapter 4-6: 47-9
Unit V:Text book 3, Chapter 15-17,265-306;

Text book 4, Chapter 6-8: 95-154

Reference Book (s):

1. Christian Joseph R. Cumagun, **Plant Pathology**, Published by InTech., 2012.
2. Singh RS., Introduction to Principles of Plant Pathology, 4th Edition, Oxford & IBH Publishing Co. Pvt. Ltd., 2009.
3. http://ipm.ucanr.edu/PMG/diseases/diseaseslist.html
4. http://www.hillagric.ac.in/edu/coa/ppath/lect/plpath111/Lect.%207%20Pl%20Path%20111-%20%20DEFENCE%20IN%20PLANTS.pdf
5. file:///C:/Users/Admin/Downloads/Plant-Pathogens-Principles-of-Plant-Pathology.pdf

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Class Performance	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	L	M	L	M	L	L	M	H	M	H	H
CO2	M	M	L	M	L	M	L	L	M	H	L	L	H
CO3	H	M	L	L	L	M	M	H	L	H	L	L	M
CO4	L	M	L	L	L	H	M	L	L	M	M	M	M
CO5	H	H	L	M	L	L	M	L	L	M	H	M	H

H – High; M- Medium; L – Low

Course Designed by	Verified by HOD	Checked by	Approved by
	30/3/22 Dr.M.THANGAVEL	Convenor CDC	31 MAR 2022

Course Code	Title		
21U3MBE606	Discipline Specific Elective Paper II – Group C Microbial Quality Control in Food and Pharmaceutical Industries		
Semester: VI	Credits: 4	CIA : 50 Marks	ESE: 50 Marks

Course Objective:

This course impart skills to students in the area of Quality Control for food and pharmaceutical industries to ensure that their final products are consistent, safe, effective and predictable.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Acquire knowledge about Good Laboratory Practices and biosafety.
CO2	Gain an in-depth knowledge in Determining Microbes in Food**.**
CO3	Understand the concepts of determining Microbes in Pharmaceutical.
CO4	Acquire knowledge about Pathogenic Microorganisms.
CO5	Outline the basic steps about Food Safety and Microbial Standards.

Offered by: Microbiology

Course Content **Instructional Hours / Week: 4**

Unit	Description	Text Book	Chapter
I	**Microbiological Laboratory and Safe Practices:** Working of biosafety cabinets, using protective clothing, specification for BSL-1, BSL-2, BSL-3. Discarding biohazardous waste – Methodology of Disinfection, Autoclaving & Incineration.	1	1
	Instructional Hours		**12**
II	**Methods for Determining Microbes in food:** Culture and microscopic methods - Standard plate count, Most probable numbers, Direct microscopic counts, Biochemical and immunological. Concepts of food safety. Methods of preventing food contaminants.	1	4,5
	Instructional Hours		**12**
III	**Determining Microbes in Pharmaceutical:** Methods: Limulus lysate test for endotoxin, gel diffusion, sterility testing for pharmaceutical products. Concepts of quality management. Molecular methods - Nucleic acid probes, PCR based detection, biosensors.	1	6-9
	Instructional Hours		**12**
IV	**Pathogenic Microorganisms of importance in Food & Water:** Enrichment culture technique, Detection of specific microorganisms - on XLD agar, Salmonella Shigella Agar, Manitol salt agar, EMB agar, MacConkey Agar, Saboraud Agar. Ascertaining microbial quality of milk by MBRT, Rapid detection methods of microbiological quality of milk at milk collection centers (Resazurin assay).	2	6
	Instructional Hours		**12**

V	**HACCP for Food Safety and Microbial Standards:** Hazard analysis of critical control point (HACCP) - Principles, flow diagrams, limitations Microbial Standards for Different Foods and Water – BIS standards for common foods and drinking water. Application of quality assurance in food industry.	3	3
Instructional Hours			**12**
Total Hours			**60**

Text Book(s):

1. Baird RM, Hodges NA and Denyer SP. **Handbook of Microbiological Quality Control in Pharmaceutical and Medical Devices**, Taylor and Francis Inc., 2005.
2. Cangliang Shen and Yifan Zhang, **Food Microbiology Laboratory for the Food Science Student: A Practical Approach**, Springer Publications, 2017.
3. Martin Cole, **A simplified guide to understanding and using Food Safety Objectives and Performance Objectives**, International Commission on Microbiological Specifications for Foods (ICMSF), 2002.

