Sadakathullah Appa College

(Autonomous)

(Reaccredited by NAAC at an'A' Grade. An ISO 9001:2015 Certified Institution)

Rahmath Nagar, Tirunelveli- 11.
Tamil Nadu.

DEPARTMENT OF ZOOLOGY

CBCS SYLLABUS

Learning Outcomes-based Curriculum Framework for

ZOOLOGY (B.Sc.)

(Applicable for the students admitted from June 2021 as per the Resolutions of the Academic Council Meeting held on 20.03.2021)

CONTENTS

B.Sc. Zoology

DISTRIBUTION OF HOURS, CREDITS, NO. OF PAPERS & MARKS

(Applicable for students admitted in June 2021 and onwards)

Part	Course	Semester	Hours	Credits	Papers	Marks
I	Tamil / Arabic	I to IV	24	12	4	400
II	English	I to IV	24	12	4	400
III	Discipline Specific Core (DSC) + Field work & Practical	I to VI	73	62	20	1700
	Discipline Specific Elective (DSE) + Project	III & VI	16	18	4	400
	Allied Theory & Practicals	I to IV	24	16	8	600
IV	Non-Major Elective (NME)	III to IV	4	4	2	200
	Skill Enhancement Course (SEC)	III, IV & VI	10	10	5	500
	Ability Enhancement Compulsory Course (AECC) Social Value Education (SVE)	I	2	2	1	100
	Environmental Science (EVS)	II	2	2	1	100
V	Extension Activities	IV	--	1+1	1	200
	Library Reading Hour	V	1			
		TOTAL	**180**	**140**	**50**	**4600**

SEMESTER WISE DISTRIBUTION OF HOURS

Part	I	II	III				IV				Total
SEM	**T/A**	**ENG**	**DSC**	**FW**	**DSE/ PRO**	**AL**	**NME**	**SEC**	**VE/ EVS**	**LRH**	
I	6	6	10	-	-	6	-	-	2		**30**
II	6	6	10	-	-	6	-	-	2		**30**
III	6	6	6	-	-	6	2	4	-	-	**30**
IV	6	6	6	-	-	6	2	4	-	-	**30**
V	-	-	21	-	8	-	-	-	-	1	**30**
VI	-	-	20	-	8	-	-	2	-		**30**
Total	**24**	**24**	**73**	**-**	**16**	**24**	**4**	**10**	**4**	**1**	**180**

CBCS Syllabus – B.Sc., ZOOLOGY
(2021-22 onwards)

SEM	Part	Course	Title of the paper	Course Code	H/W	L*	T*	P*	C	Marks		
										I	E	T
I	I	L-I	இக்காலத்தமிழ்	21ULTA11	6	-	-	-	3	25	75	100
			Grammar and Translation - I	21ULAR11								
	II	L-I	Communicative English -I	21ULEN11	6	-	-	-	3	25	75	100
	III	DSC-I	Animal Diversity-I	21UCZO11	4	4	-	-	4	25	75	100
	III	DSC-II	Animal Diversity-II	21UCZO12	4	4	-	-	4	25	75	100
	III	P-I	Animal Diversity-I& Animal Diversity-II Practicals	21UCZO1P1	2	-	-	2	1	40	60	100/2
	III	A-I/1	Food Science	21UAAN11	4	4	-	-	3	25	75	100
	III	A-I/1P	Food Science Practicals	21UAAN1P1	2	-	-	2	1	40	60	100/2
	IV	AECC-I	Value Education I	21USVE1A	2	2	-	-	2	25	75	100
			Value Education II	21USVE1B								
II	I	L-II	சமயத்தமிழ்	21ULTA21	6	-	-	-	3	25	75	100
			Grammar and Translation - I	21ULAR21								
	II	L-II	Communicative English II	21ULEN21	6	-	-	-	3	25	75	100
	III	DSC-III	Developmental Biology	21UCZO21	4	4	-	-	4	25	75	100
	III	DSC-IV	Ecology	21UCZO22	4	4	-	-	4	25	75	100
	III	P-II	Developmental Biology & Ecology Practicals	21UCZO2P1	2	-	-	2	1	40	60	100/2
	III	A-I/2	Applied Nutrition	21UAAN21	4	4	-	-	3	25	75	100
	III	A-I/2P	Applied Nutrition Practicals	21UAAN2P1	2	-	-	2	1	40	60	100/2
	IV	AECC-II	Environmental Science	21UEVS21	2	2	-	-	2	25	75	100
III	I	L-III	பயன்பாட்டுத்தமிழ்	21ULTA31	6	-	-	-	3	25	75	100
			Modern Prose	21ULAR31								
	II	L-III	Communicative English III	21ULEN31	6	-	-	-	3	25	75	100
	III	DSC-V	Cell and Molecular biology	21UCZO31	4	4	-	-	4	25	75	100
	III	P-III	Cell and Molecular biology practicals	21UCZO3P1	2	-	-	2	1	40	60	100/2
	III	A-II/1	Plant Diversity &Amp; Phytopathology	21UABT31	4	4	-	-	3	25	75	100
	III	A-II/1P	Plant Diversity &Amp; Phytopathology Practicals	21UABT3P1	2	-	-	2	1	40	60	100/2
	IV	SEC-I	Nursery and Gardening	21USBT31	2	2	-	-	2	25	75	100
	IV	SEC-II	SWAYAM - NPTEL Online Course	21USOC32	2	2	-	-	2	25	75	100
			Public Health	21USAN32								

	IV	NME-I	Economic Botany	21UNBT31	2	2	-	-	2	25	75	100
IV	I	L-IV	சங்கத்தமிழ்	21ULTA41	6	-	-	-	3	25	75	100
			Classical Prose	21ULAR41								
	II	L-IV	A Practical Course in Spoken English	21ULEN41	6	-	-	-	3	25	75	100
	III	DSC-VI	Biochemistry	21UCZO41	4	4	-	-	4	25	75	100
	III	P-IV	Biochemistry Practicals	21UCZO4P1	2	-	-	2	1	40	60	100/2
	III	A-II/2	Plant Anatomy, Physiology and Biotechnology	21UABT41	4	4	-	-	3	25	75	100
	III	A-II/2P	Plant Anatomy, Physiology and Biotechnology Practicals	21UABT4P1	2	-	-	2	1	40	60	100/2
	IV	SEC-III	Herbal Medicine	21USBT41	2	2	-	-	2	25	75	100
	IV	SEC-IV	Diet Therapy	21USAN42	2	2	-	-	2	25	75	100
	IV	NME-II	Health and Fitness	21UNAN41	2	2	-	-	2	25	75	100
	V	ECA	Extra Curricular Activities		-	-	-	-	1	-	-	100
	V	SOP	Sadakath Outreach Programme		-	-	-	-	1	-	-	100
	III	FW/I	Filed work/Internship	21UFZO41	-	-	-	-	2	-	-	100
V	III	DSC-VII	Animal Physiology	21UCZO51	5	5	-	-	4	25	75	100
	III	DSC-VIII	Genetics	21UCZO52	4	4	-	-	4	25	75	100
	III	DSC- IX	Aquaculture	21UCZO53	4	4	-	-	4	25	75	100
	III	P-V	Animal Physiology & Genetics Practicals	21UCZO5P1	4	-	-	4	2	40	60	100/2
	III	P-VI	Aquaculture Practicals	21UCZO5P2	4	-	-	4	2	40	60	100/2
	III	DSE I-A/B/C	Evolution	21UEZO51A	4	4	-	-	4	25	75	100
			Wildlife Conservation and Management	21UEZO51B								
			Animal Husbandry and its Management	21UEZO51C								
	III	DSE II-A/B/C	Fundamentals of Biotechnology	21UEZO52A	4	4	-	-	4	25	75	100
			Environmental Toxicology	21UEZO52B								
			Endocrinology	21UEZO52C								
		LRH	Library Reading Hour		1	-	-	-	-	-	-	-
VI	III	DSC- X	Immunology and Microbiology	21UCZO61	4	4			4	25	75	100
	III	DSC- XI	Biostatistics and Computer Application	21UCZO62	4	4	-	-	4	25	75	100

	III	DSC-XII	Applied Zoology	21UCZO63	4	4	-	-	4	25	75	100
	III	P-VII	Immunology and Microbiology& Applied Zoology Practicals	21UCZO6P1	4	-	-	4	2	40	60	100/2
	III	P-VIII	Biostatistics and Computer Application Practicals	21UCZO6P2	4	-	-	4	2	40	60	100/2
	III	DSE-III A/B/C	Applied Biotechnology	21UEZO61A	4	4	-	-	4	25	75	100
			Medical Microbiology	21UEZO61B								
			Environmental Biotechnology	21UEZO61C								
	III	DSE-IV	Project	21UEZO62	4+4*		4	-	6	-	-	100◆
	IV	SEC-V	Mushroom Culture Technology	21USBT61	2	2	-	-	2	25	75	100
				Total	**180+4***				**140**			**4600**

*** L – Lecture hours * T – Tutorial hours * P – Practical hours**

*** Extra hours for Project Work outside the working hours.**

◆ Project Report - 60 marks, Viva-Voce Examination - 40 marks
Fieldwork Report - 60 marks, Viva-Voce Examination - 40 marks

B.A. ZOOLOGY COURSE STRUCTURE (CBCS)
(Applicable for students admitted in June 2021 and onwards)

TITLE OF THE PAPERS, CREDITS & MARKS

GROUP II COURSES (TWO -YEAR LANGUAGE COURSES)

(B.A. Arabic, B.A. Tamil, B.A. English, B.A. History, B.A. Economics, B.Sc. Mathematics, B.Sc. Physics, B.Sc. Chemistry, B.Sc. Zoology, B.Sc. Microbiology and B.Sc. Nutrition and Dietetics, B.Sc. Psychology)

SEM	Title of the paper	Course Code	H/W	C	I	E	T
PART I - TAMIL							
I	இக்காலத் தமிழ்	21ULTA11	6	3	25	75	100
II	சமயத் தமிழ்	21ULTA21	6	3	25	75	100
III	பயன்பாட்டுத் தமிழ்	21ULTA31	6	3	25	75	100
IV	சங்கத் தமிழ்	21ULTA41	6	3	25	75	100
		TOTAL	**24**	**12**			**400**
PART I – ARABIC							
I	Applied Grammar and Translation – I	21ULAR11	6	3	25	75	100
II	Applied Grammar and Translation – II	21ULAR21	6	3	25	75	100
III	Applied Grammar and Translation – III	21ULAR31	6	3	25	75	100
IV	*Classical Prose*	21ULAR41	6	3	25	75	100
		TOTAL	**24**	**12**			**400**
PART II – ENGLISH							
I	Prose, Poetry and Grammar-I	21ULEN11	6	3	25	75	100
II	Prose, Poetry and Grammar-II	21ULEN21	6	3	25	75	100
III	One – Act Plays and Writing Skill	21ULEN31	6	3	25	75	100
IV	A Practical Course in Spoken English	21ULEN41	6	3	25	75	100
		TOTAL	**24**	**12**			**400**

PART III

DSC, DSE, Field work and Project								
SEM	**COURSE**	**TITLE OF THE PAPER**	**COURSE CODE**	**H/W**	**C**	**MARKS**		
						I	**E**	**T**
I	DSC1	Animal Diversity-I	21UCZO11	4	4	25	75	100
	DSC2	Animal Diversity-II	21UCZO12	4	4	25	75	100
	P-I	Animal Diversity-I& Animal Diversity-II Practicals	21UCZO1P1	2	1	25	75	100/2
II	DSC3	Developmental Biology	21UCZO21	4	4	25	75	100
	DSC4	Ecology	21UCZO22	4	4	25	75	100
	P-II	Developmental Biology & Ecology Practicals	21UCZO2P1	2	1	25	75	100/2
III	DSC5	Cell and Molecular biology	21UCZO31	4	4	25	75	100
	P-III	Cell and Molecular biology practicals	21UCZO3P1	2	1	25	75	100/2
IV	DSC6	Biochemistry	21UCZO41	4	4	25	75	100
	P-IV	Biochemistry Practicals	21UCZO4P1	2	1	25	75	100/2
	FW/I	Field Work/Internship	21UFZO41		2			100
V	DSC7	Animal Physiology	21UCZO51	5	4	25	75	100
	DSC8	Genetics	21UCZO52	4	4	25	75	100
	DSC9	Aquaculture	21UCZO53	4	4	25	75	100
	P-V	Animal Physiology & Genetics Practicals	21UCZO5P1	4	2	25	75	100/2
	P-VI	Aquaculture Practicals	21UCZO5P2	4	2	25	75	100/2
	DSE-I	Evolution	21UEZO51A	4	4	25	75	100
		Wildlife Conservation and Management	21UEZO51B					
		Animal Husbandry and its Management	21UEZO51C					
	DSE-2	Fundamentals of Biotechnology	21UEZO52A	4	4	25	75	100
		Environmental Toxicology	21UEZO52B					
		Endocrinology	21UEZO52C					
VI	DSC10	Immunology and Microbiology	21UCZO61	4	4	25	75	100
	DSC11	Biostatistics and Computer Application	21UCZO62	4	4	25	75	100
	DSC12	Applied Zoology	21UCZO63	4	4	25	75	100
	P-VII	Immunology and Microbiology& Applied Zoology Practicals	21UCZO6P1	4	2	25	75	100/2
	P-VIII	Biostatistics and Computer Application Practicals	21UCZO6P2	4	2	25	75	100/2
	DSE-III	Applied Biotechnology	21UEZO61A	4	4	25	75	100
		Medical Microbiology	21UEZO61B					
		Environmental Biotechnology	21UEZO61C					
	DSE-IV	Project	21UEZO62	4	6			100
			TOTAL	**89**	**80**			**2100**

Part III – Allied									
SEM	**COURSE**	**TITLE OF THE PAPER**	**COURSE CODE**	**H/W**	**C**	**MARKS**		
						I	**E**	**T**
I	AI-1	Food Science	21UAAN11	4	3	25	75	100
	AI-1P	Food Science Practicals	21UAAN1P1	2	1	25	75	100/2
II	AI-2	Applied Nutrition	21UAAN21	4	3	25	75	100
	AI-2P	Applied Nutrition Practicals	21UAAN2P1	2	1	25	75	100/2
III	AII-1	Plant Diversity & Amp; Phytopathology	21UABT31	4	3	25	75	100
	AII-1P	Plant Diversity &Amp; Phytopathology Practicals	21UABT3P1	2	1	25	75	100/2
IV	AII-2	Plant Anatomy, Physiology and Biotechnology	21UABT41	4	3	25	75	100
	AII-2P	Plant Anatomy, Physiology and Biotechnology Practicals	21UABT4P1	2	1	25	75	100/2
			TOTAL	**24**	**16**			**600**
Part IV – NME								
III	NME1	Economic Botany	21UNBT31	2	2	25	75	100
IV	NME2	Health and Fitness	21UNAN41	2	2	25	75	100
			TOTAL	**4**	**4**			**200**
Part IV – SEC								
III	SEC-1	Nursery and Gardening	21USBT31	2	2	25	75	100
	SEC-2	SWAYAM - NPTEL Online Course	21USOC32	2	2	25	75	100
		Public Health	21USAN32					
IV	SEC-3	Herbal Medicine	21USBT41	2	2	25	75	100
	SEC-4	Diet Therapy	21USAN42	2	2	25	75	100
V	SEC-5	Mushroom Culture Technology	21USBT61	2	2	25	75	100
			TOTAL	**10**	**10**			**500**
Part IV –Value Education & EVS								
I	VE	Value Education-I	21USVE1A	2	2	25	75	100
		Value Education-II	21USVE1B					
II	EVS	Environmental Science	21UEVS21	2	2	25	75	100
			TOTAL	**4**	**4**			**200**

PART – V – Extension Activities

SEM	**Extension Activities (Choose any one)**	**S. CODE**	**H/W**	**C**	**MARKS**		
					I	**E**	**T**
I to IV	NCC	21UEXNCC		**1**			**100**
	NSS	21UEXNSS					
	Physical Education	21UEXPHE					
	Red Ribbon Club	21UEXRRC					
	Youth Red Cross	21UEXYRC					
	Youth Welfare	21UEXYWL					
	Yoga	21UEXYOG					
III to IV	Sadakath Outreach Programme (SOP)	21UEXSOP		**1**			**100**
	Total		**-**	**2**			**200**

Department of ZOOLOGY
Programme : B.Sc.
Programme Learning Outcomes

PLO	Upon completion of B.Sc. Degree Programmes, the graduates will be able to:
PLO 1	**Disciplinary Knowledge** Acquire scientific knowledge and the understanding of major concepts and theoretical principles.
PLO 2	**Creative Thinking and Practical Skills / Problem Solving Skills** Enrich skills of observation / research related skills to draw logical inferences from scientific experiments/ programming and skills of creative thinking to develop novel ideas. Hone problem solving skills in theoretical, experimental and computational areas and to apply them in real life situations.
PLO 3	**Sense of inquiry and Skilled Communicator** Develop the capability for raising appropriate questions relating to the current/emerging issues encountered in the scientific field and to plan, execute and express the results of experiments / investigations through technical writings as well as through oral presentations.
PLO 4	**Ethical Awareness / Team Work / Environmental Conservation and Sustainability** Equip them for conducting work as an individual / as a member, or as a leader in diverse teams upholding values such as honesty and precision and thus preventing unethical behaviours such as fabrication, falsification, misrepresentation of data, plagiarism etc. to ensure academic integrity. Realise that environment and humans are dependent on one another and to know about the responsible management of our ecosystem for survival, and for the well-being of the future generation as well.
PLO 5	**Usage of ICT/ Lifelong Learning / Self-Directed Learning** Inculcate the habit of learning continuously through the effective adoption of ICT to update knowledge in the emerging areas in Sciences for inventions/discoveries and also to engage in remote / independent learning.

Programme Specific Outcomes

PSO No.	Upon completion of B.Sc. ZOOLOGY Degree Programme, the students will be able to :	PLOs Mapped
PSO-1	Understand the fundamental principles of Zoology which include animal diversity with animal classification, taxonomy and their diagnostic characteristics.	1
PSO-2	Apply the knowledge to understand the protection and restoration of biological diversity, ecological integrity, health, conservation, management of wildlife and their gene bank.	1,4
PSO-3	Collect, record, analyze and interpret data using appropriate ecological, genetic, and physiological techniques adopted in vivo and in vitro and to express them effectively through written and oral presentations using ICT.	1,3,4,5
PSO-4	Analyse the principles, animal development, physiology, genetics animals, their evolution, and to compare the structure of Prokaryotes and Eukaryotes	1,4
PSO-5	Develop creative, practical and problem solving skills to pursue research and gain placements in the fields of Biochemistry, Microbiology, Sericulture, Aquaculture, Apiculture and Biotechnology.	1,2

SEMESTER – I

Course Title	**இக்காலத் தமிழ்** **Ikkala Tamil (Modern Tamil)**
Total Hrs.	**90**
Hrs./Week	**6**
Course Code	**21ULTA11**
Course Type	**Part – I - Tamil**
Credits	**3**
Marks	**100**

General Objective: To introduce literary history, the basics of grammar, and the genres such as poetry, short stories and essays.

Course Objectives:

CO	The learners will be able to:
CO-1	Understand the major literary forms such as poetry, short stories and essays and their characteristics.
CO-2	Apply their knowledge to learn the effective use of language and literature.
CO-3	Analyse the social / political / religious / economical issues dealt with in literary pieces.
CO-4	Differentiate the literary forms to know their nuances.
CO-5	Produce verses, short stories and essays.