Unit I : Text Book 1, Chapter 1: 5-17
Unit II : Text Book 1, Chapter 4 - 5: 57-90
Unit III : Text Book 1, Chapter 6-9: 92-123
Unit IV : Text Book 2, Chapter 6: 31-58
Unit V : Text Book 3, Chapter 3: 20

Reference Book(s):

1. Jay JM, Loessner MJ, Golden DA. **Modern Food Microbiology**, 7th Edition, Springer, 2005.
2. Garg N, Garg KL and Mukerji KG. **Laboratory Manual of Food Microbiology**, IK International Publishing House Pvt. Ltd., 2010.

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Class Performance	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	L	M	L	L	L	M	M	H	L	M	M
CO2	L	M	M	M	M	H	M	H	H	H	M	H	M
CO3	L	H	L	M	M	M	H	H	L	M	M	M	M
CO4	M	H	L	M	H	H	M	M	M	M	M	L	M
CO5	L	M	M	H	M	M	H	L	L	M	M	L	M

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
	30/3/22 Dr.M.THANGAVEL	Convenor CDC	30 MAR 2022

Course Code	Title		
21U3MBE607	Discipline Specific Elective Paper III Group A -Nanobiotechnology		
Semester: VI	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Course Objective:

The objective is to understand nanoelectronics, DNA computer and quantum computer, nanobiometrics, natural nanocomposites, use of nanotechnology in Agriculture and nano analytics techniques.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Understand the construction of various circuits models using the biological neuronal network.
CO2	Improve knowledge on quantum computers and Nano Machines.
CO3	Develop knowledge on Nano biometrics.
CO4	Recognize the concept of Nano based agricultural system.
CO5	Know methods on analysis of Nano particles.

Offered by: Microbiology

Course Content **Instructional Hours / Week: 4**

Unit	Description	Text Book	Chapter
I	**Biological Inspired Concepts:** Biological Networks – - Information-Driven Nanoassembly- Energetic- Chemical Transformation- Regulation - Traffic Across Membranes- Biomolecular Sensing – Modelling of Neuronal cells by VLSI circuits.	1	4
Instructional Hours			**12**
II	**Biological and Quantum Mechanical Computers:** DNA Computer – Information Processing with Chemical reaction – Nanomachines – Parallel Processing – Quantum Computer. DNA as a Biomolecular template - DNA branching.	1	5
Instructional Hours			**12**
III	**Nanobiometrics:** Introduction – lipids as nano-bricks and morter- Self assembled nanolayers - the bits that do things - proteins – DNA Computer. Protein and Peptide based Nanostructures. Bottom up and Top down approach.	2	6
Instructional Hours			**12**
IV	**Natural nanocomposites:** Introduction – natural nanocomposite materials – biologically synthesized nanostructures – protein based nanostructure formation –Nanotechnology Applications in agriculture, food, medical and environment.	3	3
Instructional Hours			**12**

V	**Nanomaterial in Biotechnology:** Quantum dot Biolabelling – Nanoparticle Molecular labels – Analysis of Biomolecular Structure by AFM. – Nano structuring Immuno Fluorescent Biomarker Imaging - Immuno gold labeling- Nanoprobes BioPhotonics- Diagnostic Biosensors.	4	22, 23, 24
Instructional Hours			**12**
Total Hours			**60**

Text Book(s):

1. Goser, K., Glösekötter, P., and Dienstuhl, J. **Nanoelectronics and Nanosystems: from Transistors to Molecular and Quantum Devices**. Berlin: Springer, 2004.
2. Wilson, M. Nanotechnology: **Basic Science and Emerging Technologies**. Boca Raton: Chapman & Hall. CRC Press, 2004.
3. Ajayan, P. M., Schadler, L. S., and Braun, P. V. **Nanocomposite Science and Technology**. Weinheim: Wiley-VCH, 205.
4. Niemeyer, C. M., & Mirkin, C. A. **Nanobiotechnology: Concepts, Applications and Perspectives**. Weinheim: Wiley-VCH, 2007.

Unit I: Text Book 1, Chapter 4 (61-75)
Unit II: Text Book 1 Chapter 5 (77-88)
Unit III: Text Book 2, Chapter 6 (140-154)
Unit IV: Text Book 3, Chapter 3 (155-207)
Unit V: Text Book 4 Chapter 22, 23, 24 (360-399)

Reference Book(s):

1. Chen, J. **Nanotechnology: Science and Computation**. Berlin: Springer, 2006.
2. Mirkin, C. A., and Niemeyer, C. M. **Nanobiotechnology II: More Concepts and Applications**. Weinheim: Wiley-VCH, 2007.
3. https://drive.google.com/file/d/1AyOD15BJxRIbFf735pANFj3lR6yQkEGt/view?usp=sharing
4. http://www.ncabr.org/wp-content/uploads/2015/12/chapter_nanobiotechnology.pdf

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Attendance	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	L	M	L	M	L	L	M	M	L	L	M
CO2	L	M	M	L	L	L	L	M	M	L	M	M	L
CO3	M	M	L	H	L	M	L	L	M	H	M	H	M
CO4	L	M	L	L	M	L	L	L	M	H	M	L	L
CO5	M	H	L	L	L	L	M	L	M	M	H	L	M

H-High; M-Medium; L-Low

Course Designed by	Verified by HOD	Checked by	Approved by
	30/3/22	Convenor CDC	

Dr. M. THANGAVEL

31 MAR 2022

Course Code	Title		
21U3MBE608	Discipline Specific Elective Paper III Group B - Microbiology and Entrepreneurship		
Semester: VI	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Course Objective:

To gain knowledge on designing, launching and running a new business using potential microorganisms.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Understand the basic concepts of entrepreneurship and become a young women Entrepreneur.
CO2	Get knowledge about the business opportunities on mushroom cultivation.
CO3	Attain technical knowledge on different composting technology.
CO4	Separate different types of biotechnological approaches to establish successful enterprises.
CO5	Apply for financial agencies for supporting entrepreneurship

Offered by: **Microbiology**

Course Content **Instructional Hours / Week: 4**

Unit	Description	Text Book	Chapter
I	**History and concept of Entrepreneurship**: Characteristics & Functions and types of Entrepreneur. Entrepreneurship – role in economic development. Women entrepreneurs: Problems of women entrepreneurs – Factors affecting entrepreneurial growth. Management concepts, Marketing Strategies	1	1
Instructional Hours			**12**
II	**Mushroom cultivation:** Edible mushroom morphology, Nutritional and medicinal value. Preparation of spawn, types of spawning. Preparation of substrate - Casing – harvesting. Storage, Preservation and marketing. Mushroom diseases and its management **Value added products**: Cookies, Soup, Omlette, Samosa, Noodles, Pickles and Curry.	2	2-5
Instructional Hours			**12**
III	**Vermicomposting**: Biology and ecological classification of earthworm. Physical and chemical effects of earthworm on soil, Vermicomposting - species employed, methods and types of production – preparation of vermin wash – Field application and crop response, Storage and marketing of composts. Vermi Brick preparation.	3	3-9
Instructional Hours			**12**
IV	**Biofertilizer**: Rhizobium, BGA, Azolla, VAM – bioinoculum, mass production- carriers, field application and crop response and Liquid biofertilizers. Biopesticide – bacteria and fungi. Production of SCP – Spirulina and Yeast.	4	2
Instructional Hours			**12**
V	**Patents and process**: History of Indian patent system, Patenting authorities, requirements of patenting, types of patent, types of patent applications in India, farmer's rights.	5	16
Instructional Hours			**12**