அலகு 1 தமிழ்ச் செய்யுள்

1. தமிழ் - பாரதியார்
2. புதிய உலகு செய்வோம் - பாரதிதாசன்
3. மனிதனைத் தேடி - மு.மேத்தா
4. தொலைந்து போனவர்கள் - அப்துல் ரகுமான்
5. ஒவ்வொரு புல்லையும் பெயர் சொல்லி அழைப்பேன் - இன்குலாப்
6. சினேகிதனின் தாழ்வான வீடு - கலாப்ரியா
7. இடைவெளி - மனுஷ்ய புத்திரன்
8. சிறைச்சாலைக்காக -அறிவுமதி
9. விழித்தெழுக என் தேசம் - இரவீந்திரநாத் தாகூர் (ஜெயபாரதன் (மொ.பெ))
10. மறதி - ஈரோடு தமிழன்பன்
11. பெண்கவிகளின் கவிதைகள்
12. என்மேல் பரிவுகாட்டு என் ஆத்மாவே - கலீல் ஜிப்ரான்
13. அந்தி மனம் - கல்யாண்ஜி
14. நகைப்பா - மாமதயானை
15. பியானோ- பிரமிள்
16. அழிவு - ஆத்மாநாம்
17. உள் உலகங்கள் - ஞானக்கூத்தன்
18. கிளிக்குஞ்சு - ந.பிச்சமூர்த்தி
19. கடைசி விருந்து - சுகுமாரன்

20. தூர் - நா.முத்துக்குமார்
21. ஜென் கவிதைகள்
22. ஹைக்கூ கவிதைகள்

நீங்கள் பயின்ற புதுக்கவிதைகளின் அடிப்படையில் நவீனப் புதுக்கவிதைகள் மற்றும் ஹைக்கூக் கவிதைகள் தருக.

அலகு - 2 சிறுகதைகள்

1. மனித யந்திரம் - புதுமைப்பித்தன்
2. அனந்தசயனம் காலனி - தோப்பில் முகம்மது மீரான்
3. மிருகம் - வண்ணநிலவன்
4. செடிகளுக்கு – வண்ணதாசன்
5. கனவில் உதிர்ந்த பூ - நாறும்பூநாதன்
6. சொர்க்கக் கன்னிகை - கருணாமணாளன்
7. நீலம் பூக்கும் திருமடம் - ஜா.தீபா
8. குற்றமும் தண்டனையும் - லியோ டால்ஸ்டாய்

சிறுகதைகள் எழுதப் பயிற்சி அளித்து மாணவரின் சிறுகதையினைக் கல்லூரி ஆண்டு மலரில் இடம்பெறச்செய்தல்.

அலகு 3 அறிவுசார் கட்டுரைகள்

1. தொல்லியல் நோக்கில் உலகத் தமிழர் பண்பாடு
2. ஓங்கி ஒலித்த பெருங்குரல்; ஆத்மாநாம் கவிதைகள்
3. நகுலனின் தனிமை
4. கவிக்கோ அப்துல் ரகுமான் கவிதைகள்
5. இறைவனை நினைப்போம் அன்பினை வளர்ப்போம்
6. சுருக்கம் தேடும் விரிந்த கவிதைகள்
7. இலக்கியத்தில் சுற்றுச்சூழலியல்

நீங்கள் அண்மையில் பயணித்த ஓர் இடம் குறித்து இரசனையோடு எழுதுக.

அலகு 4 இலக்கிய வரலாறு

1. புதுக்கவிதை தோற்றமும் வளர்ச்சியும்
2. நவீனத் தமிழ்க் கவிதைகளின் புதிய போக்குகள்
3. தமிழ்ச் சிறுகதைகளின் தோற்றமும் வளர்ச்சியும்

அலகு 5 இலக்கணம் அறிமுகம்

1. முதலெழுத்துகள்
2. சார்பெழுத்துகள்
3. உயிர் எழுத்தின் வகைகள்
4. மெய் எழுத்தின் வகைகள்
5. சுட்டெழுத்துகள்
6. வினாவெழுத்துகள்
7. வல்லினம் மிகும் இடங்கள்
8. வல்லினம் மிகா இடங்கள்
9. பகுபத உறுப்புகள்
10. இலக்கணக் குறிப்புகள்

நீங்கள் வாசிக்கும் செய்தித்தாள்களில் இடம்பெறும் எழுத்துப் பிழைகளைச் சுட்டிக் காட்டுக.

பாடநூல்கள்

- இக்காலத்தமிழ், தமிழ்த்துறை வெளியீடு, சதக்கத்துல்லாஹ் அப்பா கல்லூரி, திருநெல்வேலி.

பார்வை நூல்கள்

தமிழ் இலக்கிய வரலாறு, முனைவர் சு.ஆனந்தன், கண்மணி பதிப்பகம்,

Course Outcomes:

CO	Upon completion of this course, students will be able to	PSOs Addressed	Cognitive Level
CO-1	Understand the concepts behind modern poetry, short stories, essays, literary history and grammar.	1	Understanding
CO-2	Explain the methodologies for the effective use of language and literature.	1, 2	Applying
CO-3	Apply their knowledge to analyse the socio-political / economic / religious issues presented in the literary texts.	1,2,3,4	Applying
CO-4	Categorize the major literary forms according to their origin and development.	1,2,3	Analysing
CO-5	Assess the ways and means to develop the art of writing insisting on environmental conservation, social harmony and interconnectedness regionally, nationally and globally.	1,2,4,5	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credit
I	21ULTA11	Ikkala Tamil	90	3

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO-2	✓	✓	✓	✓	✓	✓	✓	✓		
CO-3	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO-4	✓	✓	✓		✓	✓	✓	✓		
CO-5	✓	✓	✓	✓	✓	✓	✓		✓	✓
	Number of matches (✓) = 43 Relationship = **High**									

SEMESTER – I

Course Title	**BASIC GRAMMAR AND TRANSLATION-I**
Total Hrs.	**90**
Hrs./Week	**6**
Sub. Code	**21ULAR11**
Course Type	**Part – I - Arabic**
Credits	**3**
Marks	**100**

General Objective: To teach the basics of Arabic Phonetics, Grammar and Translation.

Course Objectives:

CO	The learners will be able to:
CO-1	Identify the Arabic Alphabet.
CO-2	Understand the speech sounds in Arabic.
CO-3	Explain the basic grammatical items and their uses.
CO-4	Evaluate the strategies for developing communicative competency.
CO-5	Experiment the art of speaking and writing.

Unit I: Arabic for Beginners

Lesson 1-4 (Page No. 1 to 19) The Alphabet, Vowels-Diphthong,

Nunation Doubled consonant, changing shapes of the Alphabet, Definite article

Unit II: Arabic for Beginners

Lesson-5 Parts of Speech Class room (Page No. 20,21)

Model sentences (Page No. 25)

Lesson-6 Noun-Qualified and Adjectives (Page No. 26 &27)

Model sentences (Page No. 32,33)

Lesson-7 Gender (Page No. 34&35)

Lesson-8 Singular, Dual and Plural (Page No. 36&37)

Lesson-9 The Nominal Sentence (Page No. 38&40)

Model sentences (Page No. 44,45)

Unit III: Arabic for Beginners

Lesson-10 The possessive (Page No. 46& 47), Model sentences (Page No.51)

Lesson-11 Personal pronouns, We work (Page No. 52,53 &54)

Model sentences (Page No.58 & 59)

Lesson-12 demonstrative and Relative pronouns, New York city (Page No. 60,61,62,& 67)

Lesson-13 Interrogatives, Conversation (Page No. 68,69 & 70)

Model sentences (Page No.74 & 75)

Unit IV: Al -Qirat –Al-Wazhiha Part –I

Lesson 1-7 from

Unit V: Al -Qirat –Al-Wazhiha Part –I

Lesson 8-14

Textbooks:

1. Syed Ali. *Arabic for Beginners*. UBS Publishers & Distributors Ltd. New Delhi:

(International Edition 2011)

2 Waheed Az-zaman Al-Keeranavi. Al -Qira'ath –Al-Wazhiha Part –I.

Course Outcomes:

CO	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Summarize the Arabic alphabet and speech sounds in Arabic.	1,2	Understanding
CO-2	Apply the basic grammar rules of Arabic in their communication.	1,2,5	Applying
CO-3	Discover the functions of Nouns, Adjectives, Personal and Demonstrative Pronouns, Prepositions, Countable and Uncountable for effective usage.	1,2,3	Applying
CO-4	Analyze the methods in order to attain communication skills.	1,2,3,5	Analyzing
CO-5	Evaluate conversational patterns and write short passages in Arabic.	1,2,4	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
I	21ULAR 11	GRAMMAR AND TRANSLATION-I	90	3

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓			✓	✓	✓			
CO-2	✓	✓				✓	✓			✓
CO-3	✓	✓	✓	✓		✓	✓	✓		
CO-4	✓	✓		✓		✓	✓	✓		✓
CO-5	✓			✓	✓	✓	✓		✓	
	Number of matches (✓) = 30 Relationship = **Medium**									

SEMESTER – I

Course Title	**COMMUNICATIVE ENGLISH - I**
Total Hrs.	**90**
Hrs./Week	**6**
Course Code	**21ULEN11**
Course Type	**Part – II - English**
Credits	**3**
Marks	**100**

General Objective:

To teach the four skills viz. Listening, Speaking, Reading, and Writing to train the students the skills necessary for social and academic interactions.

Course Objectives:

CO	The learners will be able to:
CO-1	Understand the significance and the use of the four skills (LSRW).
CO-2	Apply the skills acquired to listen to English keenly, to understand the context clearly and to respond to others accordingly.
CO-3	Identify the strategies of language learning and use in real-life situations by means of reading extensively.
CO-4	Examine the correct and incorrect expressions in everyday English to take notes and write essays.
CO-5	Express their ideas without committing any grammatical errors.

Unit – I

1. Listening and Speaking
   a. Introducing self and others
   b. Listening for specific information
   c. Pronunciation (without phonetic symbols)
      i. Essentials of pronunciation
      ii. American and British pronunciation
2. Reading and Writing
   a. Reading short articles – newspaper reports / fact based articles
      i. Skimming and scanning

ii. Diction and tone

iii. Identifying topic sentences

b. Reading Aloud: Reading an article/report

c. Journal (Diary) Writing

3. Study Skills - 1

Using dictionaries, encyclopedias, thesaurus

Grammar in Context:

Naming and Describing

- Nouns & Pronouns
- Adjectives

Unit – II

1. Listening and Speaking

a. Listening with a purpose:

b. Effective Listening:

c. Tonal Variation:

d. Listening for information

e. Asking for Information

f. Giving Information:

2. Reading and Writing

a. Strategies of Reading:

Skimming and Scanning

b. Types of Reading:

Extensive and Intensive Reading

c. Reading a prose passage

d. Reading a poem

e. Reading a short story

3. Paragraphs: Structure and types

a. What is a Paragraph?

b. Paragraph structure

c. Topic Sentence

d. Unity

e. Coherence.

f. Connections between Ideas: Using Transitional words and expressions.

g. Types of Paragraphs

4. Study Skills II:

Using the Internet as a Resource

a. Online search:

b. Know the keyword:

c. Refine your search:

d. Guidelines for using the Resources:

e. e-learning resources of Government of India

f. Terms to know

5. Grammar in Context

Involving Action-I

a. Verbs

b. Concord

Unit – III

1. Listening and Speaking
    a. Giving and following instructions
    b. Asking for and giving directions
    c. Continuing discussions with connecting ideas
2. Reading and writing
    a. Reading feature articles (from newspapers and magazines)
    b. Reading to identify point of view and perspective (opinion pieces, editorials etc.)
    c. Descriptive writing – writing a short descriptive essay of two to three paragraphs.
3. Grammar in Context:

Involving Action – II

- Verbals - Gerund, Participle, Infinitive
- Modals

Unit – IV

1. Listening and Speaking
    a. Giving and responding to opinions

2. Reading and writing
    a. Note taking
    b. Narrative writing – writing narrative essays of two to three paragraphs

3. Grammar in Context:

Tense

- Present
- Past
- Future

Unit - V

1. Listening and Speaking
    a. Participating in a Group Discussion
2. Reading and writing
    a. Reading diagrammatic information – interpretations maps, graphs and pie charts
    b. Writing short essays using the language of comparison and contrast
3. Grammar in Context: Voice (showing the relationship between Tense and Voice)

Textbook:

Board of Editors. *COMMUNICATIVE ENGLISH* -1. Tamil Nadu State Council for Higher Education (TANSCHE). Chennai: 2020.

References:

1. Radhakrishna Pillai.G,ed.Written English for You.Chennai:Emerald Publishers, 1990 (rpt2008).
2. Nihamathullah.A.et al. A Course in Spoken English.Tirunelveli: MSU, 2005. (rpt 2010).

Course Outcomes

CO No.	Upon completion of this course, students would have learned to:	PLO Addressed	Cognitive Level
CO-1	Understand the importance of language skills in order to communicate effectively.	1,2	Understanding
CO-2	Apply the listening skill to pronounce words better and to understand contextual meaning.	1,2,3	Applying
CO-3	Develop reading skill to learn vocabulary, use it appropriately, and acquire analytical skill and the like.	1,2,3,4	Applying
CO-4	Explain the nuances of common errors in English.	3,4,5	Analyzing
CO-5	Choose to use English language consciously without any errors.	1,2,4,5	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
I	21ULEN11	Communicative English - I	90	3

Course Outcomes (COS)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO3	PLO4	PLO5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓				✓	✓			
CO-2	✓	✓	✓			✓	✓	✓		
CO-3	✓	✓	✓	✓		✓	✓	✓	✓	
CO-4	✓		✓	✓	✓	✓		✓	✓	✓
CO-5	✓	✓		✓	✓	✓	✓		✓	✓
	Number of matches (✓) = 34 Relationship = High									

SEMESTER – I

Course Title	**ANIMAL DIVERSITY - I**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UCZO11**
Course Type	**DSC-I**
Credits	**4**
Marks	**100**

General Objective:

To understand Morphology, Taxonomy and general characters of Invertebrates

Course Objectives:

CO No.	The learners will be able to:
CO-1	List the characters and classification of Phylum Protozoa
CO-2	Describe the life history of Porifera and Coelenterata
CO-3	Interpret the pathogenesis of Platyhelminthes and Aschelminthes
CO-4	Distinguish the characters of Annelids and Arthropods
CO-5	Justify the economic importance of Mollusca

UNIT I

Introduction to Principles of Taxonomy (Binomial nomenclature), Types of classification-Natural, Artificial, Practical.

Protozoa: General characters and classification upto classes with examples.

Type study: Paramecium - Morphology – Nutrition – Locomotion – Reproduction - (Binary fission & Conjugation).

General topic: General structure, life cycle, pathogenicity and control measures of *Entamoeba histolytica,Plasmodium malariae*.

UNIT II

Porifera: General characters and classification upto classes with examples

Type study: Scypha (Sycon) - External characters and life history.

General topic: Canal system in sponges.

Coelenterata: General characters and classification upto classes withexamples.

Type study: *Obelia geniculata*- External characters and life history.

General topic: Coral formation and types of coral reefs**.**

UNIT III

Platyhelminthes: General characters and classification upto classes with example.

General topic *: Taenia solium* –External morphology, life cycle, pathogenicity and control measures.

Aschelminthes: General characters and classification upto classes with example

General topic: External morphology,life cycle, pathogenicity and control measures of *Ascaris lumbricoides.*

UNIT IV

Annelida: General characters and classification upto classes with examples.

Type study: Earthworm – external morphology and reproduction.

General topic: Metamerism in Annelids,

Arthropoda: General characters and classification upto classes with an example.

Type study: Cockroach- Morphology and nervous system.

General topic: 1.Economic Importance of Honey Bee. 2. Peripatus and its affinities

UNIT V

Mollusca: General characters and classification upto classes with examples.

Type study:*Pila globosa* -External characters and life history.

General topic: Economic importance of Molluscs. (Oyster and Mussels)

Echinodermata: General characters and classification upto classes with examples.

Type study: Star fish - External characters and water vascular system only.

General topic: Larval forms of Echinodermata**.**

TEXT BOOKS :

1. Jordon. E.L.and Verma. P. S. 1963 Invertebrate Zoology - S.Chand Publishers.
2. Kotpal, R. L. 2019. Modern Text Book of Zoology – Invertebrates, Rastogi Publications.

REFERENCE BOOKS - INVERTEBRATA

1. Arora, M. P. 2006. Non – chordates, Himalaya Publishing House.
2. Bhamrah, H.S. *et al.,* 2002- A text Book of Invertebrates –Anmol Publications.
3. Ekambaranatha Iyer .M.A. 1992. Manual of Zoology – Part I - Invertebrata - S.Viswanathan Printers and Publishers.
4. Nair N.C, Murugan. T, Arumugam .2010 -A Text Book of Invertebrates- Saras publications.

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Recall the general characters and classification of Protozoa	1,3	Remembering
CO-2	Relate the characters of Porifera and Coelenterata	1,2,3	Understanding
CO-3	Illustrate the Life cycle of Platyhelminthes and Aschelminthes	1,3,5	Applying
CO-4	Compare and contrast the characters of Annelids and Arthropods	1,2,3	Analysing
CO-5	Assess the Life history of *Pila globosa* (Mollusca)	1,2,3,5	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
I	21UCZO11	Animal diversity -I	60	4

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓			✓	✓		✓		
CO-2	✓	✓		✓		✓	✓	✓		
CO-3	✓	✓			✓	✓		✓		✓
CO-4	✓	✓	✓		✓	✓	✓	✓		
CO-5	✓		✓		✓	✓	✓	✓		✓

Number of matches (✓) = …31….
Relationship = Medium
Low (If the No. of matches are less than 25)
Medium (If the No. of matches are between 25 and 33)
High (If the No. of matches are more than 33)

SEMESTER – I

Course Title	**ANIMAL DIVERSITY-II (CHORDATA)**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UCZO12**
Course Type	**DSC-II**
Credits	**4**
Marks	**100**

General Objective:

To study the structure, functional organization, adaptations and the economic importance of lower and higher chordates

Course Objectives:

CO	The learners will be able to:
CO-1	Define the general characters of chordates
CO-2	Classify the fresh water and marine water fishes
CO-3	Sketch amphibians and reptiles
CO-4	Compare and contrast the flight adaptation of different birds
CO-5	Distinguish the characteristic features of various species of mammals

UNIT I

Introduction to Chordata: General characters and classification upto classes with examples.

Prochordata: General characters and classification upto orders with examples. **Type Study:** Ascidian – External morphology- Life history

External features and biological significance of the following Examples a) Amphioxus b) Balanoglossus

Agnatha: Petromyzon – External morphology -Ammocoetes Larva.

UNIT -II

Pisces: General Characters and Classification upto sub-classes with examples **Type Study:**Scoliodon – External characters – Placoid scales – Digestive system .

General Topics: (i) Accessory respiratory organs in fishes. (ii) Migration of fishes, (iii) Commercial freshwater Edible fishes (Catla, Rohu, Mrighal and Cat fishes).

UNIT - III

Amphibia : General Characters and Classification upto orders with examples.

External features and Biological Significance of the following examples a) Rhachophorus b) Axolotl Larva

General Topic: Parental care in Amphibia.

Reptilia: General Characters and Classification up to orders with examples.

External features and Biological significance of the following examples a) Chamaeleon b) Draco c) Cobra d) Enhydrina

General Topics: (i) Identification of poisonous and non-poisonous snakes of South India. (ii) Poison Apparatus – Biting mechanism – Venom – Antivenom – First aid for snake bite

UNIT IV

Aves: General characters and classification upto subclasses with examples.

Type study: *Columba livia* – External characters – Exoskeleton – Flight muscles – Respiratory system

General Topics: (i) Migration of Birds, (ii) Flight adaptations in Birds (iii)Flightless Birds

UNIT V

Mammalia: General Characters and Classification upto subclasses with examples.

Type Study: Rabbit – External Morphology – Dentition – Respiratory System – Circulatory system – Structure of Brain.

General topic: (i) Adaptations of aquatic mammals (ii) Egg laying Mammals

TEXT BOOKS :

1. E.L.Jordan and P.S. Verma. 2014. Chordate Zoology. S. Chand & Company Ltd, New Delhi.
2. Kotpal, R. L. 2012. Text book of zoology vertebrates, Global media Publications.

REFERENCE BOOKS :

1. A Text Book Of Zoology Chordata by B.D. Singh (Author) Publisher : KEDAR NATH RAM NATH; 2021st edition (1 January 2020); KEDAR NATH RAM NATH, 132, R.G. College Roads, Meerut-250001 (U.P.)
2. Mohan P. Arora , (2018) Chordata – I, Himalaya Publishing House Pvt. Ltd
3. B.N.Pandey, Vartika Mathur (2018) Biology of Chordates PHI Learning
4. Kardong, (2005) K.V.Vertebrates Comparative Anatomy,Function and Evolution. IV Edition. McGrawhill Higher Education.
5. Ekambaranatha Iyer . M. and Anathakrishnan T. N.A Manual of Zoology - Vol. II –Chordata - S. Viswanathan Printers and Publishers Pvt. Ltd. Chennai.

Course Outcomes

CO	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Identify the general characteristics and the classification of Chordates.	1,2,3	Remembering
CO-2	Relate the respiratory organs in fishes and their adaptation with environment	1,2,3,5	Understanding
CO-3	Interpret the characters of Amphibians and Reptiles	1,2,3,5	Applying
CO-4	Review the unique characters and functions of aves with reference to their adaptations.	1,2,3,5	Evaluating
CO-5	Compose the classification and characters of Mammals.	1,2,3,5	Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
I	21UCZO12	ANIMAL DIVERSITY-II (CHORDATA)	60	4

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓		✓		✓	✓	✓	✓		
CO-2	✓	✓	✓	✓		✓	✓	✓		✓
CO-3	✓	✓	✓		✓	✓	✓	✓		✓
CO-4	✓	✓	✓			✓	✓	✓		✓
CO-5	✓	✓	✓	✓		✓	✓	✓		✓
	Number of matches (✓) = 37- Medium Relationship = High									

SEMESTER - I

Course Title	**ANIMAL DIVERSITY I AND II PRACTICALS**
Total Hrs.	**30**
Hrs./Week	**2**
Course Code	**21UCZO1P1**
Course Type	**Practicals-I**
Credits	**1**
Marks	**100/2**

General Objective:

To impart knowledge on specific characteristics of invertebrates and chordates.

Course Objectives:

CO No.	The learners will be able to:
CO-1	Examine the structure of Nervous system and digestive system of a cockroach.
CO-2	Understand the structure of salivary glands and oral system of a cockroach.
CO-3	Determine the features of different types of scales in fish.
CO-4	Compare the nervous system of animals with human beings.
CO-5	Create a model regarding the features of poisonous snakes.

DISSECTION AND MOUNTING

1. Earth worm - Body setae and Penial setae.
2. Cockroach - Nervous system, digestive system, salivary gland and mouth parts.
3. Shark - Placoid scales.Teleost fish - ctenoid and cycloid scales, chick - brain mounting
4. Key for Identification of poisonous and non-poisonous snakes
5. Museum specimens, slides, models and charts:

   Protozoa –*Amoeba proteus*, *Euglena viridis*, *Paramecium caudatum*; **Porifera –***Sycon ciliatum*, *Leucosolenia cervicornis* ; **Coelenterata -** *Obelia sp, Physalia sp, Aurelia* sp; **Platyhelminthes -** *Taenia solium*, *Fasciola hepatica;* **Aschelminthes -** Male and female *Ascaris lumbricoides, Ancylostoma duodenale***; Annelida**- Pheretima,Nereis, *Chaetopterus;* **Arthropoda -** *Penaeus monodon*, *Periplaneta americana*, *Bombyx mori***,** *Apis indica***; Mollusca**–*Sepiaglobosa*, octopus, *Pila;* **Echinodermata -** Echinus, Cucumaria, Star fish. **Prochordata**-Amphioxus, Herdmania, Balanoglossus. **Agnatha**-Tornaria larva, Petromyzon,**Pisces-** Narcine, Scoliodon, Anguilla, **Amphibia-***Draco,Rhacoporus,* **Reptilia**-*Chamaeleon, Enhydrina, Naja naja,***Aves-** King Fisher, Pigeon **Mammals-** Bat, Rabbit,

An "animal album" containing photographs, cut outs, with appropriate write up about the commonly available animals from different taxa.

Different topics may be given to different sets of students for this purpose.

Textbooks: Lab Manual

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Classify the structure and functions of Body setae and Penial setae in Earthworms.	1,2,3	Understanding
CO-2	Sketch the brain of chick.	1,2,3,4	Applying
CO-3	Explain the anatomy of various organ systems of Cockroach.	1,2,3	Analysing
CO-4	Experiment the Placoid ,Cycloid and Ctenoid scales.	1,2,3,4	Evaluating
CO-5	Infer the features of poisonous and non-poisonous snakes.	1,2,3,5	Creating

Relationship Matrix

Semester	Course Code		Title of the Course			Hours				Credits
I	18UCZO1P1		ANIMAL DIVERSITY I AND II PRACTICALS			30				1
Course Outcomes (COS)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓			✓	✓	✓	✓		
CO-2	✓	✓			✓	✓	✓	✓	✓	
CO-3	✓	✓			✓	✓	✓	✓		
CO-4	✓	✓			✓	✓	✓	✓	✓	
CO-5	✓	✓			✓	✓	✓	✓		✓
	Number of matches (✓) = …33…. Relationship = High									

Semester – I

Course Title	**FOOD SCIENCE**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UAAN11**
Course Type	**Allied-I/1**
Credits	**3**
Marks	**100**

General Objective:

This course covers the importance of food groups, nutritional value and their preparation.

Course Objectives:

CO.	**The learners will be able to:**
CO-1	Observe the vital link between food and nutrients.
CO-2	Employ different methods of cooking
CO-3	Compare the nutritive values of nuts
CO-4	Evaluate the nutritive value of vegetables
CO-5	Develop innovative methods to discover adulterants

UNIT I - INTRODUCTION TO FOOD SCIENCE

Human health: Definition, food and nutrition- Classification of food according to functions, Food groups: Basic IV, V-Food pyramid.

Preliminary preparation of food, Different methods of cooking and their influence on nutrient retention.

UNIT II - CEREALS AND PULSES

Cereals and millets – Structure of wheat and nutritive value of rice, wheat and ragi; Parboiling of rice – Advantages.

Pulses, – Nutritive value–Germination of pulses and its advantages; Factors influencing cooking quality of pulses.

UNIT III FATS AND OIL

Nuts and oil seeds – Nutritive value of groundnuts, soybeans, sesame, coconut.

Kinds of fats and oils- Mustard oil, sunflower oil, Safflower oil and its importance.

Stages of sugar cookery.

UNIT IV- PLANT FOODS

Vegetables –Classification, Nutritive value, pigments in vegetables and changes during cooking.

Fruits – Classification, nutritive value and browning reaction

Types of beverages.

UNIT V - ANIMAL FOODS

Milk – Nutritive value- different types of milk and milk products.

Egg – Structure and nutritive value –uses of egg in cookery.

Flesh foods- Nutritive value – methods of selection of fish, poultry, and meat.

Food Adulteration –common food adulterants and its harmful effects.

TEXT BOOK

B. Srilakshmi., Food Science, 7th Edition, 2018, New age International (P) limited publishers.

REFERENCE BOOKS:

1. Dr.M. Swaminathan, Advanced Text – Book on Food & Nutrition, Bappco, Bangalore. 1985
2. N. Shakuntala Manay, M. Shadaksharaswamy, Foods Facts and principles, New age International (p) Ltd., Publishers Second Edition, 2001
3. Food Science, Potter, AVI publishing Company, New York, USA-1992.

Course Outcomes

CO.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive level
CO-1	Summarize the basics of food science and its classification.	1,2,5	Understanding
CO-2	Experiment the processing techniques of cereals and pulses.	1,3,5	Applying
CO-3	Categorize the different types of oil and its influence on health.	1,4,5	Analyzing
CO-4	Assess the loss of nutrients during cooking of vegetables and fruits .	1,2,3,5	Evaluating
CO-5	Adapt innovative technologies in the production of milk products.	1,2,4,5	Creating

Relationship Matrix

Semester	Course Code		Title of the Course			Hours				Credits
I	21UAAN11		FOOD SCIENCE			60				3
Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓	✓		✓	✓			✓
CO-2	✓	✓	✓	✓		✓		✓		✓
CO-3	✓	✓	✓	✓		✓			✓	✓
CO-4	✓	✓	✓	✓		✓	✓	✓		✓
CO-5	✓	✓	✓	✓		✓	✓		✓	✓
	Number of matches (✓) = 37 Relationship = High									

SEMESTER – I

Course Title	**FOOD SCIENCE PRACTICALS**
Total Hrs.	**30**
Hrs./Week	**2**
Course Code	**21UAAN1P1**
Course Type	**Allied Practical-I/1P**
Credits	**1**
Marks	**100/2**

General Objective:

This course covers the basics of food preparation.

Course Objectives:

Co. No.	The learners will be able to:
CO-1	Identify the basic food groups
CO-2	Observe the methods of cooking
CO-3	Discover the stages of cooking sugar
CO-4	Examine the adulterants in food products
CO-5	Prepare a variety of recipes

FOOD SCIENCE PRACTICALS-I

1. Identification of food groups.
2. Tests for detecting food adulteration.
3. Identification of different stages of sugar cooking.
4. Preparation of
    a. Cereals
    b. Pulses
    c. Milk products
    d. Meat and fish and poultry
    e. Egg

Course Outcomes

CO. No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive level
CO-1	List various food groups.	1,3,4	Remembering
CO-2	Practice different stages of sugar cookery.	3,4,5	Applying
CO-3	Analyze the food adulterants	1,2,4,5	Analyzing
CO-4	Assess different methods of cooking and their influence on nutrient retention.	1,24,5	Evaluating
CO-5	Develop new recopies on pulses, milk products, meat, fish, poultry and egg.	2,34,5	Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
I	21UAAN1P1	FOOD SCIENCE PRACTICALS – I	30	1

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓	✓		✓		✓	✓	
CO-2	✓	✓	✓	✓				✓	✓	✓
CO-3	✓	✓	✓	✓		✓	✓		✓	✓
CO-4	✓	✓	✓	✓		✓	✓		✓	✓
CO-5	✓	✓	✓	✓	✓		✓		✓	✓
	Number of matches (✓) = 38 Relationship = **High**									

SEMESTER – I

Course Title	**VALUE EDUCATION-1**
Total Hrs.	**30**
Hrs./Week	**2**
Course Code	**21USVE1A**
Course Type	**AECC-I**
Credits	**2**
Marks	**100**

General Objective: To make students inculcate moral values, leading to faith and righteous action in their life.

Unit – I: Islam – Meaning – Importance – A complete Religion – The religion accepted by God – Five Pillars of Islam – Kalima – Prayers – Fasting – Zakat – Haj. Iman – Monotheism – Angels – Books – Prophets – Dooms Day – Life after death – Heaven and Hell.

Unit – II: Quran – The Book of Allah – Wahi – Revelation to Prophet Muhammad(sal) – Compilation – Preservance – Structure – Content – Purpose – Source of Islamic Law– SuraFathiha, Kafirun, Iqlas, Falakh and Nas.

Unit – III: Hadith – Siha Sitha – Buhari – Muslim – Tirmithi – Abu Dawood – Nasai – Ibn Maja – Collection of Hadith – Meaning of 40 Hadith.

Unit – IV: Life History of Prophet Muhammad (sal) – AiamulJahiliya – Prophet's Childhood and Marriage – Prophethood – Life at Mecca – Life at Medinah – Farewell Address – Seal of Prophethood.

Unit – V: Good character – Etiquettes – Halal and Haram – Duties towards Allah – Duties towards fellow beings – MasnoonDuas.

Textbooks:

Publication of SadakathullahAppa College

Reference Books:

1.V.A. Moahmed Ashrof – Islamic Dimensions – Reflection and Review on Quranic Themes.

2.The Presidency of Islamic Researchers – Revised & Edited – The Holy Quran.

3.M. ManzoorNomani – Islamic Faith & Practice.

4.Ali Nadawi, Abul Hasan– Muhammad Rasulullah.,Muassasathus Sahafawa Nashr publication Lucknow, India,1999.

5.K. Ali – A Study of Islamic History.

6.Abdul Rahuman Abdulla h – Islamic Dress code for Women.

7.Dr. MunirAhamed Mughal – Code For Believers.

8. Abdul Malik Mujahid – Gems and Jewels.

SEMESTER – I

Course Title	**VALUE EDUCATION-1I**
Total Hrs.	**30**
Hrs./Week	**2**
Course Code	**21USVE1B**
Course Type	**AECC-I**
Credits	**2**
Marks	**100**

UNIT I

Individual Morality – Objective of Moral life – Living in accordance with the code of Morality – the goodness of Morality – Morality and *Thirukural*- The need for faith.

UNIT II

Adherence to higher code of Morality – Fear of God – Good Moral Values – Duty to Parents – Teacher, respecting elders – Moral Etiquettes – Right-minded Principle – High Principles for Proper conduct.

UNIT III

Inculcating good attitudes – Open mindedness – Morale – analysing the pros and cons of good and bad – Service to others – Mind Power, tolerance, respecting others, showing love to others, patience – tranquility – Modesty, kindness and forgiveness.

UNIT IV

Quotations and moral Stories expressing Good characters of Great personalities – Life History of Great people: Mahatma Gandhi, Abraham Lincoln, Dr. A.P.J. Abdul Kalam.

UNIT V

Truth, the importance of uprightness, integrity, friendship – Health awareness on Alcohol and drug abuse – inculcating reading habit – reading good books – Hygiene – Dowry – Corruption.

TEXTBOOKS:

Publication of Sadakathullah Appa College.

SEMESTER – II

Course Title	சமயத்தமிழ் **Religious Tamil or Tamil and Religion**
Total Hrs.	**90**
Hrs./Week	**6**
Course Code	**21ULTA21**
Course Type	**Part – I - Tamil**
Credits	**3**
Marks	**100**

General Objective: To expose students to the tenets of all the religions.

Course Objectives:

CO	The learners will be able to:
CO-1	Understand religions and their objectives by means of the literary texts prescribed.
CO-2	Classify the tenets, concepts and rituals of various religions.
CO-3	Choose to know about the concept of virtues necessary for society through literature of ethics.
CO-4	Devise strategies to get through competitive exams.
CO-5	Consider focussing on their skill development by gaining confidence.

அலகு – 1

சைவம்

1. அ. திருஞானசம்பந்தர் - தோடுடைய செவியன்...
   - என்ன புண்ணியம் செய்தனை (2.106.1)
   - ஊனத் திருள்நீங் கிட ... (1.38.3)

   ஆ. திருநாவுக்கரசர் - மாசில் வீணையும்
   - குனித்த புருவமும் கொவ்வைச் ...
   - புழுவாய்ப் பிறக்கினும்

   இ. சுந்தரமூர்த்தி நாயனார் - பித்தா பிறைசூடி
   - பொன்னார் மேனியனே ...

2. மாணிக்கவாசகர்-திருவாசகம் - வானாகி மண்ணாகி
   திருவெம்பாவை - முன்னைப் பழம்பொருட்கும்
3. திருமூலர்-திருமந்திரம் - உள்ளம் பெருங்கோயில்

வைணவம்

4. அ. பொய்கையாழ்வார் - பாலன் தனதுருவாய் ஏழுலகுண்டு
   ஆ) பூதத்தாழ்வார் - சென்ற திலங்கைமேல் ....
   இ) பேயாழ்வார் - அடைந்த தரவணைமேல் ஐவர்க்காய்...
   ஈ) நம்மாழ்வார் - உண்ணும் சோறு...
   உ) மதுரகவியாழ்வார் - கண்ணி நுண்சிறுத்...
5. ஆண்டாள்-திருப்பாவை - மார்கழித் திங்கள்...

சமணம்

6. யசோதர காவியம் (கடவுள் வாழ்த்து) - நல்லார் வணங்கப் படுவான்..
   நீலகேசி (கடவுள் வாழ்த்து)

பௌத்தம்

7. மணிமேகலை (பாத்திரம் பெற்ற காதை) - மாரனை வெல்லும் வீரநின் (59-72)

கிறித்தவம்

8. இரட்சணிய யாத்திரிகம் (கடவுள் வாழ்த்து) - 1. மூல காரண முதற்பொருள் ...
   - 2. ஆதி மெய்த்திரு...
   - 3. வானமும், பூமியும்...

இஸ்லாம்

9. உமறுப்புலவர் - அல்லாஹ்
10. சதாவதானி செய்குதம்பிப் பாவலர் - மாண்டசவம் ஒன்றெடுத்து...
    (நபிகள் நாயக மான்மிய மஞ்சரி) - ஒன்று தெய்வம் ஒன்று மதம்....

இரகுமான் கண்ணி

11. குணங்குடி மஸ்தான் சாகிபு
    1) ஈறும் முதலுமற்றே இயங்குகின்ற முச்சுடராய்க்
    காணிக்கை வைத்தேனென் கண்ணே றகுமானே-2
    2) ஏகப் பெருவெளியில் இருட்கடலிற் கம்பமற்ற
    காகமது வானேன் கண்ணே றகுமானே – 7
    3) வேட்டை பெரிதென்றே வெறிநாயைக் கைப்பிடித்து
    காட்டிற் புகலாமோ கண்ணே றகுமானே – 22
    4) இன்றுள்ளோர் நாளைக் கிருப்பதுபொய்
    யென்பதையான் கண்டுகொண்டேன் ஐயாவென்
    கண்ணே றகுமானே - 37
    5) எட்டிப் பிடிக்கும் இதமறிந்தா லுன்பதத்தைக்
    கட்டிப் பிடித்திடுவேன் கண்ணே றகுமானே – 49
12. ஞானமாமேதை தக்கலை பீர்முகம்மது அப்பா - அலைகடலும் அம்புலியும்....
    - பொல்லாக்குபிர்களும் வருங்....

13. இறையருட்கவிமணி பேராசிரியர்
காஅப்துல்கபூர் - அலகிலா அருளும் அளிவிலா..