Total Hours	60

Text Book (s):

1. Khanka S.S. **Entrepreneurial Development**. S. Chand & Company, New Delhi. 3rd Edition, 2003.
2. Kanniyan.S and Ramaswamy K. A. **Handbook of Edible Mushrooms**. Today's and Tomorrow's Printers, New Delhi, 1980.
3. Rhonda Sherman, **The Worm Farmer's Handbook**. Chelsea Green Publishing, 2018.
4. Panda H, **Manufacture of Biofertilizer and Organic Farming**, Asia Pacific Business Press, 2011.
5. Sateesh MK., Bioethics and Biosafety, I.K. International Publishing House Pvt. Ltd., 2008.

Unit I: Text Book1, Chapter1: 3-35.
Unit II: Text Book 2, Chapter 2-5: 25 – 75
Unit III: Text Book3, Chapter 3-9: 36-112
Unit IV: Text Book4, Chapter 2: 20-42
Unit V: Text Book 5, Chapter 16: 353-390

Reference Book(s):

1. Vasant Desai. **Dynamics of Entrepreneurial Development and Management**. Himalaya Publishing House, New Delhi, 2001.
2. Chang S.T and Hayes W.A. **Biology and Cultivation of Mushrooms**. Academic Press, NewYork, 1978.
3.

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Class Performance	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	H	H	H	H	M	H	H	L	L	H
CO2	M	H	M	M	H	H	H	H	M	H	M	L	H
CO3	H	M	H	H	M	H	M	M	H	M	M	L	H
CO4	H	H	M	H	H	H	H	H	M	M	H	M	H
CO5	M	M	H	M	H	H	M	H	H	M	H	M	H

H- High; M- Medium; L- Low.

Course designed by	Verified by HoD	Checked by	Approved by
Dr. K. Franckline Noah	Dr. M. THANGAVEL	Convener CDC	30 MAR 2022

Course Code	Title		
21U3MBE609	Discipline Specific Elective Paper III Group C - Microbial Diagnosis in Health Clinics		
Semester : VI	Credits: 4	CIA :50 Marks	ESE:50 Marks

Course Objective:

This course helps to Importance of diagnosis of diseases.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Identify Microscopic examination and culture methods
CO2	Describe the Importance of diagnosis of diseases.
CO3	Disseminate knowledge on Collection of Clinical Samples.
CO4	Understand the Serological, Molecular method.
CO5	Explicate Testing for Antibiotic sensitivity in Bacteria.

Offered by: Microbiology

Course Content **Instructional Hours / Week:4**

Unit	Description	Text Book	Chapter
I	**Microscopic examination and culture methods:** Examination of sample by staining - Gram stain, Ziehl-Neelson staining for tuberculosis, Giemsa stained thin blood film for malaria. Preparation and use of culture media - Blood agar, Chocolate agar, Lowenstein-Jensen medium, MacConkey agar, Distinct colony properties of various bacterial pathogens..	2	13
Instructional Hours			**12**
II	**Importance of diagnosis of diseases :** Bacterial, Viral, Fungal and Protozoan Diseases of various human body systems, clinical samples for diagnosis of infectious disease	2	6
Instructional Hours			**12**
III	**Collection of Clinical Samples**: How to collect clinical samples (oral cavity, throat, skin, Blood, CSF, urine and faeces) and precautions required. Method of transport of clinical samples to laboratory and storage.	2	1
Instructional Hours			**12**
IV	**Serological, Molecular methods and Kits for rapid Detection of Pathogens**: Serological Methods - Agglutination, ELISA, immunofluorescence, Nucleic acid based methods - PCR, Nucleic acid probes. Typhoid, Dengue and HIV, Swine flu	2	10
Instructional Hours			**12**
V	**Testing for Antibiotic sensitivity in Bacteria**: Importance, Determination of resistance/sensitivity of bacteria using disc diffusion method, Determination of minimal inhibitory concentration (MIC) of an antibiotic by serial double dilution method.	1	11
Instructional Hours			**12**
Total Hours			**60**