நீதி இலக்கியம்

14. திருக்குறள் - உழவு (1031-1040)
15. நாலடியார் - கல்வி கரையில கற்பவர் நாள்சில... 135
16. நான்மணிக்கடிகை - நாற்றம் உரைக்கும் மலர்.... 45

அலகு – 2

புதினம்

வாடிவாசல் - சி.சு. செல்லப்பா, காலச்சுவடு, நாகர்கோவில்

அலகு – 3

உரைநடை

(போட்டித் தேர்வுகளுக்குக் கட்டுரை எழுதும் பயிற்சி)

1. நபிகள் நாயகம் (ஸல்) அன்பின் தாயகம்
2. சதக்கத்துல்லாஹ் அப்பா அவர்களின் வாழ்வும் பணியும்
3. பண்பெனப்படுவது பாடறிந்து ஒழுகுதல்
4. நம்பிக்கையோடிருப்போம்
5. தமிழின் தொன்மையும் சிறப்பும்
6. தடம் பதித்த தமிழ் நாவலாசிரியர்கள்

அலகு – 4

இலக்கிய வரலாறு

(போட்டித் தேர்வுத் தயாரிப்பு)

1. சைவம், வைணவம், கிறித்தவம், இசுலாம், வளர்த்த தமிழ்
2. புகழ்பெற்ற தமிழ் நூல்கள், நூலாசிரியர்கள்
3. சாகித்ய அகாதெமி விருது பெற்ற படைப்புகள்

அலகு – 5

தமிழ்நாடு அரசுப் பணியாளர் தேர்வாணையம் நடத்தும் போட்டித் தேர்வுக்குரிய

பொதுத்தமிழ் இலக்கணப் பகுதி ஓர் அறிமுகம்

1. வேர்ச்சொல்லைக் கண்டறிதல்
2. பெயரெச்சம், வினையெச்சம், முற்றெச்சம் பற்றி அறிதல்
3. வினைமுற்று, ஏவல் வினைமுற்று அறிதல்
4. வியங்கோள் வினைமுற்று, வினையாலணையும் பெயர்
5. வினைத்தொகை, பண்புத்தொகை அறிதல்
6. உவமைத்தொகை, உம்மைத் தொகை அறிதல்
7. வேற்றுமைத் தொகையைக் கண்டறிதல்
8. அன்மொழித் தொகையைக் கண்டறிதல்
9. இரட்டைக்கிளவி, அடுக்குத்தொடர் அறிதல்

பாடநூல்:

சமயத்தமிழ், சதக்கத்துல்லாஹ் அப்பா கல்லூரித் தமிழ்த்துறை வெளியீடு,

பார்வை நூல்

சமயம் வளர்த்த தமிழ், வேங்கடசாமி நாட்டார், பாவைப் பதிப்பகம், சென்னை

Course Outcomes:

CO	Upon completion of this course, students will be able to	PSOs Addressed	Cognitive Level
CO-1	Understand the doctrines, divine thoughts and virtues of the various religions.	1,3,4,5	Understanding
CO-2	Develop impeccable spoken and written languge ability.	1,4,5	Applying
CO-3	Choose to improve their confidence and the nuances of governance by reading the history of great personalities.	1,4	Applying
CO-4	Explain the ancient Tamil people's life history.	3,4,5	Analyzing
CO-5	Summarize great literary works and to get substance from them to attract employment opportunites.	1,2	Evaluating

Relationship Matrix

Semester	Course Code		Title of the Course			Hours				Credit
II	21ULTA21		சமயத்தமிழ்			90				3
Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓	✓		✓		✓	✓	✓
CO-2	✓	✓	✓			✓			✓	✓
CO-3	✓	✓	✓	✓	✓	✓			✓	
CO-4	✓	✓	✓					✓	✓	✓
CO-5	✓	✓				✓	✓			
	Number of matches (✓) = 31 Relationship = Medium									

SEMESTER – II

Course Title	**BASIC GRAMMAR AND TRANSLATION-II**
Total Hrs.	**90**
Hrs./Week	**6**
Sub. Code	**21ULAR21**
Course Type	**Part – I - Arabic**
Credits	**3**
Marks	**100**

General Objective: To make the students develop the intermediate Arabic Grammar and Translation skills.

Course Objectives:

CO	The learners will be able to:
CO-1	Understand the parts of speech of Arabic to comprehend text books in terms of the sentences given.
CO-2	Differentiate the conjugations of verbs in Arabic.
CO-3	Explain the various predicates in Arabic sentences.
CO-4	Illustrate the morphology in Arabic grammar.
CO-5	Analyze nominal sentences in Arabic.

Unit I: Arabic for Beginners

Lesson-14 Prepositions, The village (Page No. 76& 77)

Lesson-15 Verbal sentence – The past tense (Page No. 82 to 87)

Lesson-16 The Imperfect tense- The River Nile (Page No. 93 to 97)

Lesson-17 The Imperative and Negative command (Page No. 102 to 104)

Unit II: Al -Qirat –Al-Wazhiha Part –I

Lesson 15-21

Unit III: Arabic for Beginners

Lesson-20 The verbs of Incomplete predicate (Page No. 126 to 130)

Lesson-21 Inna and its categories, the banks (Page No. 136,137)

Lesson-22 the Numerals, Days and months (Page No. 144 to 148)

Lesson-24 اسم التفضيل (Page No. 151)

Unit IV: Al -Qirat –Al-Wazhiha Part –I

Lesson 22-28

Unit V: Al -Qirat –Al-Wazhiha Part –I

Lesson 29-35

Text and Reference books

1) Arabic for Beginners (selected topics only)

By Dr. Syed Ali (Former HOD of Arabic, The New College, Chennai.

(UBS Publishers & Distributors Ltd) 5, Ansari Road, New Delhi -110 002.

2) Al -Qirat –Al-Wazhiha Part –I, From Lesson 15 to 35 only.

by Waheed Az-zaman Al-Keeranavi.

Available at: Al-Manar Book Depot, Mannarpuram, Trichy-20.

Course Outcomes

CO	Upon completion of the course, the students will be able to	PSOs Addressed	Cognitive Level
CO-1	Understand the intermediate Arabic grammar.	1,2,3	Understanding
CO-2	Apply the functions of verbs such as the past tense, the imperfect tense etc. in sentences.	1,2,4	Applying
CO-3	Produce sentences in Arabic with the grammar rules.	1,4,5	Applying
CO-4	Categorize the different particles in Arabic.	1,2,3	Analyzing
CO-5	Find errors in Arabic sentences with the rules of grammar and translate Arabic texts.	1,4,5	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
II	21ULAR 21	BASIC GRAMMAR AND TRANSLATION-II	90	3

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓	✓	✓	✓	✓	✓		
CO-2	✓	✓	✓	✓		✓	✓		✓	
CO-3	✓	✓	✓			✓			✓	✓
CO-4	✓		✓	✓	✓	✓	✓	✓		
CO-5		✓			✓	✓			✓	✓
	Number of matches = 33 Relationship = Medium									

SEMESTER – II

Course Title	**COMMUNICATIVE ENGLISH - II**
Total Hrs.	**90**
Hrs./Week	**6**
Course Code	**21ULEN21**
Course Type	**Part – II - English**
Credits	**3**
Marks	**100**

General Objective:

To teach students the four skills viz. Listening, Speaking, Reading, and Writing and to impart language skills through basic grammatical categories.

Course Objectives:

CO	The learners will be able to:
CO-1	Understand the importance of real-life situations, as responding to complaints and to use language effectively.
CO-2	Generalize the nuances and methods of giving short speeches, proposing welcome address and vote of thanks and the like.
CO-3	Associate themselves with learning to give short presentations, formal presentations and writing e-mails.
CO-4	Apply their knowledge in writing sentences with grammatical order, writing brochure and understanding texts in context.
CO-5	Develop their knowledge and skills to use clauses and collocations appropriately in spoken and written contexts.

Unit – I

Listening and Speaking

a. Listening and Responding to Complaints (formal situation)

b. Listening to Problems and Offering Solutions (informal)

Reading and Writing

a. Reading Aloud (brief motivational anecdotes)

b. Writing a Paragraph on a Proverbial Expression / Motivational Idea

Word Power / Vocabulary

a. Synonyms and Antonyms

Grammar in Context

- Adverbs
- Prepositions

Unit – II

Listening and Speaking

a. Listening to Famous Speeches and Poems

b. Making Short Speeches – Formal:

Welcome Speech and Vote of Thanks.

Informal Occasions – Farewell Party, Graduation Speech

Reading and Writing

a. Writing Opinion Pieces (could be on travel, food, film / book reviews

or on any contemporary topic)

b. Reading Poetry

i. Reading Aloud: (Intonation and Voice Modulation)

ii. Identifying and using figures of speech-simile, metaphor, personification etc.

Word Power

a. Idioms and Phrases

Grammar in Context

Conjunctions and interjections

Unit – III

Listening and Speaking

a. Listening to Ted Talks

b. Making Short Presentations – Formal Presentation with PPT,

Analytical Presentation of Graphs and Reports of Multiple Kinds

c. Interactions during and after the Presentations

Reading and Writing

a. Writing Emails of Complaint

b. Reading Aloud Famous Speeches

Word Power

a. One word Substitution

Grammar in Context:

- Sentence Patterns

Unit – IV

Listening and Speaking

a. Participating in a Meeting: face to face and online

b. Listening with Courtesy and adding ideas and giving opinions

during the meeting and making concluding remarks

Reading and Writing

a. Reading Visual Texts - Advertisements

b. Writing a Brochure

Word Power

a. Denotation and Connotation

Grammar in Context:

- Sentence Types

Unit - V

Listening and Speaking

a. Informal Interview for Feature Writing

b. Listening and Responding to Questions at a Formal Interview

Reading and Writing

a. Writing Letters of Application

b. Reader's Theatre (Script Reading)

c. Dramatizing Everyday Situations / Social issues through Skits. (writing scripts and performing)

Word Power

a. Collocation

Grammar in Context:

- Working with Clause

Textbook:

COMMUNICATIVE ENGLISH-II. Tamil Nadu State Council for Higher Education (TANSCHE).2020.

References:

1. RadhakrishnaPillai.G,ed.Written English for You.Chennai: Emerald Publishers,1990 (rpt2008).
2. Nihamathullah.A.et al. A Course in Spoken English, Tirunelveli: MSU,2005. (rpt 2010).

Course Outcomes

CO No.	Upon completion of this course, students will be able to:	PLO Addressed	Cognitive Level
CO-1	Distinguish the various real life situations to use language accordingly.	1,2	Understanding
CO-2	Experiment giving short speeches, welcome address, vote of thanks in programmes and functions organised.	1,2,3	Applying
CO-3	Write e-mails and give short presentations, formal presentations using the English language.	1,2,3,4	Applying
CO-4	Order sentences with its basic units and to prepare brochures etc.	1,2,3,4	Analyzing
CO-5	Find errors in the correct use of collocations and clauses in everyday spoken and written communication.	1,2,3,4,5	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
II	21ULEN21	COMMUNICATIVE ENGLISH - II	90	3

Course Outcomes (COS)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓				✓	✓			
CO-2	✓	✓	✓			✓	✓	✓		
CO-3	✓	✓	✓	✓		✓		✓	✓	
CO-4	✓	✓	✓	✓		✓		✓	✓	
CO-5	✓	✓	✓	✓	✓	✓		✓	✓	✓
	Number of matches (✓) = …36…. Relationship = High									

SEMESTER – II

Course Title	**DEVELOPEMENTAL BIOLOGY**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UCZO21**
Course Type	**DSC-III**
Credits	**4**
Marks	**100**

General Objective:

To study the principles of developmental Biology and understand various steps that lead to the formation of a new progeny.

Course Objectives:

CO No.	The learners will be able to:
CO-1	Understand the principles of developmental biology and the progression of gametogenesis.
CO-2	Execute the Spemann's experiment in lower organisms.
CO-3	Distinguish the types and physiology of placenta
CO-4	Justify the method of in vitro fertilization
CO-5	Construct a model of teratogenic embryo.

UNIT I – Gametogenesis and Fertilization

Spermatogenesis – Oogenesis. Structure of sperm and egg of Chick and Human. Sperm and egg interaction – pre and post fertilization, theories and biochemical events-Parthenogenesis.

UNIT II – Cleavage and Gastrulation

Cleavage in Chick and Human. Fate map of Chick and Human. Gastrulation in Chick and Human. Development of Brain and Heart in Chick.

UNIT III – Extra Embryonic Membranes and Placentation

Extra embryonic membranes in Chick – development, types and physiology. Placentation in mammals – types and physiology. Organizer – Primary and secondary organizers – Spemann's experiment.

UNIT IV – Human Reproduction and Birth Control

Reproduction in Human – Infertility (male and female), Artificial insemination – Assisted reproductive Technology,(ART)Invitro fertilization and embryo transfer –Test tube babies – Amniocentesis.

Contraceptive devices – Surgical method – Hormonal method – Intra Uterine Contraceptive Devices (IUCD).

UNIT V – Nuclear transplantation and Regeneration

Nuclear transplantation in *Acetabularia*. Regeneration- definition and types, Regeneration in *Planaria* and Amphibians. Teratogenesis,Embryonic stem cells and significance.Morphogenetic field and gradient hypothesis.

TEXT BOOKS :

Verma . P. S. and V. K. Agarwal. 2006**,** Chordate Embryology,S. Chand & Company Ltd.

REFERENCE BOOKS :

1. Arora,M.P., 2018 Embryology, Himalaya Publishing House,.
2. Berril, N. J., 1986 Developmental Biology, TataMc.Graw – Hill Publishing Company.
3. Balinsky,B.I.Fabian.B.C. 2012. An Introduction to Embryology, Thomson Press India Ltd.5th edition.

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Describe the development of spermatogenesis and oogenesis.	1,2,4	Understanding
CO-2	Chart the growth of brain and heart in chick.	1,2,3	Applying
CO-3	Correlate the varied type of placenta.	1,3,4,5	Analysing
CO-4	Predict the factors involved in infertility.	1,4,5	Evaluating
CO-5	Generate a model of various stages of human embryo.	1,3,4,5	Creating

Relationship Matrix

Semester	Course Code	Title of the Course				Hours		Credits		
II	21UCZO21	DEVELOPMENTAL BIOLOGY				60		4		
Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓		✓		✓	✓		✓	
CO-2	✓	✓		✓		✓	✓	✓		
CO-3	✓	✓	✓		✓	✓		✓	✓	✓
CO-4	✓	✓	✓	✓		✓			✓	✓
CO-5		✓	✓	✓	✓	✓		✓	✓	✓
	Number of matches (✓) = …35…. Relationship = High									

Prepared by
Dr.M.Sithi Jameela
Signature

Checked by

Head of the Department

SEMESTER - II

Course Title	**ECOLOGY**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UCZO22**
Course Type	**DSC-IV**
Credits	**4**
Marks	**100**

General Objective:

To create an awareness on the mechanism of eco system and protection of natural resources and biodiversity.

Course Objectives:

CO No.	The learners will be able to:
CO-1	Understand the concepts and scope of various branches of Ecology.
CO-2	Sketch the varied types of Food chain and Food web.
CO-3	Analyse the different types of animal relationship.
CO-4	Evaluate the faunal adaptations of different habitats.
CO-5	Construct innovative methods to conserve rare, endangered and critically endangered species.

UNIT – I Ecology factors

Ecology and Environmental Science – Definition - Scope – Branches – Abiotic factors –Water, Temperature and Light. Biotic factors – Animal relationship – Symbiosis – Commensalism – Mutualism –Antagonism – Antibiosis – Parasitism and its types and adaptations- Predation – Competition.

UNIT – II Ecosystem

Ecosystem –Definition Structure – Pond ecosystem – Primary production – Secondary production –Food chain – Food web – Trophic levels – Energy flow – Pyramid of biomass – Pyramid of energy. Biogeochemical cycles – carbon and nitrogen

UNIT – III Community& Population Ecology

CommunityEcology: Introduction – diversity – structure – community dominance – community stratification – periodicity – community interdependence -Ecotone – Edge effect – ecological niche – concepts of community –Ecological succession

Population Ecology – Definition – Density – Estimation –Natality – Mortality – Age distribution - Age pyramids – Population growth and Population equilibrium.

UNIT - IV Habitat Ecology

Characteristic features of different habitats and faunal adaptations of fresh water (Lentic and Lotic), marine, estuarine, mangrove, cave, forest and desert.

UNIT - V Biodiversity the Conservation

Biodiversity – definition, loss and cause. IUCN, CITES and brief outlines of Indian laws of conservation. Biodiversity hotspots in India, Indian endangered species and conservation, community reserves, sanctuaries, national parks and tiger reserves in TamilNadu. Afforestation and deforestation. Human animal conflicts

TEXT BOOKS:

1. P.S.Verma, V.K.Agarwal (2010) Environmental biology, S.Chand & Co. New Delhi.
2. Text book of Ecology & Animal Distribution by P.S.Verma V.K.Agarwal S.Chand & Co. New Delhi.

REFERENCE BOOKS:

1. Odum, E.P., 1971 – Fundamentals of Ecology., W.B. Saunders Company.
2. Verma, P.S. and V.K.Agarwal 2013. Cell Biology, Genetics, Molecular Biology, Evolution & Ecology. S.Chand & Company.
3. Arumugam.N and V.Kumaresan 2014. Environmental Studies, Saras Publication.
4. S.V.S. Rao (2013), Ecology and Emvironmental science, PHI Publishers.
5. P.D. Sharma (2011)Ecology and Emvironment, Rastogi publishers
6. Pranav Kumar (2017) Fundamentals of Ecology and Pathfinder Publication, Second edition.

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Understand the relationship between the biotic and abioic factors.	1,2,3,5	Understanding
CO-2	Integrate the features of ecosystems and their diversity.	1,2,5	Applying
CO-3	Distinguish the features between Population and community.	1,2,4,5	Analysing
CO-4	Comment on the characteristics of different habitats and faunal adaptations.	1,2,4	Evaluating
CO-5	Devising the Strategies to improve the protection of Rare, endemic, threatened and endangered species.	1,2,3,4,5	Creating

Relationship Matrix

Semester	Course Code			Title of the Course		Hours				Credits
II	21UCZO22			Ecology		60				4
Course Outcomes (COS)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓		✓		✓	✓	✓		✓
CO-2	✓	✓		✓		✓	✓			✓
CO-3	✓	✓		✓		✓			✓	✓
CO-4	✓	✓	✓	✓		✓	✓		✓	
CO-5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Number of matches (✓) = ……36. Relationship =High									

SEMESTER – II

Total Hrs.	**Developmental Biology and Ecology Practical**
Hrs./Week	**2**
Course Code	**21UCZO2P1**
Course Type	**Practical-II**
Credits	**1**
Marks	**100/2**

General Objective:

To acquire key experimental skills and explore simple experiments relevant to developmental biology and ecology.

Course Objectives:

CO No.	**The learners will be able to:**
CO-1	Examine the Hardness of water in diverse samples.
CO-2	Identify the different embryonic stages of chick and developmental stages of frog.
CO-3	Apply the principle of wingkler's method in various water samples and observe the results.
CO-4	Assess the primary productivity using light and dark bottle method.
CO-5	Develop replica of different types of placenta.

DEVELOPMENTAL BIOLOGY

1. Temporary mounting and observation of Chick embryo - 24, 48, 72 and 96 Hours.
2. Frog – Egg/sperm - Demonstration only – Model/ chart/ CD
3. **Museum specimens, slides, models and charts:**

a) Human Sperm
b) Egg of Insect.(Cockroach&Silkworm).
c) Tadpole
d) Axolotl larva.
e) Developmental stages of Frog:Egg,Morula, Blastula, Gastrula and yolk plug stage
f) Chick embryo – 24, 48, 72 & 96 hrs.
g) Contraceptive devices – Condom, Copper T and Pills (Mala-D).
h) Placenta in mammals – Diffuse, Discoidal, Zonary and Cotyledonary.

ECOLOGY

1. Estimation of Dissolved oxygen in two water samples (River and Pond water)
2. Estimation of Hardness in two water samples (River and Pond water)
3. Determination of primary productivity using light and dark bottle method (Demonstration)
4. a) Mutualism- Hermit crab and Sea anemone b) Commensalism – Echeneis and Shark c) Parasitism – Ascaris.

Museum specimens, slides, models and charts

5. a) Food chain b) Food web c) Ecological pyramids d) Age pyramids e) Growth curves
6. Biogeochemical cycles – carbon and nitrogen
7. Biodiversity hotspots in India
8. Indian endangered species (any four)
9. a) Nauplius larva b) Zoea larva c) Mysis larva.

Reference Books:

1. A. Gibbs, 2007 A Practical Guide to Developmental Biology,Oxford Exclusive.
2. W. Fresenius, K.E.Quentin & W.Schneider, 2011, Water analysis, Springer, 2011.