Text Book(s):

1. Ananthanarayan R and Paniker CKJ (2009) Textbook of Microbiology, 8th edition, Universities Press Private Ltd.
2. Patricia, M.T. Bailey and Scott's Diagnostic Microbiology, 13th Edition, Mosby, Inc. Publishers, China. 2014.
   Unit I : Text Book 2, Chapter 13 193-200
   Unit II : Text Book 2, Chapter 6 68-105.
   Unit III: Text Book 2, Chapter 1 34-44
   Unit IV: Text Book 2, Chapter 10 140-150
   Unit V : Text Book 1, Chapter 11 153-168.

Reference Book(s):

1. Tille P (2013) Bailey's and Scott's Diagnostic Microbiology, 13th edition.
2. Mosby.Collee JG, Fraser, AG, Marmion, BP, Simmons A (2007) Mackie and Mccartney Practical Medical Microbiology, 14th edition, Elsevier.
3. Randhawa, VS, Mehta G and Sharma KB (2009) Practicals and Viva in Medical Microbiology 2nd edition, Elsevier India Pvt Ltd.

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Quiz	Class Performance	Total
8	8	10	8	8	8	50

Mapping

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	H	M	H	M	M	L	M	M	H	H	M
CO2	H	M	M	L	H	M	M	M	M	L	M	M	L
CO3	H	M	L	H	H	M	H	M	M	H	M	H	M
CO4	H	M	H	H	H	H	M	L	M	H	M	M	M
CO5	M	H	H	H	H	H	M	M	M	M	H	L	M

H-High; M-Medium; L-Low

Course designed by	Verified by HoD	Checked by	Approved by
Dr. K. Franckline Nooah	Dr.N.THANGAVEL	Convener CDC	

30 MAR 2022

EXTRA DEPARTMENTAL COURSE

Course Code	Title	
21U4MB3ED1	Extra Departmental Course I - Mushroom Cultivation Technology	
Semester: III	Credits: 2	ESE : 50 Marks

Course Objective:

To get the knowledge on the mushroom cultivation technology and significance of mushroom cultivation technology.

Course Outcomes:

After successful completion of this course the students will be able to

CO1	Understand structure and importance of edible mushroom, differentiate edible and poisonous mushrooms.
CO2	Acquire knowledge about reproduction and cultivation of mushrooms.
CO3	Gain information on mushroom cultivation houses.
CO4	Know how to harvest and utilize the mushrooms.
CO5	Recognize various types of recipes preparation using mushroom.

Offered by: Microbiology

Course Content **Instructional hours 2/ week**

Unit	Description	Text Book	Chapter
I	**Background to Mushrooms**: Common Features, Types and Uses, Edible Mushrooms, Non-edible and Poisonous Mushrooms, Common Features to note on Poisonous Mushrooms, Uses of Mushrooms, Importance of Mushrooms, Biological Efficiency	1	1
Instructional Hours			**05**
II	**Biology of Mushrooms**: Reproduction in Fungi, Fungal Growth Factors, Nutrition of Mushrooms, Types of oyster mushrooms, Types of button mushroom, Substrate Definition, Cultivation of Oyster Mushrooms: Collecting of substrate, Drying of substrate, Chopping of substrate, Watering of the substrate, Pasteurization, Spawning.	1	2
Instructional Hours			**10**
III	**Mushroom Houses**: Materials for constructing a mushroom house, Maintaining and monitoring the mushroom house, Production cycle, Waste management and recycling, Trouble shooting.	2	7
Instructional Hours			**07**
IV	**Harvest, Utilization**: Utilization of Spent Mushroom Substrate, Harvesting and Preservation of Mushrooms. Pests and Diseases. Packaging of mushrooms.	1	6
Instructional Hours			**05**
V	**Mushroom Recipes**: Mushroom soup, Chicken Mushroom, Mushroom Curry.	2	12
Instructional Hours			**03**
Total Hours			**30**

Text Book(s):

1. Chenjerayi Kashangura, Edna Kunjeku, Audrey Mabveni, Tsungai Chirara, Arnold Mswaka, Vimbai Manjonjo-Dalu. **Manual for Mushroom Cultivation**. Biotechnology Trust of Zimbabwe, 2004.
2. Nailoke Pauline Kadhila-Muandingi, Fabian Sinvula Mubiana, Keumbo Lorna Halueendo. **Mushroom Cultivation: A Beginners Guide**. 2nd edition, University of Namibia, 2008.

Unit I: Text book 1, Chapter 1: 9-15
Unit II: Text book 1, Chapter 2: 24-47
Unit III: Text book 2, Chapter 7: 28-33.
Unit IV: Text book 1, Chapter 6: 59-62
Unit V: Text book 2, Chapter 12: 39-40

Reference Book(s):

1. Gregoire Pesti. **Mushrooms Cultivation, Antioxidant Properties and Health Benefits**. Nova Science Pub Inc., 2014.
2. Philip G. Miles, Shu-Ting Chang. **Mushrooms: Cultivation, Nutritional Value, Medicinal Effect, and Environmental Impact**, 2nd edition, CRC Press, 2004.
3. https://www.biologydiscussion.com/fungi/mushrooms-meaning-values-and-cultivation-procedure/46635
4. https://www.yourarticlelibrary.com/mushrooms/mushrooms-cultivation-procedure-for-mushrooms-cultivation-1703-words/7268

Course Designed by	Verified by HOD	Checked by	Approved by
	30/3/22 Dr.M.THANGAVEL	Convenor CDC	31 MAR 2022

Course Code	Title	
21U4MB3ED2	Extra Departmental Course II - Vermitechnology	
Semester: III	Credits: 2	ESE: 50

Course Objectives:

Able to prepare compost in a limited space and describe the decomposing process. The interested students will get the knowledge of composting. They can generate employments. They will also turn towards organic farming. Will help to maintain the environment pollution free and will get the knowledge of biodiversity of local earthworms.

Course Outcomes:

On successful completion of this course the students will be able to

CO1	Understand importance of Vermitechnology.
CO2	Acquire knowledge on role of earthworms.
CO3	Gain information on vermicompost processing.
CO4	Know how to feed and monitor to prepare vermicompost.
CO5	Know harvest and packaging technology of vermicompost.

Offered by: Microbiology

Course Content **Instructional hours / week: 2**

Unit	Description	Text Book	Chapter
I	**Vermiculture and Vermicomposting**: Green Revolution, Chemical Fertilizers, Composting, Vermicomposting, difference between vermiculture and vermicomposting, Advantages of vermicomposting, Vermitechnology and its importance	1	1 (a-h)
Instructional Hours			**03**
II	**Earth worm and vermicomposting**: Earthworms description, Geographical distribution of earthworms, Classification of earthworms, Biology of Earthworms - Anatomy and Physiology Basics, Amazing Earthworm Facts, Ecological Groups and Species, Earthworm Reproduction, Earthworm Needs for Vermicomposting	1, 2	1 (i-q), 3
Instructional Hours			**04**
III	**Vermicomposting Process**: Parameters for Choosing a System, Space Requirements, Types of Vermi-Systems, Covering the Bed, Accessing the Worm Bed, Bedding Options and Preparation, Adding Earthworms to Your Vermi-System, Utility Needs, Safety.	2	5
Instructional Hours			**09**
IV	**Feeding and monitoring**: Feedstock Options, Developing a Feedstock Recipe, Processing Feedstocks, Testing New Feedstocks, Worm Feed Characteristics, Pre-Composting Feedstocks, Feeding Schedule, Applying Feedstocks to the Bed, The Daily Inspection, Moisture Control, Temperature Control, Lighting, Earthworm Predators or Annoyances, Troubleshooting Worm Bed Condition, Recording Observations.	3	7
Instructional Hours			**10**
V	**Harvesting and Packaging:** Manual Earthworm Removal, Vermicast Harvesting, Packaging and Shipping Earthworms, Vermicast: Quality, Stability, and Maturity of Product, Product Labeling, Tea or Aqueous Extracts.	3	4

Instructional Hours	04
Total Hours	30

Text Book(s):

1. Avnish Chauhan, **Vermitechnology, Vermiculture, Vermicompost and Earthworms**. Lap lambert Academic publishing, 2012.
2. Rhonda Sherman, **The Worm Farmer's Handbook**. Chelsea Green Publishing, 2018.