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Discuss various embryonic stages in chick.	1,3,5	Understanding
CO-2	Sketch the progressive and larval phases in amphibians.	1,2,3	Applying
CO-3	Correlate the dissolved oxygen content present in soft and hard water.	1,2,4	Analysing
CO-4	Validate the results of primary productivity in various samples.	1,2,3,5	Evaluating
CO-5	Construct a chart of Biodiversity hotspots in India.	1,2,3,5	Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
II	21UCZO2P1	Developmental Biology and Ecology Practical	30	1

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓			✓	✓		✓		✓
CO-2		✓	✓		✓	✓	✓	✓		
CO-3	✓	✓	✓	✓		✓		✓	✓	
CO-4		✓		✓	✓	✓	✓	✓		✓
CO-5	✓	✓		✓	✓	✓	✓	✓		✓
	Number of matches (✓) = ...34.... Relationship = High									

SEMESTER – II

Course Title	**APPLIED NUTRITION**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UAAN21**
Course Type	**Allied-I/2**
Credits	**3**
Marks	**100**

General Objective:

This course covers the role of nutrition, their deficiencies and prevention of diseases.

Course Objectives:

Co. No.	The learners will be able to:
CO-1	Recognize different food groups and their nutritive values
CO-2	Apply various methods of nutritional assessment for different age groups.
CO-3	Classify the functions and sources of lipids as well as proteins.
CO-4	Evaluate the role of nutrition in preventing and managing diseases.
CO-5	Generalize importance of Macro and micro nutrients in human diet

UNIT I MENU PLANNING

Menu planning- Principles of planning diet, points to be considered in planning a diet.

Assessment of Nutritional status – Methods- Anthropometric measurements, biochemical examination, clinical examination and diet surveys.

UNIT II ENERGY & CARBOHYDRATES

Energy – Unit of energy - Bomb calorimeter, Physiological energy value of food. BMR- Definition and Factors affecting BMR

Carbohydrates – Classification, functions and sources.

UNIT III LIPIDS & PROTEINS

Lipids – Classification, functions and sources.

Proteins – Classification, functions, and sources.

UNIT IV VITAMINS

Fat soluble Vitamins A,D,E,K – Functions, Sources requirements and deficiency

Water soluble Vitamins C, B group vitamins- B1,B2,B3,B5,B6,B12 and folic acid- Functions, Sources, requirements and deficiency

UNIT V MINERALS

Minerals- Macro minerals- Calcium and Phosphorus- Functions, Sources, requirements and deficiency; Micro minerals- Iron, Fluorine and Iodine- Functions, Sources, requirements and deficiency.

Role of fibre in preventing and managing diseases, Sources of fibre.

Water –functions and dehydration

TEXT BOOKS :

1. Srilakshmi, Nutrition Science, 6th Edition, 2018, New age International (P) limited publishers.
2. Srilakshmi, Dietetics, 7th Edition, 2014,New age International (P) limited publishers.

REFERENCE BOOKS:

1. Dr.M. Swaminathan, Advanced Text – Book on Food & Nutrition, Bappco,Bangalore. 1985
2. Foundation of Food Preparation, peck am, McMillan Company, London 1994.
3. Krause's Food, Nutrition and Diet Therapy, Mahan W.B Saunders Company, 10th edition, 2000.
4. Normal and therapeutic nutrition, Robinson C.H. and Lawler, McMillan Publications Co. Inc., New York, 1990, Revised Edition.
5. Introductory Nutrition, Guthrie & Boston, 8th Edition. 1989.

Course Outcomes

CO. No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive level
CO-1	Understand the importance of planning menus for different age groups and health conditions.	**1,2,3,4**	Understanding
CO-2	Illustrate the classifications, functions and sources of carbohydrate.	**1,3,4,5**	Applying
CO-3	Categorize the functions, sources of proteins and lipids	**1,2,3,5**	Analyzing
CO-4	Summarize fat soluble and water soluble vitamins.	**1,2,3,5**	Evaluating
CO-5	Integrate the functions of Macro and Micro minerals, fibre and water.	**1,2,4,5**	Creating

Relationship Matrix

Semester	Course Code			Title of the Course			Hours		Credits
II	21UAAN21			Applied Nutrition			60		3
Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓	✓		✓	✓	✓	✓	
CO-2	✓	✓	✓	✓		✓		✓	✓	✓
CO-3	✓	✓	✓	✓		✓	✓	✓		✓
CO-4	✓	✓	✓	✓		✓	✓	✓		✓
CO-5	✓	✓	✓	✓		✓	✓		✓	✓
	Number of matches (✓) = 40 Relationship = **High**									

SEMESTER – II

Course Title	**APPLIED NUTRITION PRACTICALS**
Total Hrs.	**30**
Hrs./Week	**2**
Course Code	**21UAAN2P1**
Course Type	**Allied Practical-I/2P**
Credits	**1**
Marks	**100/2**

General Objective:

This course focuses on the basic knowledge of planning menus for different age groups.

Course Objectives:

Co.No.	The learners will be able to:
CO-1	Describe the basic principles and properties of nutrients
CO-2	Interpret the chemistry of starch and proteins
CO-3	Analyze the nutrients qualitatively and quantitatively
CO-4	Summarize the principles of menu planning
CO-5	Plan and prepare the menu for different age groups

1. Principles of Nutrition practicals
   1. Qualitative estimation of Carbohydrate
   2. Qualitative estimation of protein
   3. Estimation of vitamin C in foods
2. Planning menu for the following age groups
   a. Adult women
   b. Pregnant mothers
   c. Lactating women
   d. Vitamin A deficient school child
   e. College going girl – diet for Anaemia
3. Visit to (ANY ONE) milk factory, food analysis institute, CFTRI, observing school lunch program and ICDS programme.

Course Outcomes

CO. No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive level
CO-1	Estimate vitamin C in different food products.	**1,4,5**	Understanding
CO-2	Demonstrate qualitative estimation of carbohydrate and protein.	**1,4,5**	Applying
CO-3	Prioritize menu for pregnant and lactating women based on their health condition.	**1,3,5**	Analyzing
CO-4	Estimate a menu for vitamin A deficient school child based on the nutritive value.	**1,3,5**	Evaluating
CO-5	Plan and prepare a menu for anemic college going girl.	**1,3,5**	Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
II	**21UAAN2P1**	**Applied Nutrition Practicals**	**30**	**1**

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO-1	✓	✓	✓			✓			✓	✓
CO-2	✓	✓	✓			✓			✓	✓
CO-3	✓	✓	✓			✓		✓		✓
CO-4	✓	✓	✓			✓		✓		✓
CO-5	✓	✓	✓			✓		✓		✓
	Number of matches (✓) = 30 Relationship = **Medium**									

SEMESTER – II

Course Title	**ENVIRONMENTAL SCIENCE**
Total Hrs.	**30**
Hrs./Week	**2**
Course Code	**21UEVS21**
Course Type	**AECC-II**
Credits	**2**
Marks	**100**

UNIT - I: Nature of Environmental Studies

Goals, Objectives and guiding principles of environmental studies. Towards sustainable development - Environmental segments– Atmosphere, Hydrosphere, Lithosphere, Biosphere – definition. Pollution episodes -– Hiroshima – Nagasaki, - Bhopal gas Tragedy, Fukushima. Stone leprosy in Taj Mahal, Minamata disease.

UNIT - II: Natural Resources

Renewable and Non-Renewable resources - classification.

- Forest resources: Use and over - exploitation, Afforestation and deforestation.
- Water resources: Use and over - utilization and conservation of surface and ground water – Rain harvesting.
- Marine Resources: Fisheries and Coral reefs.
- Mineral resources: Use and exploitation - environmental impacts of extracting and using mineral resources.
- Food resources: Effects of modern agriculture fertilizers - pesticide problem.
- Energy resources: Growing energy needs - use of alternate energy source - Solar cells & wind mills.
- Land resources: Land degradation

UNIT - III: Ecosystem

- Concept of Eco-systems - Tropic level, food chains, food web and Ecological pyramids, Living conditions on other planets (Brief account). Types, structure & Functions, prevention and control of pollution of the following:

a) Aquatic ecosystem

b) Terrestrial ecosystem – Grassland, Forest and Desert ecosystem

UNIT - IV: Biodiversity & Its Conservation

Introduction - Definition: ecosystem diversity, species diversity and Genetic diversity. Hot spots of biodiversity - Western Ghats, Eastern Himalayas and Gulf of Mannar. Threats to biodiversity - Habitat Loss, Poaching of wildlife and Man - wildlife conflicts. Nature reserves. Conservation of biodiversity: In-situ and Ex-situ, Environmental movements – Green peace and Chipco movement. Biodiversity law.

UNIT - V: Environmental protection, Policies and practices

Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture.

Prevention, Control of Pollution and Environmental Laws:

- Water, Air and Noise (prevention & Control of Pollution) Act.
- Environmental Protection Act.
- Wildlife production Act, Forest Conservation Act, International agreements, Monstreal and Kyoto protocols and conservation on biological Diversity. The Chemical Weapons Convention (CWC)
- Role of Central & State Pollution Control Boards.

Field work : 5 marks

Visit to an area to document environmental assets: river/ forest / fauna.

or

Visit to a local polluted site-urban/rural/Industrial / Agricultural

or

Study of common plants, insects, birds and basic principles of identification

REFERENCE BOOKS:

1. Basic of Environmental Science. Vijayalakhmi, Murugesan and Sukumaran – Manonmaniam Sundaranar University publications.

2. Environmental Studies. John de Brito, Victor, Narayanan and Patric Raja - published by St. Xavier's College, Palayamkottai, 2008.

3. Environmental Science and Biotechnology. A.G. Murugesan and C. Raja Kumar - MJP Publishers.

4. Fundamental of Environmental pollution - Krishnan Kannan - Chand & Company Ltd., New Delhi, 1997.

5. Environmental Studies. S. Muthiah, Ramalakshmi publications, Tirunelveli.

6. EnRole of central and state pollution control boards. Environmental Studies. V.M. Selvaraj, Bavani Publications, Tirunelveli.

SEMESTER – III

Course Title	பயன்பாட்டுத் தமிழ் **(Payanpattu Tamil)**
Total Hrs.	**90**
Hrs./Week	**6**
Course Code	**21ULTA31**
Course Type	**Part – I - Tamil**
Credits	**3**
Marks	**100**

General Objective: To teach the Sangam literature.

Course Objectives:

CO	**The learners will be able to:**
CO-1	Understand Sangam Tamil through the texts prescribed.
CO-2	Describe the speciality of love, valour, charity in Tamil tradition.
CO-3	Choose life's rules and regulations through literature.
CO-4	Determine to increase self confidence.
CO-5	Prioritize to learn modern skills such computer operation.

அலகு 1

. 1. சிலப்பதிகாரம் - வழக்குரை காதை
2. மணிமேகலை - பாத்திரம் பெற்ற காதை
3. சீவகசிந்தாமணி - சீவகனுக்கு விசயை கூறிய அறிவுரை
4. பெரிய புராணம் - சிறுத்தொண்டர் நாயனார் புராணம்
5. கம்பராமாயணம் - கங்கை காண் படலம்
6. இயேசு காவியம் - பாரச்சிலுவை
7. சீறாப்புராணம் - விட மீட்ட படலாம்

சிற்றிலக்கியங்கள்

1. முக்கூடற்பள்ளு - ஆற்று வளமும் மீன் வளமும்
2. திருக்குற்றாலக் குறவஞ்சி - மலை வருணனை

இக்காலக் காப்பியம்

1. நாயகம் ஒரு காவியம் - பாம்பின் நேசமும் தோழரின் பாசமும் மு.மேத்தா

அலகு - 2

(இந்திய ஆட்சிப்பணிக்குத் ஆயத்தப்படுத்தும் நோக்கில் அமைந்த பயன்பாட்டுக் கட்டுரை நூல்) ஐஏஎஸ் தேர்வும் அணுகுமுறையும் இறையன்பு இ.ஆ.ப.

அலகு 3

ஊடகப் படைப்பாக்கம்

தகவல் தொடர்பு அறிமுகம் - உலகப் புகழ்பெற்ற பத்திரிகைகளும் பத்திரிகையாளர்களும் - இதழ்களுக்குச் சிறப்புக் கட்டுரைகள் எழுதுதல் - காணாமல் போன கடித இலக்கிய கட்டுரை – (இந்து தமிழ்) கலை இலக்கியப் பக்கம் - நூற்றாண்டு கடந்த இஸ்லாமியக் கர்னாடக இசை நூல் கீர்த்தனா ரஞ்சிதம் - தமிழ் இதழ்கள் பற்றிய அறிமுகம் - புகழ்பெற்ற இதழ்கள் - புகழ்பெற்ற பத்திரிகையாளர்கள் - தமிழே எங்கள் அடையாளம்

அலகு 4

தமிழ் இலக்கிய வரலாறு, ஐம்பெரும் காப்பியங்கள், ஐஞ்சிறு காப்பியங்கள், சிற்றிலக்கியங்கள் (உலா, தூது, பிள்ளைத் தமிழ், பரணி)

அலகு 5

தமிழ்நாடு அரசுப்பணியாளர் தேர்வாணையத்தின் பொதுத்தமிழ் தாளில் இடம்பெறும் இலக்கணப் பகுதி.

பிழைத்திருத்தம், வல்லினம் மிகும் இடங்கள், மிகா இடங்கள், ஒருமை-பன்மை திருத்தம், மரபுப்பிழைகள், வழுஉச்சொற்கள், பிறமொழிச் சொற்கள், வேர்ச்சொல் உள்ளிட்ட பகுதிகள்.

பாடநூல்

பயன்பாட்டுத் தமிழ், சதக்கத்துல்லாஹ் அப்பா கல்லூரித் தமிழ்த்துறை வெளியீடு - 2022

பார்வை நூல்கள்

1. தமிழ் இலக்கிய வரலாறு, முனைவர் சு.ஆனந்தன், கண்மணி பதிப்பகம், திருச்சி-620002
2. இதழியல் நுணுக்கங்கள், செண்பகா பதிப்பகம், 24/28, கிருஷ்ணா பதிப்பகம், சென்னை-600 017.

Course Outcomes

CO	Upon completion of the course, the students will be able to	PSOs Addressed	Cognitive Level
CO-1	Associate themselves to regulate life by means of the messages from old Tamils' politics, tradition and to increase belief in God besides knowing about natural resources.	1,2,3,5	Understanding
CO-2	Observe to grow characters related to discipline, high thoughts and to develop a good personality with confidence, further knowing about modern skills to develop creative skills.	1,5,3	Understanding
CO-3	Choose to create media persons, to enhance language skill, to inform historical news, and to know news related to valour and war.	1,2,4	Applying
CO-4	Explain concepts of justice and live with Nature and animals.	4,5,	Analyzing
CO-5	Summarize about arts and the mixing of other languages.	1	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
III	21ULTA31	பயன்பாட்டுத் தமிழ்	90	3

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓	✓	✓	✓	✓	✓		✓
CO-2	✓	✓		✓		✓		✓		✓
CO-3	✓	✓	✓			✓	✓		✓	
CO-4				✓	✓				✓	✓
CO-5	✓	✓				✓				
	Number of matches (✓) = 28 Relationship = Medium									

SEMESTER – III

Course Title	**MODERN PROSE**
Total Hrs.	**90**
Hrs./Week	**6**
Course Code	**21ULAR31**
Course Type	**Part – I - Arabic**
Credits	**3**
Marks	**100**

General Objective: To teach the history of the Prophet Muhammad (PBUH).

Course Objectives:

CO No	The learners will be able to:
1	Understand the life and history of the Prophet Muhammad (Pbuh).
2	Describe the process of the Prophethood of the Prophet Muhammad (Pbuh).
3	Explain the origins of the first Muslim convert followed by the opposition to the Prophet Muhammad (Pbuh).
4	Illustrate the incidents of Quraish indicted violence.
5	Summarise the migration of the Companions of the Prophet (Pbuh) to Ethiopia.

Unit I: page No. 27 to 38

عبد الله وآمنة – ولادته الكريمة ونسبه الزكي – رضاعته ﷺ – وفاة آمنة وعبد المطلب – مع عمه أبي طالب– التربية الإلهية – زواجه ﷺ من خديجة – قصة بنيان الكعبة ودرء فتنة عظيمة –

Unit II: 38 to 49

حلف الفضول – بعد البعثةو تباشير الصبح وطلائع السعادة – في غار الحراء –مبعثه ﷺ – في بيت خديجة– بين يدي ورقة بن نوفل – إسلام خديجة وأخلاقها – إسلام علي بن أبي طالب وزيد بن حارثة

Unit III: 50 to 62

إسلام أبي بكر بن أبي قحافة وفضله في الدعوة إلى الإسلام – إسلام أشراف من قريش – الدعوة جهارا على جبل الصفا – إظهار قومه العداوة له وحدب أبي طالب عليه – بين رسول الله ﷺ وأبي طالب – لو وضعوا الشمس في يميني والقمر في يساري – تعذيب قريش للمسلمين

Unit IV: **62 to 74**

محاربة قريش لرسول الله ﷺ وتفننهم في الإيذاء – ما فعل كفار قريش بأبي بكر؟! – احتيار قريش في وصف رسول الله ﷺ – قسوة قريش في إيداء رسول الله ﷺ ومبالغتهم في ذلك – إسلام حمزة بن عبد المطلب – ما دار بين عتبة وبين رسول الله ﷺ–

Unit V: **74 to 88**

هجرة المسلمين إلى الحبشة – تعقب قريش للمسلمين – تصوير جعفر بن أبي طالب للجاهلية وتعريفه بالإسلام – خيبة وفد قريش – إسلام عمر بن الخطاب

Textbook: Ali Nadawi, Abul Hasan, QasasunNabiyeen Part - V MuassasathusSahafa wa Nashr publication Lucknow, India,1999.

Reference Books:

1. Mohammed Mus'yid Hussain, *Qasas Al Anbiya Lil Atfaal,* 2010, Dar Al Kunooz, Jordan, 2010.

2. M.R.M. Abdur Raheem, NabimargalVaralaru, Universal Publishers, Chennai, 2015.

Course Outcomes

CO	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
1	Associate themselves with the art of writing simple sentences.	1,2	Understanding
2	Construct sentences in Arabic using common words flawlessly.	1,5	Applying
3	Interpret the history of the leader of Prophets in Islam.	1,2,3,4	Applying
4	Prioritize to live a life learned from the biography of the Prophet Muhammad (PBUH).	1,4,5	Analyzing
5	Summarize the style of classical prose.	1,2,3	Evaluating

Relationship Matrix

Semester	Course Code		Title of the Course			Hours				Credits
III	21ULAR31		MODERN PROSE			90				3
Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO2	PSO3	PSO4	PSO 5
1	✓	✓				✓	✓			
2	✓			✓	✓	✓				✓
3	✓	✓	✓	✓		✓	✓	✓	✓	
4	✓	✓		✓	✓	✓			✓	✓
5	✓	✓	✓			✓	✓	✓		
	Number of matches = 30 Relationship = Medium									

SEMESTER – III

Course Title	**ONE-ACT PLAYS AND WRITING SKILL**
Total Hrs.	**90**
Hrs./Week	**6**
Course Code	**21ULEN31**
Course Type	**Part – II - English**
Credits	**3**
Marks	**100**

General Objective:

To expose students the conversational patterns and help them learn written English in given practical situations.

Course Objectives:

CO	The learners will be able to:
CO-1	Identify and learn the conversational patterns in written communication.
CO-2	Distinguish the patterns of writing in formal and informal situations.
CO-3	Observe the conversational patterns in real-life situations.
CO-4	Examine various possible methods to learn the writing skill through the prescribed texts.
CO-5	Practise writing messages, essays, and reports.

UNIT I – ONE-ACT PLAYS

1. The Bishop's Candlesticks - Norman McKinnell
2. The Proposal - Anton Chekov
3. The Hour of Truth - Percival Wilde

UNIT II – ONE-ACT PLAYS

4. Aladdin and his Magic Lamp - Y. Sayed Mohammed
5. Tippu Sultan - Y. Sayed Mohammed

6. Evergreen Merchant of Venice - Y. Sayed Mohammed

UNIT III – WRITING SKILL

1. **Messages** (Pages 1-9 of *Written English for You* to be taught and the tasks given to be accomplished in the *Record of Writing*)

i) What is a message?

ii) When do we write messages?

iii) Why do we write messages?

iv) How do we write messages?