Unit I: Text book 1: Chapter 2 (a-h) - 11-18
Unit II: Text book 1, 2: Chapter 1(i-q), 3 - 22-34, 32-39
Unit III: Text book, 2 Chapter 5: 52-72
Unit IV: Text book 3, Chapter 7: 73- 97
Unit V: Text book 3, Chapter 4: 25-27

Reference Book(s):

1. Sreenivasan E., **Handbook of Vermicomposting Technology**. The Western India Plywoods Ltd., 2015.
2. Glenn Munroe, **Manual of On-Farm Vermicomposting and Vermiculture**, Organic Agriculture Centre of Canada, 2005.
3. https://www.onlinebiologynotes.com/vermicomposting/
4. https://www.vedantu.com/biology/vermiculture

Course designed by	Verified by HoD	Checked by	Approved by
		Convenor CDC	

Dr. M. THANGAVEL

SELF STUDY PAPERS

Course Code	Title
21UMBSS01	Self-Study Paper I – Solid Waste Management
Semester – II to V	Credit: 1

Course Objective:

To impart knowledge and skills in the collection, storage, transport, treatment, disposaland recycling options for solid wastes.

Course Outcomes:

On the successful completion of the course, students will be able to demonstrate

On successful completion of this course the students will be able to

CO1	Learn basic concepts of solid waste management
CO2	Achieve an overview understanding of the main aspects of waste policy and systems.
CO3	Emphasis their types, amounts of solid waste, regulatory aspects, the handling of wastes and byproducts.
CO4	Implement the technology for waste treatment, and political instruments and consequences of solid waste handling.
CO 5	Implement of solid waste treatment and methods.

Offered By: Microbiology

Unit	Description	Text Book	Chapter
I	**Waste generation and management**: Issues in solid waste management, Integrated waste management, Implementing integrated waste management strategies, Typical costs for major waste management options	1	1
II	**Planning for municipal solid waste management programs**: State solid waste management planning, Local and regional solid waste management planning	1	4
III	**Solid waste stream characteristics**: Municipal solid waste, Methods of characterizing municipal solid waste, Municipal solid waste management, Discards of municipal solid waste by volume, The variability of municipal solid waste generation.	1	5
IV	**Source Reduction, Waste Minimization and Environmental Laws**: Hierarchy of Waste Management, Principles of Life Cycle, Costs of Environmental Management, Waste Minimization at Work, NEPA, RCRA, Clean Air Act, Clean Water Act, CERCLA, Emergency Planning and Community Right-To-Know Act, Oil Pollution Act, Pollution Prevention Act, Safe Drinking Water Act, Toxic Substances Control Act.	2	1, 2
V	**Collection of solid waste:** Types of waste collection services, Types of collection systems, equipment, and personnel requirements, Collection routes, Management of collection systems, Collection system economics, Recycling - Development and implementation of materials recovery facilities.	1	7

Text Book(s):

1. George Tchobanoglous, Frank Kreith. **Handbook of Solid Waste Management**, 2nd edition, The McGraw –Hill, 2002.

2. Cheremisinoff, Nicholas P. Handbook of Solid Waste **Management and Waste Minimization Technologies**. Elsevier Science (USA), 2003.