2. **Letters – 1** (Pages 10-19 *Written English for You* to be taught and the tasks given in pages 17 and 19 should be accomplished in the *Record of Writing*)

i) Letters for Ordering Supply of Goods

ii) Letters of Apology

iii) Letters of Complaint

iv Letters of Applications

3. **Letters – 2** (Pages 36-40 of *Written English for You* to be taught and the tasks given in the pages 38 and 40 should be accomplished in the *Record of Writing*)

i) Letters to inform your plan of visit

ii) Letters of Request

iii) Letters of Apology

UNIT IV – WRITING SKILL

4. **Essays** (Pages 66-79 to be taught and only the tasks 1-3 from pages 79 and 80 should be accomplished in the *Record of Writing*)

i) What is an Essay?

ii) Types of Essays.

iii) The Structure of an Essay.

iv) Introductory Paragraph.

v) Supporting Paragraph.

vi) What can be the length of an Essay?

vii) Why am I writing this Essay?

viii) Who am I writing for?

ix) How to begin an Essay?

x) How to organize an Essay?

xi) What to avoid in writing an Essay?

5. **Narrating** (Pages 109-116 of *Written English for You* to be taught only the tasks 1 and 2 from pages 115 to 116 to be accomplished in the *Record of Writing*)

i) Describing events in a chronological order.

ii) Narrating events from different points of view

iii) Narrating events from different view point in time

UNIT V – WRITING SKILL

6. **Reporting** (Pages 127-136 be taught. The tasks given in pages 129- 134 and 136-137 must be accomplished in the *Record of Writing*)

i) News Reports

ii) Reporting Events or Developments.

iii) Reporting Interviews and Press Conferences

iv) Reports of Meetings.

7. **Summarizing** (Pages 164-172 of *Written English for You* be taught and the tasks 1-3 in pages 172-178 to be accomplished in the *Record of Writing*)

i) What is a Summary?

ii) How to write a Summary?

iii) How long should a Summary be?

iv) Should the Summary be in a Paragraph?

v) Analysis of the Process of Summarizing.

NOTE: Questions for Units III, IV and V should be framed from the tasks given in the prescribed textbook ***Written English for You.***

Textbooks:

1. Compiled by a Board of Editors. *Plays for Pleasure*, Chennai: Paavai Publications, 2009
2. Sayed Mohammed.Y, ed. *Three One - Act Plays*. Tirunelveli. Mohammed Taahaa Publications, 2011.
3. Radhakrishna Pillai. G, ed. *Written English for You* Chennai. Emerald Publishers, 1990 (rpt. 2008)

Course Outcomes:

CO	Upon completion of this course, students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Understand the nuances of English conversational patterns.	1,3,4,6	Understanding
CO-2	Explain the patterns required for conversing in formal and informal situations.	1,3,4,6	Applying
CO-3	Choose to write English sentences by means of applying their skills learned.	1,2,3	Applying
CO-4	Focus on language activities to master the writing skill.	3	Analysing
CO-5	Summarize the uses and methods of writing messages, essays, reports and pamphlets.	1,3,4	Evaluating

Relationship Matrix

Semester	Course Code			Title of the Course				Hours				Credits
III	21ULEN31			One-Act Plays and Writing Skill				90				3
Course Outcomes (COS)	Programme Learning Outcomes (PLOs)						Programme Specific Outcomes (PSOs)					
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO-1	✓	✓	✓				✓		✓	✓		✓
CO-2		✓	✓	✓			✓		✓	✓		✓
CO-3		✓	✓				✓	✓	✓			✓
CO-4		✓	✓	✓			✓		✓	✓	✓	✓
CO-5		✓	✓	✓			✓		✓	✓		✓
CO-6												
	Number of matches (✓) = 35 Relationship = High											

SEMESTER – III

Course Title	**CELL AND MOLECULAR BIOLOGY**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UCZO31**
Course Type	**DSC-V**
Credits	**4**
Marks	**100**

General Objectives:

To gain knowledge of the structure as well as functions of cell, cellular components and its cytological techniques.

Course Objectives:

CO Bo.	The learners will be able to:
CO-1	Define the basic concept of cell
CO-2	Discuss the integrated activity of the animal cell.
CO-3	Interpret the microscopic techniques with various animal cells
CO-4	Distinguish between chromosome and special variant of chromosome
CO-5	Evaluate the ultra structure and functions of various cell organelles

UNIT I - Introduction

Cell biology–Introduction – History and scope - cell types - prokaryotes and eukaryotes.Microscopy - detailed study of compound, phase contrast and electron microscopes – Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM)

UNIT II – Cell organelles

Ultra structure, chemical composition and functions of cell organelles: a) Plasma membrane b) Mitochondria c) Golgi apparatus d) Endoplasmic reticulum e) Ribosomes f) Lysosomes g) Centriole h) Nucleus i) Nucleolus.

UNIT III – Cell Division

Ultra structure, chemical composition and functions of Chromosomes-types -Euchromatin, heterochromatin, Sat chromosomes, Karyotype, chromosomal banding- Special type of chromosomes (Polytene and lampbrush). Cell Division and Cell cycle - Amitosis, Mitosis, Meiosis and their significance. Apoptosis.

UNIT IV - Molecular Biology and Cancer Biology

DNA - types, structure, replication - DNA as the genetic material.

RNA- types,structure and transcription

Cancer cells – Carcinogenesis – definition, types,causes,properties, theories, diagnosis and treatment – Oncogenes.

UNIT V – Genetic Code and Protein Synthesis

Mechanism of protein synthesis. Genetic code – codons and anticodons - Regulation of gene expression in prokaryotes and eukaryotes, lac-operon concept.

TEXT BOOK :

Verma.P.S and Agarwal V K.2010. Molecular Biology, S.Chand&Co.Limited, 7361, Ram Nagar,QutubRoad,New Delhi – 110 055

REFERENCE BOOKS :

1. **Lodish** *et al.,*2007. Molecular Biology, 6th edition, W.H.Freeman and Company, Newyork.
2. Agarwal, V. K. Cell Biology, S. Chand & Co. Limited, 7361, Ram Nagar, Qutub Road, New Delhi – 110 055.
3. Arora, M.P. and Humanshu Arora.2017. Molecular Biology. HimalayaPublishingHouse,Ramdoot,Dr. BhaleroMarg, Giraon, Mumbai 400 004.
4. Anand Kumar and Shailendra Singh Shera. 2020. Basic concepts of Molecular Biology, VikasPublishingHouse Private Ltd. 576, Maszid Road,Jangpura, New Delhi – 100 014.
5. Powar, C.B., 2010. Cell Biology, Himalaya Publishing House, Mumbai.
6. Gupta, M.L. and Jangir, M.L., 2012. Cell Biology. Student Edition, Jodhpur.
7. Rastogi, 2005. Cell Biology, Wiley Eastern Limited, New Delhi.
8. Gerald Karp. 2013. Cell Biology. Wiley Eastern Limited, New Delhi.

Course Outcomes

CO	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Enumerate the importance of cell and cellular components	1,2,4,5	Remembering
CO-2	Relate the properties, structure and functions of cell organelles	1,2,5	Understanding
CO-3	Explain the process of cell cycle	1,3,5	Applying
CO-4	Distinguish between the structure of DNA and RNA.	1,2,3,5	Analysing
CO-5	Evaluate the mechanism of protein synthesis	1,2.3,5	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
III	21UCZO31	Cell & Molecular Biology	60	4

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO2	PLO 3	PLO 4	PLO 5	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓		✓	✓	✓		✓	✓
CO-2	✓	✓	✓	✓		✓	✓			✓
CO-3	✓	✓	✓		✓	✓		✓		✓
CO-4	✓	✓	✓	✓		✓	✓	✓		✓
CO-5	✓	✓	✓			✓	✓	✓		✓
	Number of matches (✓) = 37 Relationship = High									

SEMESTER – III

Course Title	**CELL & MOLECULAR BIOLOGY PRACTICALS**
Total Hrs.	**30**
Hrs./Week	**2**
Course Code	**21UCZO3P1**
Course Type	**Practical-III**
Credits	**1**
Marks	**100/2**

General Objectives:

To gain knowledge of the structural and functional details of cell, cell organelles and understand the cytological techniques using scientific methods.

Course Objectives:

CO	The learners will be able to:
CO-1	Examine the giant chromosomes in animals.
CO-2	Identify the different stages of mitosis in plants.
CO-3	Understand the cytological techniques of various cellular components.
CO-4	Interpret the RBC and WBC in human beings.
CO-5	Test the different stages of meiosis in grasshopper.

CELL & MOLECULAR BIOLOGY PRACTICALS

1. Onion root tip squash:Observation of different stages of mitosis.
2. Chironomous larva:Mounting of Polytene chromosomes.
3. Male Grasshopper:Observation of different stages of meiosis.
4. Preparation of the following:

a) Human Squamous epithelium
b) Human blood smear

5. Models & charts:
   a) DNA
   b) tRNA
   c) Ribosome
   d) Protein synthesis
   e) Mitochondria
   f) Golgi apparatus
   g) Nucleus
   h) Endoplasmic reticulum
   i) Lysosomes
   j) Microtome.
   k) Frog Blood Smear
   l) Cell cycle
   m) Histology of cancer cells (sarcoma and carcinoma)

Course Outcomes

CO	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Identify the varied cell organelles	1,2,3	Remembering
CO-2	Observe the various stages of mitosis and meiosis	2,4,5	Understanding
CO-3	Examine the blood cells in human beings	1,2,3,5	Applying
CO-4	Dissect the giant chromosomes of chronomous larva	1,2,3,4	Analysing
CO-5	Create models of a range of cell organelles	2,3,4	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
III	21UCZO3P1	CELL & MOLECULAR BIOLOGY PRACTICALS	30	1

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO2	PLO 3	PLO 4	PLO 5	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓			✓	✓	✓		
CO-2	✓	✓	✓				✓		✓	✓
CO-3	✓	✓	✓			✓	✓	✓		✓
CO-4	✓	✓	✓			✓	✓	✓	✓	
CO-5	✓	✓	✓				✓	✓	✓	
	Number of matches (✓) = 32 Relationship = Medium									

SEMESTER III

Course Title	**PLANT DIVERSITY & PHYTOPATHOLOGY**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UABT31**
Course Type	**Allied-II/1**
Credits	**3**
Marks	**100**

General Objective:

To edutain students on plant-biodiversity for higher academic pursuits, especially in the field of Biological Sciences, environment and conservation.

Course Objectives:

CO. No.	The learners will be able to:
CO-1	Understand the origin and evolution of life with reference to lower plants ranging from various groups such as algae and fungi and their economic importance.
CO-2	Develop knowledge of theplant groups such as lichens, bryophytes and their economic importance and to enable students understand the relevance of environment and human well-being.
CO-3	Explain the structure and their economic importance of pteridophytes and gymnosperms.
CO-4	Identifynomenclature and classify the plants by determiningthe morphology, its salient features and the economic importance of angiosperms.
CO-5	Examine the concepts and principles of phytopathology.

UNIT I - Algae & Fungi

Algae – General characteristics;Economic importance; Morphology, Structure, Reproduction & life cycle in *Sargassum.* Fungi - General characters;Economic importance; Morphology, Structure, Reproduction & life cycle in *Puccinia*.

UNIT II – Lichens and Bryophytes

Lichens- General characteristics;Economic importance; Types – Crustose, Foliose, Fruiticose. Bryophytes- General characters; Economic importance; Morphology, Structure,Reproduction& life history in *Marchantia*.

UNIT III – Pteridophytes & Gymnosperms

Pteridophytes- General characteristics;Economic importance; Morphology, Structure, Reproduction & life cycle in *Lycopodium* and

Adiantum. Gymnosperms – General characteristics;Economic importance; Morphology, Structure, Reproduction & life cycle in Pinus.

UNIT IV – Plant Taxonomy

Brief account on Classification: Natural – Bentham & Hooker. Morphology and reproductive characters of flowering plants (Pyllotaxy and inflorescence). Study of the following families – Fabaceae, Asteraceae, Solanaceae and Poaceae.

UNIT V – Phytopathology

Terms and concepts; pertaining to phytopathology; Disease cycle and environmental relation; prevention and control of plant diseases. Fungal diseases – Early blight of potato, White rust of crucifers. Bacterial diseases – Citrus canker and angular leaf spot of cotton. Viral diseases – Tobacco Mosaic viruses.

TEXT BOOKS:

1. Pandey B.P. 2001. College Botany Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta.S. Chand & Company Ltd, New Delhi.
2. Pandey.B.P.1997 – Taxonomy of Angiosperms – S.Chand& Co., New Delhi
3. Vashishta, B.R. 2008. Botany for Degree Students – Vol I Algae.
4. Sethi, I.K. and Walia, S.K. 2011. Text Book of Fungi and Their Allies, Macmillan Publishers Pvt.Ltd. Delhi.
5. Sharma, P.D. (2011). Plant Pathology, Rastogi Publication, Meerut, India.
6. Vashistha, P.C., Sinha, A.K., Kumar, A. (2010). Pteridophyta. S. Chand. Delhi, India.

REFERENCE BOOKS:

1. Parihar. N. S.2001. Bryophyta - Central Book Depot Publications in Botany, Allahabad
2. Vashista. B R .1997, The Algae, S .Chand& Co. Ltd... New Delhi
3. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology. 4thedition.John Wiley & Sons (Asia) Singapore.
4. Webster, J. and Weber, R. (2007). Introduction to Fungi. 3rd edition. Cambridge University Press, Cambridge.
5. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi and Their Allies, Macmillan Publishers India Ltd.
6. Bhatnagar, S.P. and Moitra, A. (1996). Gymnosperms. New Age International Publishers, New Delhi, India.
7. R.S. Mehrotra. (2003). Plant Pathology. Tata McGraw-Hill Education, New Delhi.

Course Outcomes:

CO	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Observe the knowledge of microbial diversity and describe the characters, structure and life history of some common algae,fungi and their economic importance.	1,2,3	Remembering/ Understanding
CO-2	Determine the general features and life cycle patterns of lichens and bryophytes.	1,2,4	Applying
CO-3	Explain the characters, structure and life history of some common Pteridophytes and Gymnosperms and their economic importance	1,2	Analyzing
CO-4	Summarize taxonomy and the basic principles of environment.	1,2,5	Evaluating
CO-5	Collaborate with farmers to advise them on various plant diseases.	1,2,3,4,5	Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
III	21UABT31	PLANT DIVERSITY & PHYTOPATHOLOGY	60	3

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	✓	✓	✓	-	✓	✓	✓	✓	-	-
CO-2	✓	✓	-	✓	✓	✓	✓		✓	-
CO-3	✓	✓	-	-	-	✓	✓	-	-	-
CO-4	✓	✓	-	-	✓	✓	✓	-	-	✓
CO-5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Number of matches (✓) = 34 Relationship = **High**									

SEMESTER III

Course Title	**PLANT DIVERSITY AND PHYTOPATHOLOGY PRACTICALS**
Total Hrs.	**30**
Hrs./Week	**2**
Course Code	**21UABT3P1**
Course Type	**Allied Practical-II/1**
Credits	**1**
Marks	**100/2**

General Objective:

To study about the various groups of non-flowering plants in developing skill to identify from the flowering plants to species level.

Course Objectives:

CO	The learners will be able to:
CO-1	Observe and understand the internal organization of plant body such as primary, secondary and anomalous, anatomical structure of stem and root.
CO-2	Identify and describe the specimens belonging to higher cryptogams.
CO-3	Categorize the sections of plant materials of anatomical and morphological interest for identification.
CO-4	Summarize the features of plant taxonomy.
CO-5	Distinguish the plant diseases and casual organisms.

DIVERSITY OF PLANT LIFE& PHYTOPATHOLOGY

1. Micropreparation& Identification of the following:
   Sargassum – Thallus.
   Marchantia - Thallus.
2. Observation and Identification of Permanent slide –
   Sargassum – Male and female conceptacles.
   Marchantia sporophyte.
   Puccinia – Permanent Slide.
3. Micropreparation& Identification of Lycopodium and Adiantum Stem &Pinus needle.
4. Study of vegetative and floral characters of the following families prescribed in the theory syllabus (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification):

5. Identification of plant diseases prescribed in the syllabus – Specimen/Photograph.
6. Field trip for specimen collection.

REFERENCE BOOKS:

1. Gunasekaran, P., 1996. Lab Manual in Microbiology. New Age International (P), Ltd., Publishers, New Delhi.
2. Parihar, N.S. 19985, The Biology and Morphology of Pteridophytes, Central Book Department, Allahabad.
3. Sporne, K.R. 1971, The Morphology of Gymnosperms, Hutchinson University library London.
4. Pandey, B.P. 2010. Modern Practical Volume – 1. S.Chand& company Ltd. New Delhi.
5. Santra. S.C, Chatterjee, T.P and Das, A.P. 2001. College botany practical – Vol. II. NewCentral Book Agency (p) Ltd. India.

Course Outcomes

CO	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Discuss the structure and reproduction of select algae, fungi and bryophytes.	1,2	Understanding
CO-2	Examine the structures of morphology and the internal structures of the select species of pteridophyte and gymnosperms.	1,2,4	Applying
CO-3	Analyze the importance of plant diversity.	1,2	Analyzing
CO-4	Distinguish various angiosperm plant habits by comprehending the concepts of plant taxonomy and classification of angiosperms.	1,4	Evaluating
CO-5	Assess the bacterial and fungal disease of crop plants.	1,2,5	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
III	21UABT3P1	PLANT DIVERSITY AND PHYTOPATHOLOGY PRACTICALS	30	1

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO2	PLO 3	PLO 4	PLO 5	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	-	-	-	✓	✓	-	-	-
CO-2	✓	✓	-	✓	✓	✓	✓	-	✓	-
CO-3	✓	✓	✓	-	✓	✓	✓	✓	-	-
CO-4	✓	-	-	✓	✓	✓	-	-	✓	-
CO-5	✓	✓	-	-	✓	✓	✓	-	-	✓
	Number of matches (✓) = 29 Relationship = Medium									

SEMESTER III

Course Title	**NURSERY AND GARDENING**
Total Hrs.	**30**
Hrs./Week	**2**
Course Code	**21USBT31**
Course Type	**SEC-I**
Credits	**2**
Marks	100

General Objective:

To gain knowledge of gardening, cultivation, multiplication and raising seedlings of ornamental plants.

Course Objectives:

CO	The learners will be able to:
CO-1	Understand the methods to prepare nursery plants.
CO-2	Develop themselves to do vegetative propagation.
CO-3	Plan to know about landscaping design.
CO-4	Predict the design and components of parks and to develop the knowledge about the soil condition for seedling, manuring and harvesting.
CO-5	Recommend the storage of seeds and know about the methods of marketing.

UNIT I

Nursery: definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants.

UNIT II

Vegetative propagation: Air layering, cutting, grafting, budding. Hardening of plants - green house, shade house and glass house.

UNIT III

Gardening: definition, objectives and scope - different types of gardening - landscape and home gardening

UNIT IV

Parks and its components - plant materials and design - soil laying, manuring, watering, management of pests and diseases and harvesting.

UNIT V

Sowing/raising of seeds and seedlings - Transplanting of seedlings - Study of cultivation of different vegetables: cabbage, brinjal, onion. Storage and marketing procedures.

TEXT BOOK :

1. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil

REFERENCE BOOKS :

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
3. Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.
4. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and Cooperation, National Seed Corporation Ltd., New Delhi.
5. Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA.