Unit I : Text Book 1, Chapter 1: 19- 43
Unit II : Text Book 1, Chapter 4: 117-130
Unit III: Text Book 1, Chapter 5: 131-160
Unit IV: Text Book 2, Chapter 1, 2: 1 - 32
Unit V : Text Book 1, Chapter 7: 203 – 230

Reference Book(s):

1. A. Nag, K. Vizayakumar, **Environmental Education and Solid Waste Management**, New Age International Ltd., Publishers, 2005.
2. Samuel Stucki, Christian Ludwig (auth.), Dr. Christian Ludwig, Dr. Stefanie Hellweg, Dr. Samuel Stucki. **Municipal Solid Waste Management: Strategies and Technologies for Sustainable Solutions**, 1st edition, Springer-Verlag Berlin Heidelberg, 2003.
3. https://courses.lumenlearning.com/suny-monroe-environmentalbiology/
4. https://www.epa.gov/sites/production/files/2020-0/documents/master_swmg_10-20- 20_0.pdf

Course designed by	Verified by HoD	Checked by	Approved by
Dr. J. Jumila Noah (Dr. K. Franckline Noah)	Dr. M. THANGAVEL	Convener CDC	30 MAR 2022

Course Code	Title
21UMBSS02	Self Study Paper II- Human Anatomy and Physiology
Semester – II to V	Credit: 1

Course Objective:

Fundamentals of Anatomy & Physiology gives students in-depth instruction in the organization, structures, and functions of the human body. Students will learn the terminology, anatomy and physiology, and pathology of each body system and how they interrelate to maintain homeostasis.

Course outcomes:

On successful completion of this course the students will be able to

CO1	Use correct terminology to discuss the chemistry, cell structure, and tissues of the human body.
CO2	Use correct terminology to discuss the components and functions of blood, as well as the formation and anatomy of blood cells.
CO3	Identify and explain the structure and functions of each body communication system.
CO4	Identify and explain the structure and functions of digestive system.
CO5	Explain the role of each body system in maintaining homeostasis.

Offered by Microbiology

Unit	Description	Text Book	Chapter
I	**Introduction to the human body, chemical and tissue level of organization**: The body and its constituents, Introduction to the human body, Introduction to the chemistry of life, The cells, tissues and organization of the body.	2	1-4
II	**Circulatory and cardiac system:** The blood, The cardiovascular system.	1	7, 8
III	**Body communication and respiration:** The nervous system, endocrine system, and respiratory system.	2	12-18, 23
IV	**Digestive system**: Activity, organization, organs, mouth, pharynx, esophagus, structure of digestive system, process of digestion.	1	9
V	**Protection and survival**: The tissue, skin, skeleton, muscular, renal and reproductive systems.	1	4-6, 10, 17

Text Book(s):

1. Ian Peate, Muralitharan Nair, **Fundamentals of Anatomy and Physiology for Nursing and Healthcare Students**, 2nd edition, Wiley Balckwell, 2017.
2. Gerard J. Tortora, Bryan H. Derrickson, **Principles of Anatomy and Physiology,** 14th Edition, Wiley, 2014.

Unit I: Text Book 2, Chapter 1-4, 2: 1- 141
Unit II: Text Book 1, Chapter 7, 8: 185-251
Unit III: Text Book 2, Chapter 12-18, 23: 379-650, 840-878
Unit IV: Text Book 1, Chapter 2: 258-292
Unit V: Text Book 1, Chapter 4-6, 10, 17: 95-179, 300-326, 551-569

Reference Book(S):

1. Anne Waugh, Allison Grant, **Ross & Wilson Anatomy and Physiology in Health and Illness,** 13th edition, Elsevier, 2018.
2. Frederic H. Martini, Judi L. Nath, Edwin F. Bartholomew. **Fundamentals of Anatomy & Physiology**, 9th edition, Benjamin Cummings, 2012.
3. https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/nursing_students/LN_human_anat_final.pdf
4. https://www.drnaitiktrivedi.com/index.php/notes/anatomy-physiology-notes/

Course designed by	Verified by HoD	Checked by	Approved by
Dr. J. M. R Noah (Dr. K. Franciline Noah)	30/3/22 Dr. M. THANGAVEL	Convener CDC	30 MAR 2022