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Explain how nursery of the plants is prepared.	1,3,4	Understanding
CO-2	Determine the various resources required for the development of vegetative propagation.	1,3,4,5	Applying
CO-3	Develop knowledge to distinguish among the different forms of sowing and growing of plants.	2,3,4	Analyzing
CO-4	Summarize the process of vegetative propagation by appreciating the diversity of plants and the selection of gardening.	2,3,4	Evaluating
CO-5	Choose the methods of cultivation of different vegetables and growth of plants in nursery and gardening.	2,3,4,5	Evaluating

Relationship Matrix

Semester	Course Code		Title of the Course		Hours		Credits		
III	21USBT31		NURSERY AND GARDENING		30		2		
Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO2	PLO 3	PLO 4	PLO 5	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓	✓	✓	✓	-	✓	✓	-
CO-2	✓	✓	✓	✓	✓	✓	-	✓	✓	✓
CO-3	-	✓	✓	✓	✓	-	✓	✓	✓	-
CO-4	-	✓	✓	✓	✓	-	✓	✓	✓	-
CO-5	-	✓	✓	✓	✓	-	✓	✓	✓	✓
	Number of matches (✓) = 39 Relationship = **High**									

SEMESTER- III

Course Title	**SWAYAM-NPTEL Online Certification Course**
Total Hrs.	**30**
Hrs./Week	**2**
Course Code	**21USOC32**
Course Type	**SEC-II**
Credits	**2**
Marks	**100**

SWAYAM NPTEL ONLINE CERTIFICATION COURSES

GUIDELINES AND INSTRUCTIONS

1. National Programme on Technology Enhanced Learning (NPTEL) provides e-learning through online web and video courses in Engineering, Science and Humanities streams through its portal https://swayam.gov.in/ncdetails/NPTEL.
2. Enrollment to all the courses is FREE.
3. Enrollment to courses and Examination Registration can be done ONLINE only. The link is available on NPTEL Website http://nptel.ac.in/
4. SWAYAM – NPTEL Online Certification Courses are made optional for the students in the UG Programmes from the Academic year 2021-2022.
5. Any Eight – Week, Two-Credit Course in any discipline be chosen by the respective Departments in the Third Semester of the Undergraduate Programmes.
6. The SWAYAM–NPTEL Online Certification Courses offered during the December – April Semester be chosen by the Departments. The courses may be handled by the Department Mentor or by any teacher in the respective Departments.
7. Candidates must have completed Examination Registration and submitted assignments successfully within the prescribed time to receive hall tickets and to write examinations.
8. The allocation of marks for the online examination conducted by the respective IITs is 25:75 for each course.

9. A candidate should obtain a minimum of 40 marks on 100 marks (a minimum of 10 marks for Assignment and 30 marks in the final examination) to pass the Online Courses.
10. If a student fails in the Online Examination conducted by the respective IITs he/she would be permitted to write a Supplementary Examination for 75 marks by the Controller of Examinations of our College.
11. Those who registered for the Online Courses, obtained Assignment marks, appeared for the Online Examination and failed in the courses alone are eligible to apply for the Supplementary Examinations conducted by the College.
12. If a candidate fails in the Supplemenary Examinations or does not appear for the Supplemenary Examinations conducted by the College, the norms followed for taking an Arrear Examination will be adopted.
13. Course Completion Certificate will not be issued by the respective IITs for the candidates who clear the Online Courses through the Supplementary Examinations conducted by the College. The two credits the candidate earns, if passed in the Supplemenary Examinations would be added in the Consolidated Statement of Marks issued by the Controller of Examinations.

SEMESTER III

Course Title	**PUBLIC HEALTH**
Total Hrs.	**30**
Hrs./Week	**2**
Course Code	**21USAN32**
Course Type	**SEC-II**
Credits	**2**
Marks	**100**

General Objective:

This course covers the importance of public health and preventive medicine

Course Objectives:

CO.	The learners will be able to:
CO-1	Understand the concept of public health
CO-2	To gain Knowledge about preventive medicine
CO-3	Identify the current health situation in India
CO-4	Evaluate the concept of prevention
CO-5	Develop innovative Nutritional programmes

UNIT I

Hygiene- Definition and personal hygiene. Public health- Scope and importance and Future Projects.

UNIT II

Nutritional Problems

a. Protein Energy Malnutrition- Prevalence, Causes of PEM

b. Micronutrient Deficiencies-Iodine Deficiency Disease(IDD), Iron Deficiency Anaemia

UNIT III

Nutritional monitoring and surveillances

a. Nutritional assessment- Definition, types
b. Nutritional education- Definition and methods- steps in planning, evaluation and implementation

UNIT IV

Agencies related to combat Nutrition

a. National agencies- NIN, ICMR, CFTRI
b. International agencies- FAO,WHO, UNICEF

UNIT V

a. National Programme: Vitamin A Prophylaxis Programme, National Anemia control Programme, National Leprosy control Programme
b. School lunch Programme: Mid-day meal Programme, ICDS, Supplementary feeding Programme.

TEXT BOOK :

B. Srilakshmi, Nutrition Science, 6th Edition, 2018,New age International (P) limited publishers.

REFERENCE BOOKS :

1. Park's text book of Preventive and Social Medicine, 2009. 20th edition.
2. Suryatapa Das 2016, Text Book of Community Nutrition, Second Edition, Academic Publications, Kolkatta, ISBN :978-83420-69-8
3. LaithaIshwarn Punnya 2017, Health Education and Sports Nutrition, Khel Shahiya Kendra Publications, New Delhi, ISBN : 978-81-7524-889-2
4. The Educational Planning Group 2007, Food and Nutrition for Nurses, Arya Publishing Group New Delhi, ISBN:81-7064-070-9

Course Outcomes

CO.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive level
CO-1	Summarizing the scope and importance of Public Health	1,2,3,5	Understanding
CO-2	Manipulating the Common Nutritional problems	3,4,5	Applying
CO-3	Monitoring the Nutritional Assessment	1,4,5	Analyzing
CO-4	Evaluate the importance of National and International Agencies	1,3,4,5	Evaluating
CO-5	Organise camps to prevent the public health problems in the society	1,5	Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
III	21USAN32	PUBLIC HEALTH	2	2

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓	✓		✓	✓	✓		✓
CO-2	✓	✓	✓	✓				✓	✓	✓
CO-3	✓	✓	✓	✓		✓			✓	✓
CO-4	✓	✓	✓	✓		✓		✓	✓	✓
CO-5	✓	✓	✓	✓		✓				✓
	Number of matches (✓) = 36 Relationship = **High**									

SEMESTER III

Course Title	**ECONOMIC BOTANY**
Total Hrs.	**30**
Hrs./Week	**2**
Course Code	**21UNBT31**
Course Type	**NME-I**
Credits	**2**
Marks	**100**

General Objectives:

To teach students about economic botany, its principles, comprehensive knowledge of usefulness of plant resources, practices and how plants and societies are related.

Course Objectives:

Co.	The learners will be able to:
CO-1	Understand the economic importance of food plants, their life cycle, processing, plant part used for the production of plant resources and production of new varieties.
CO-2	Give examples of plants used as fiber resources.
CO-3	Explain various plant resources concerning timber.
CO-4	Discover the specific roles of plant as beverage and address the emerging environmental issues.
CO-5	Compile the knowledge of plants' usefulness as a spice andcondiments for human welfare.

A Study on the following with references to their botanical name, morphology of useful part, family and economic importance.

UNIT I

Plant resources as food: Cereals; Origin, Morphology & uses– Rice, Wheat; Millets – Ragi; General account with special reference to Gram. Vegetables –lady'; Fruits – Mango, Banana.

UNIT II

Plant resources as fibers – Classification – Surface fibers –Cotton, Coir; Soft fibers – Jute, Aloe, banana.

UNIT III

Plant resources as timbers – Wood Classification, properties (Mechanical, Physical)– Teak, Pine; Gums – Gum Arabic; Resin – Oleoresin.

UNIT IV

Plant resources as beverages – Coffee, Tea – (morphology, processing, uses).

UNIT V

Plant resources as Spices and Condiments – General account with special reference to (Botanical name, family, part used, morphology and uses) Seed – Cardamom; Bark – Cinnamon; Fruit – Coriander, Leaves – Mint, Flower – Clove, Rhizome – Zinger, Root – *Withania*.

TEXT BOOKS :

1. Pandey, B.P. 1997. Economic Botany–S. Chand & company Ltd.New Delhi.
2. Verma, V. 198.Economic Botany – Emkay publication, New Delhi.

REFERENCE BOOKS :

1. Kochhar, S.L. (2012). Economic Botany in Tropics. New Delhi, India: MacMillan & Co.
2. Wickens, G.E. (2001). Economic Botany: Principles & Practices.The Netherlands: Kluwer Academic Publishers.
3. Chrispeels, M.J. and Sadava, D.E. (1994) Plants, Genes and Agriculture.Jones & Bartlett - Publishers.

Course Outcomes

CO	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Understand the core concepts of Economic Botany and relate with food plants,environment, populations, communities, and ecosystems.	1,2,3,4	Understanding
CO-2	Develop the knowledge of plant resource as fibre.	1,2,3,4	Applying
CO-3	Distinguish and demonstrate the botanical name,family, and morphology of specific plant resources as timbers.	1,2,3,4	Analyzing
CO-4	Analyze the cultivation practice of beverages.	1,2,3,4	Analyzing
CO-5	Assess the opportunity in plant resource as spices and condiments.	1,2,3,4,5	Evaluating

Relationship Matrix

Semester	Course Code		Title of the Course			Hours				Credits
III	21UNBT31		ECONOMIC BOTANY			30				2
Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO2	PLO 3	PLO 4	PLO 5	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
CO-2	✓	✓	✓	✓	-	✓	✓	✓	✓	-
CO-3	✓	✓	✓	✓	-	✓	✓	✓	✓	-
CO-4	✓	✓	✓	✓	-	✓	✓	✓	✓	-
CO-5	✓	✓	-	✓	✓	✓	✓	✓	✓	✓
	Number of matches (✓) = 42 Relationship = **High**									

SEMESTER – IV

Course Title	**சங்கத்தமிழ் (Sangam Tamil)**
Total Hrs.	**90**
Hrs./Week	**6**
Course Code	**21ULTA41**
Course Type	**Part – I - Tamil**
Credits	**3**
Marks	**100**

Course Objectives:

CO	The learners will be able to:
CO-1	Distinguish Sangam Tamil from other literature and language.
CO-2	Give examples about love, valour and charity in Tamil tradition.
CO-3	Determine to follow life protocols through literature.
CO-4	Focus on improving their self confidence.
CO-5	Choose to instruct about modern skills like computer.

அலகு – 1 சங்கச் செய்யுள்கள்

1. நற்றிணை - நின்ற சொல்லர், நீடு தோன்று இனியர் (1:1-9)
   அம்ம வாழி தோழி நன்னுதற்கு (388:1-10)
2. குறுந்தொகை - ஆம்பற்பூவின் சாம்பலன்ன (46: 1-7)
   - வேரல் வேலி வேர் கோட்பலவின் (18:1-5)
3. புறநானூறு - ஈன்று புறந்தருதல் எந்தலைக் கடனே (312: 1-6)
   நின் நயந்து உறைநர்க்கும் நீநயத்து உரை நற்கும் (163: 1-9)
4. ஐங்குறுநூறு - களவன் பத்து – முள்ளிவேர்
   அளைக் களவன் ஆட்டி (23: 1-4)
   புலவிப் பத்து – அம்சில் ஓதி அசிநடைப் பாண்மகள் (49: 1-4)
5. கலித்தொகை - வறியவன் இளமைபோல், வாடிய சினையவாய்ச் (10:1-23)
6. அகநானூறு - நாம் நகையுடையம் நெஞ்சே! – கருந்தேறல் (121:1-15)
7. பதிற்றுப்பத்து - இழையர் குழையர் நறுந்தண்மாலையர் (46:1-14)
8. பரிபாடல் - வைகையில் பெரு வெள்ளம்-நிறை கடல் முகந்து உராய் (1-24)
9. முல்லைப்பாட்டு - முழுவதும்

அலகு – 2

சுயமுன்னேற்றக் கட்டுரைகள்

அலகு – 3

இணையப் பயன்பாட்டில் தமிழ்

அலகு – 4

இலக்கிய வரலாறு – சங்க இலக்கியம் ஓர் அறிமுகம் - திணைக்கோட்பாடு – எட்டுத்தொகை நூல்கள் - நற்றிணை, குறுந்தொகை, ஐங்குறுநூறு, பதிற்றுப்பத்து, பரிபாடல், கலித்தொகை, அகநானூறு, புறநானூறு – பத்துப்பாட்டு நூல்கள் - திருமுருகாற்றுப்படை, பொருநராற்றுப்படை, சிறுபாணாற்றுப்படை,

பெரும்பாணாற்றுப்படை, நெடுநல்வாடை, குறிஞ்சிப்பாட்டு, முல்லைப்பாட்டு, மதுரைக்காஞ்சி, பட்டினப்பாலை, மலைப்படுகடாம்

அலகு – 5

தமிழர் வாழ்வில் அகமும் புறமும் திணைக்கோட்பாடு

பாடநூல்: சங்கத் தமிழ், சதக்கத்துல்லாஹ் அப்பா கல்லூரி தமிழ்த்துறை வெளியீடு.
பார்வைநூல் : தமிழ் இலக்கிய வரலாறு, சாகித்ய அகாதெமி வெளியீடு.

Course Outcomes

CO	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Associate themselves to learn about disciplines related to internal and external lives besides knowing about the growth of Tamil by the establishment of Sangam.	1,4,5	Understanding
CO-2	Develop their knowledge about the regulated life, charity, administration and habits of Sangam Tamils.	1,4,5	Applying
CO-3	Classify kings and lords in line with the historical information.	1,2,3,4	Analyzing
CO-4	Differenitate the honest life, high thoughts, barter system and modern skills of the courtesans.	4, 5	Analyzing
CO-5	Summarize about water, air and land resources.	5	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
IV	21ULTA41	சங்கத்தமிழ்	90	3

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓	✓	✓	✓			✓	✓
CO-2	✓	✓	✓	✓	✓	✓			✓	✓
CO-3	✓	✓	✓	✓		✓		✓	✓	✓
CO-4	✓	✓		✓					✓	✓
CO-5	✓				✓					✓
	Number of matches (✓) = 32 Relationship = High									

SEMESTER – IV

Course Title	CLASSICAL PROSE
Total Hrs.	90
Hrs./Week	6
Course Code	21ULAR41
Course Type	Part –I - Arabic
Credits	3
Marks	100

General Objective: To impart moral values to students and build their personality to make them better citizens.

Course Objectives:

CO	The learners will be able to:
1	Observe the etiquettes to be followed with the Prophet (PBUH) discussed in Surah Al-Hujuraath.
2	Associate themselves with the good characters in day today life.
3	Illustrate the life histories of Imams of the Quran, Hadeeth and Islamic jurisprudence.
4	Examine the style of Classical Arabic i.e. the language of the Quran and Hadeeth.
5	Explain the moral values mentioned in Hadeeth.

Unit I: Verses from 1 to 12 from (Sura – al – Hujraat)

" من الآية "يا أيها الذين آمنوا لا تقدموا" إلى الآية"يا أيها الذين آمنوا اجتنبوا

Unit II: Verses from 10 to 18 from (Sura–al–Hujraat) & verses from Surah Luqman (12 to 19)

"من الآية "يا أيها الناس إنا خلقناكم" إلى الآية "إن الله يعلم غيب السموات

"من الآية "ولقد آتينا لقمان الحكمة " إلى الآية "واقصد في مشيك

Unit III: Collection and compilation of Quran and Hadeeth, History of Ibn Abbas (Ral), Imam Ibn-Khathir, History of Imam Abu Hanifa, Ash-shafi, History of Imam Bukhari, Muslim, Abu Dawood, At-Tirmidi, An-Nasaee and Ibn-Majah

Unit IV: Hadeeth 1 to 10

"من الحديث " لا تأكلوا بالشمال" – إلى الحديث " خيركم من تعلم القرآن

Unit V:- Hadeeth 11 to 20

"من الحديث " لا تمنعوا نسائكم "– إلى الحديث"حق المسلم على المسلم خمس

TEXT BOOK

1. A study material on "Tafseer Surah Al Hujuraath and from Suraah Luqman and Biographies of selected Islamic Scholars" prepared by Dr. J. Ubaiyathulla and Dr. S.A. Mohamed Rafeek.
2. Shaykh Dr. V. Abdur-Raheem, Ahadeeth Sahlah, Islaamic Foundation Trust, 1994

Course Outcomes

CO	Upon completion of the course, the students will be able to	PSOs Addressed	Cognitive Level
1	Understand the core essence of the Qur'anic verses.	1,2	Understanding
2	Develop refined manners based on the clear understanding of the values as preached in the Holy Qur'an.	1,2,4	Applying
3	Analyze the life history of the eminent scholars and their remarkable contributions to the Quran and Hadeeth literature.	1,2,3	Analyzing
4	Evaluate the immaculate virtues and inspiring value systems of the Prophet.	1,2,3,4	Evaluating
5	Select a healthy environment to practise abiding by the teachings of the Prophet (PBUH).	1,2,3,5	Evaluating

Relationship Matrix

Semester	Course Code		Title of the Course			Hours			Credits	
IV	21ULAR41		CLASSICAL PROSE			90			3	
Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
1	✓	✓				✓	✓			
2	✓	✓		✓		✓	✓		✓	
3	✓	✓	✓			✓	✓	✓		
4	✓	✓	✓	✓		✓	✓	✓	✓	
5	✓	✓	✓	✓	✓	✓	✓	✓		✓
	Number of matches = 33 Relationship = Medium									

SEMESTER – IV

Course Title	**A PRACTICAL COURSE IN SPOKEN ENGLISH**
Total Hrs.	**90**
Hrs./Week	**6**
Course Code	**21ULEN41**
Course Type	**Part – II - English**
Credits	**3**
Marks	**100**

General Objective:

To introduce students to the interactive expressions and pronunciation practice to help themselves become competent in spoken mode of communication.

Course Objectives:

CO	The learners will be able to:
CO-1	Associate themselves with the interactional and transactional modes of language.
CO-2	Classify words based on the register and usage to use them contextually.
CO-3	Distinguish sound patterns in English phonetically.
CO-4	Illustrate sound patterns in English with relevant examples.
CO-5	Practise to master competency in description, narration, argumentation and continuous speech.

UNIT I

Interactive Expressions and Pronunciation Practice: Consonants (Chapters 1 - 3 of *A Course in Spoken English*)

UNIT II

Introducing oneself / others, patterns for greeting, requesting, expressing and responding to thanks and etc., & Pronunciation Practice: Vowels (Chapters 4 – 8 of *A Course in Spoken English*)

UNIT III

Developing descriptive competency, narrative competency, arguing competency, compering competency and Pronunciation Practice: Diphthongs (Chapters 9 – 13 of *A Course in Spoken English*)

UNIT IV

Practising continuous speech, group discussion and pronunciation practice: Word Accent and Intonation (Chapters 14 – 19 of *A Course in Spoken English*)

UNIT V

Listening Practice : Students will listen to audio and video materials for 10 – 12 hours.

Textbooks, Workbook, Record Note:

1. Nihamathullah. A. et al. *A Course in Spoken English,* Tirunelveli: MSU, 2005. (rpt. 2010).
2. Board of Editors, Department of English, Sadakathullah Appa College, *A Workbook for A Course in Spoken English,* 2011.
3. Spoken English Practical Record.

Evaluation Scheme:

I Internal Oral Test	: 15 Marks	The best two of the three CIA test marks will be added up
II Internal Oral Test	: 15 Marks	
III Internal Oral Test	: 15 Marks	

Distribution of Marks

The best two of the three CIA test marks	:	30 Marks
Loud Reading	:	05 Marks
Listening Test	:	05 Marks
Internal Marks	:	**40 Marks**
External Oral Test	:	50 Marks
Record Note	:	05 Marks
Workbook	:	05 Marks
External Marks	:	**60 Marks**

Course Outcomes

CO	Upon completion of this course, students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Understand and describe the nuances of language used in general communication.	1,2,4	Understanding
CO-2	Give examples of words with different register suiting the context.	1,2	Understanding
CO-3	Apply their knowledge of Phonetics and vocabulary to learn to speak distinctly.	1,2,3	Applying
CO-4	Prioritize learning vocabulary and pronounce them phonetically so as to help themselves attain the flow of speech.	1,2,3	Analysing
CO-5	Find errors in the usage and pronunciation of English words committed by their peers.	1,2,3,4	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
IV	21ULEN41	A PRACTICAL COURSE IN SPOKEN ENGLISH	90	3

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓		✓		✓	✓		✓	
CO-2	✓	✓				✓	✓			
CO-3	✓	✓	✓			✓	✓	✓		
CO-4	✓	✓	✓			✓	✓	✓		
CO-5	✓	✓	✓		✓	✓	✓	✓		✓
	Number of matches (✓) = 30 Relationship = Medium									

SEMESTER – IV

Course Title	**BIOCHEMISTRY**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UCZO41**
Course Type	**DSC-VI**
Credits	**4**
Marks	**100**

General Objective:

The course focuses on to gain knowledge on the basics of biochemistry along with principles and techniques.

Course Objectives:

CO No.	The learners will be able to:
CO-1	Identify the atomic structure and chemical bonds present in a molecule.
CO-2	Discuss the classification, structure and metabolism of carbohydrates.
CO-3	Apply the knowledge of conformation of protein in drug designing.
CO-4	Analyze the mechanism of enzyme activity and its regulation.
CO-5	Evaluate pH of disparate sample by using pH meter.

Unit – I - Basic concepts of Biochemistry

Introduction,Scope and Importance of Biochemistry. Atomic structure, Chemical bonds – Ionic, Covalent & Hydrogen bond – vander Waal's force, pH value - Acid & base concept, Chemical equilibrium - buffers. Chemical nature & biological significance of water.

UNIT II – Carbohydrate and its Metabolism

Classification, structure and biological significance of Monosaccharides (Glucose and Fructose), Disaccharides (Lactose and Sucrose) and Polysaccharides (Starch and Glycogen).Glycolysis, Kreb's Cycle, Electron transport chain and ATP synthesis, Glycogenolysis and Glycogenesis.

UNIT III – Proteins and Lipids:

Classification, structure and biological significance of Amino acids and Proteins - Primary, Secondary, Tertiary and Quarternary structure of Proteins.

Structure and biological significance of Lipids. Fatty acids- Types and Nomenclature (saturated and unsaturated). Classification - Triglycerides, Phospholipids, Sphingolipids, Cholesterol, β-oxidation and omega -oxidation of saturated fatty acids.

UNIT IV- Enzyme Kinetics Enzymes:Classification and nomenclature of enzymes– physico- chemical-properties of enzymes, enzyme kinetics-(determination of Km and Vmax using Michaelis-Menten and Lineweaver-Burk plots). Mechanism of enzyme action-factors affecting enzyme activity. Regulation of enzyme Activity and inhibition.

UNIT V – Instrumentation

Basic instruments – Principle, working mechanism and applications of pH meter, Centrifuge, Colorimeter, Spectrophotometer and Electrophoresis

– Agarose Gel Electrophoresis (AGE) and Polyacrylamide Gel Electrophoresis (PAGE), Chromatography – Paper and thin layer Chromatography.

Textbooks :

1.Ambika Shanmugam, Fundamentals of Biochemistry for Medical Students, Wolters kluwer India Pvt ltd,2016.

2.Agarwal,G. R . Kiran Agarwal and O. P. Agarwal– Text Book of Biochemistry,Krishna Prakashan Media Pvt Ltd,2007.

Reference books :

1. Lubert Stryer, Jeremy M. Berg , John Tymoczko, Gregory Gatto Biochemistry, W.H.Freeman & Company, Newyork. 2019.
2. David L. Nelson & Michael Cox. Lehninger Principles of Biochemistry , (7th edition) International Edition, 2017.
3. Geoffrey Zubay,Biochemistry (4th edition) McGraw-Hill College,2017

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressd	Cognitive Level
CO-1	Define the basic concepts of biochemistry in living organisms.	1,3,4	Remembering
CO-2	Interpret the types of carbohydrates and its metabolism in human body.	1,2,4,5	Understanding
CO-3	Make use of current biochemical and molecular techniques to carry out experiments in biochemical and Molecular biology.	1,2,4	Applying
CO-4	Infer the process of regulation of enzyme Activity and its inhibition.	1,3,4	Analysing
CO-5	Assess the dissimilar samples of amino-acids using chromatographic techniques.	1,2,4,	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
	21UCZO41	BIOCHEMISTRY	60	4

Course Outcomes (Cos)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓		✓	✓		✓	✓	
CO-2	✓	✓		✓	✓	✓	✓		✓	✓
CO-3	✓		✓		✓	✓	✓		✓	
CO-4		✓	✓	✓	✓	✓		✓	✓	
CO-5	✓	✓	✓		✓	✓	✓		✓	
	Number of matches (✓) = …35…. Relationship = High									

SEMESTER – IV

Course Title	**BIOCHEMISTRY PRACTICALS**
Total Hrs.	**30**
Hrs./Week	**2**
Course Code	**21UCZO4P1**
Course Type	**PRACTICAL-IV**
Credits	**1**
Marks	**100/2**

General Objectives:

The Course aims at developing skills of executing basic bio-chemical tests and to expand familiarity with bio-chemical laboratory techniques,

Course Objectives:

CO No.	The learners will be able to:
CO-1	List the basic concepts of biochemistry necessary for biochemical studies.
CO-2	Recognize the biochemical structure of various compounds.
CO-3	Apply Beer's and Lambert's law using Colorimeter to measure the optical density of a sample.
CO-4	Examine the properties of macromolecules.
CO-5	Evaluate pH in various samples with the help of pH meter.

1. Beer's and lambert's law verification using Colorimeter.
2. Separation of Aminoacid using paper Chromatography.
3. Separation of Aminoacid using Thin layer Chromatography.
4. Qualitative tests for Carbohydrates(Glucose, Fructose, Lactose and Starch), Proteins & Lipid.
5. Preparation of starch from potato
6. pH measurement of any two samples with the help of pH meter.
7. **Charts/Models:**
   a) Glucose
   b) Aminoacid
   c) Steroid
   d) Electrophoresis unit
   e) Colorimeter
   f) pH meter
   g)Chromatogram.
   h) Kreb cycle
   i) Glycolysis

Textbooks:

1. S. P. Singh ,Practical Manual of Biochemistry,CBS Publishers & Distributors. 2013.
2. Jeyaraman, J. Laboratory Manual in Biochemistry. New Age International Publishers. 2011.

Reference Books:

1. David T . Plummer. An Introduction to Practical Biochemistry. Tata Mc. Graw Hill Publishing Company Limited. , 2006.
2. Soundravally,Rajendiran , Pooja,Dhiman, Biochemistry Practical Manual Elsevier India, 2019.
3. Anju Jain, Veena Singh, Ghalaut. Manual of Practical Biochemistry, Arya PublishingCompany,2018.

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Define the basic principles of biochemistry and identify the biochemical apparatus and models.	1,2,4	Remembering
CO-2	Discuss the Instrumentation operating in various fields of research.	1,2,3,4	Understanding
CO-3	Experiment the given carbohydrate, protein and lipid sample, qualitatively.	1,2,3,4,5	Applying
CO-4	Test the amino acid samples qualitatively utilizing chromatography techniques.	1,2,45	Analysing
CO-5	Measure the optical density of samples using colorimeter tool.	1,2,4	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UCZO4P1	BIOCHEMISTRY PRACTICAL	30	1

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO-2	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO-3	✓	✓		✓	✓	✓			✓	✓
CO-4	✓	✓	✓		✓	✓			✓	✓
CO-5	✓	✓		✓	✓		✓	✓	✓	✓
	Number of matches (✓) = …40…. Relationship = High									

SEMESTER IV

Course Title	**PLANT ANATOMY, PHYSIOLOGY & BIOTECHNOLOGY**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UABT41**
Course Type	**Allied-II/1**
Credits	**3**
Marks	**100**

General Objective:

To learn the concepts, scope, instrumentation, basic requirements and applied aspects of plant tissue culture besides plant physiology and anatomy in detail.

Course Objectives:

CO	The learners will be able to:
CO-1	Understand the primary, secondary and anomalous, anatomical structure of plants besides inculcating the primary tissues.
CO-2	Develop the knowledge in physiological process and learn the physiological mechanisms.
CO-3	Determine the scope and importance of assimilatory function of plants.
CO-4	Apply the knowledge in understandingabout respiration andthe physiological effects of hormones in plant growth.
CO-5	Develop knowledge on plant tissue culture techniques and organize themselves to become entrepreneurs with the knowledgeof bio-fertilizers in large scale.

UNIT I- PLANT ANATOMY

Root and shoot apical meristems; Simple and complex tissues. Primary structure of dicot and monocot stem, root. Secondary growth in dicot stem. Anomalous secondary growth- *Boerhaavia.* Annual ring.

UNIT II- PLANT PHYSIOLOGY

Importance of water, water potential and its components; Diffusion, Imbibition & Osmosis. Absorption of water – Mechanism of water absorption – active and passive. Ascent of sap –Path and Mechanism, Cohesion theory. Root pressure and guttation. Transpiration -Types – Cellular, Stomatal, Lenticular and its significance; Factors affecting transpiration;–. Mechanism of Stomatal Transpiration. (Theories not needed). Antitranspirant.

UNIT III

Photosynthesis – Ultra Structure of Chloroplast. Photosynthetic Pigment systems I and II. 'Z' scheme of electron transport – C_3 Cycle, factors affecting photosynthesis – significance of photosynthesis.

UNIT IV

Respiration – Ultra Structure of Mitochondria. Types – Aerobic & Anaerobic, Glycolysis – Krebs's cycle. Growth Hormones – Discovery and Physiological role of Auxins and Gibberellin.

UNIT V- PLANT BIOTECHNOLOGY

Plant tissue culture: Definition, Historical perspective, Scope & importance. Totipotency, Callus &Meristerm Culture. Application of tissue culture. Biofertilizer – General account about the following microbes used as biofertilizer – *Rhizobium* – isolation,identification, mass multiplication of *Rhizobium*, BGA – *Spirulina.*

Textbooks:

1. Jain V. K. 1996 - Fundamentals of Plant Physiology 5th edition - S Chand & Co., NewDelhi.
2. Kumar H. D.1998 -Modern Concept of Biotechnology, Vikas Publishing House Ltd., New Delhi.

Reference books:

1. Dubey R.C. 2001 A Text Book of Biotechnology, S. Chand & Co., New Delhi.
2. Thakur. K. and Bassi. K, 2007. Diversity of microbes and cryptogams. S.Chand& company Ltd. New Delhi.
3. M.S. Tayal, Plant Anatomy, Rostegi Publication. Meerat.
4. Bajracharya, D., (1999). Experiments in Plant Physiology- A Laboratory Manual. Narosa Publishing House, New Delhi.
5. Frank B. Salisbury, Cleon W. Ross. 1985. Plant Physiology. Wadsworth Publishing Company. University of Minnesota.

Course outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Understand the various cells and tissues, meristem, epidermal and vascular tissue system in plants.	1,2	**Understanding**
CO-2	Applythe basic principles of plant functions and cell physiology.	1,2,3	**Applying**
CO-3	Explain the basic principles of photosynthesis in plant growth and development.	2,3	**Analyzing**
CO-4	Estimate the importance of plant hormones.	3,4	**Evaluating**
CO-5	Evaluate the various plant tissue culture techniques and applications of biotechnology in different fields to become entrepreneurs.	4,5	**Evaluating**

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits		
IV	21UABT41	PLANT ANATOMY,PHYSIOLOGY & BIOTECHNOLOGY-					60	3		
Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO2	PLO 3	PLO 4	PLO 5	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	-	-	-	✓	✓	-	-	-
CO-2	✓	✓	✓	-	✓	✓	✓	✓	-	-
CO-3		✓	✓	-	✓	-	✓	✓	-	-
CO-4	-	✓	✓	✓	✓	-	-	✓	✓	-
CO-5	-	-	-	✓	✓	-	-	-	✓	✓
	Number of matches (✓) = 26 Relationship = **Medium**									

SEMESTER IV

Course Title	**PLANT ANATOMY, PHYSIOLOGY AND BIOTECHNOLOGY PRACTICALS**
Total Hrs.	**30**
Hrs./Week	**2**
Course Code	**21UABT3P1**
Course Type	**Allied Practical-II/2**
Credits	**1**
Marks	**100/2**

General Objective:

To identify the various groups of non-flowering and flowering plants by taking sections of plant materials in anatomical and morphological interest.

Course Objectives:

CO	The learners will be able to:
CO-1	Define the internal structures of stem and root.
CO-2	Associate themselves with fundamentals of the major physiological aspects of plants.
CO-3	Explainthe basic knowledge of physiological activities of plants.
CO-4	Assess the scope of biotechnology in the light of recent developments.
CO-5	Predict the issues pertaining toplant tissue culture techniques.

Plant Anatomy:

1. Micropreparation and Identification of
   a. Dicot Stem
   b. Monocot Stem
   c. Dicot Root
   d. Monocot Root.
2. To observe and identify the following slides showing
   a. Meristems – Shoot apex and root apex
   b. Simple tissues.

Plant Physiology:

To demonstrate simple set up in Plant Physiology.

1. DPD (Diffusion Pressure Deficit)- Gravimetric Method. Transpiration Ganongs potometer experiment.
2. To demonstrate plasmolysis by using Tradescantia leaf.

3. Ganong's light screen experiment.
4. Transpiration- Stomatal Index.

Plant Biotechnology:

Photograph / model in Biotechnology.

1. Biofertilizer – Rhizobium/B.G.A./ Spirulina.
2. Tissue culture - Photograph (Callus &Meristerm culture).
3. Industrial visit.

Reference Books:

1. Pandey, B.P. 2010. Modern Practical Volume –III. S.Chand& company Ltd. New Delhi.
2. Pandey, B.P. 2010. Botany for degree students. S.Chand& Company Ltd. New Delhi.
3. Santra. S.C, Chatterjee, T.P and Das, A.P. 2005. College botany practical – Vol. I. New Central Book Agency (p) Ltd. India.

Course Outcomes

CO	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Understand the anatomical features of stem and root during sectioning besides identifying the various plant tissues.	1,2,3	Understanding
CO-2	Demonstrate DPD, plasmolysis and transpiration in Plant Physiology.	1,2,3,4	Applying
CO-3	Apply the basic knowledge of Ganong's light experiment and Transpiration-stomatal index in Plant Physiology.	1,2,4	Applying
CO-4	Differentiate the plant tissue culture techniques such as callus and meristem culture.	2,3,4	Analyzing
CO-5	Compare the various bio-fertilizers.	1,3,4,5	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UABT4P1	PLANT ANATOMY, PHYSIOLOGY AND BIOTECHNOLOGY PRACTICALS	30	1

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO2	PLO 3	PLO 4	PLO 5	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓	-	✓	✓	✓	✓	-	-
CO-2	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
CO-3	✓	✓	-	✓	✓	✓	✓	-	✓	-
CO-4	-	✓	✓	✓	✓	-	✓	✓	✓	-
CO-5	✓	✓	✓	✓	✓	✓	-	✓	✓	✓
	Number of matches (✓) = 39 Relationship = **High**									

SEMESTER IV

Course Title	**HERBAL MEDICINE**
Total Hrs.	**30**
Hrs./Week	**2**
Course Code	**21USBT41**
Course Type	**SEC-III**
Credits	**2**
Marks	**100**

General Objectives:

To explore the uses of plants as medicine ranging from traditional to modern pharmaceutical methods in treating ailments besides creating awareness about the rich diversity of medicinal plants in India.

Course Objectives:

CO	The learners will be able to:
CO-1	Discuss the history and relevance of medicinal plants in Indian system of medicine and subsequent marketing.
CO-2	Understand the constraints in promotion and learning the therapeutical and pharmaceutical uses of medicinal plants.
CO-3	Categorize the plants according to the treatment of various diseases.
CO-4	Experiment withthe cultivation of some important medicinal plants.
CO-5	Plan the cultivation of medicinal plants.

UNIT I

Scope and importance of medicinal plants in the traditional systems of medicine and modern medicine- cultivation - harvesting - processing - storage - marketing and utilization of medicinal plants.

UNIT II

Therapeutic and pharmaceutical uses of important plants used in the Ayurveda system of medicine. Concept of Rasayanadrugs. Siddha. Origin, concepts, therapeutic and pharmaceutical uses of important plants used in

Siddha system of medicine. Unani: History, concept of Umoor-e-Tabiya (Fundamentals

UNIT III

Plants used for the treatment of hepatic disorders, cardiac diseases, infertility, diabetes, blood pressure, cancer and skin diseases. Role of AYUSH in the promotion of medicinal plants.

UNIT IV

Study of morphology, cultivation and medicinal uses of the following plants; Root- *Gloriosa*, Leaf -Neem.

UNIT V

Study of morphology, cultivation and medicinal uses of the following plants; stem-turmeric, flower-Catharanthus.

Guest Lecturer on commercial utilization of herbal medicine.

Textbooks:

1. R.N.Chopra, S.L.Nayar and I.C.Chopra, 1956. Glossary of Indian medicinal plants, C.S.I.R, New Delhi.

2.Verma V 2009. Text book of Economic Botany. Ane Book.

Reference books:

1. Kanny, Lall, Dey and Raj Bahadur, 1984.The Indigenous Drugs of India. International Book Distributors.
2. V.V. Sivarajan and Balachandran Indra 1994, Ayurvedic Drugs and their Plant Source. Oxford IBH publishing Co.
3. Miller, Light and Miller, Bryan, 1998. Ayurveda and Aromatherapy.Banarsidass, Delhi.
4. Anne Green, 2000. Principles of Ayurveda.Thomsons, Lon.

Course Outcomes

CO	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Describe about the importance of medicinal plants in traditional and modern medicines.	1,2,3,4,	**Understanding**
CO-2	Explain the contribution of medicinal plants to traditional and modern medicine and the importance of holistic mode of treatment of the Indian traditional systems of medicine.	1,2,3,4,5	**Applying**
CO-3	Practice to cure diseases using medicinal plants.	1,3,5,	**Applying**
CO-4	Prioritize to cultivate medicinal plants.	1,2,4	**Analyzing**
CO-5	Assess the cultivation of medicinal plants.	1,2,3,4,5	**Evaluating**

Relationship Matrix

Semester	Course Code			Title of the Course			Hours			Credit
IV	21USBT41			HERBAL MEDICINE			30			2
Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
CO-2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO-3	✓	✓	✓	-	✓	✓	-	✓	-	✓
CO-4	✓	✓	-	✓	✓	✓	✓	-	✓	-
CO-5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Number of matches (✓) = 43 Relationship = **High**									

SEMESTER – IV

Course Title	**DIET THERAPY**
Total Hrs.	**30**
Hrs./ Week	**2**
Course Code	**21USAN42**
Course Type	**SEC-IV**
Credits	**2**
Marks	**100**

General Objective:

This course covers the planning and preparation of therapeutic diets for various disease condition.

Course Objectives:

Co.No.	The learners will be able to:
CO-1	Understand the responsibilities of a Dietician in a hospital.
CO-2	Establish the etiology and dietary management in Obesity and Underweight.
CO-3	Classify the cause for diarrhoea and constipation.
CO-4	Summarize the etiology and dietary modification for febrile condition.
CO-5	Modify the diet based on various disease conditions.

UNIT I Therapeutic Diet

Definition of dietetics – purpose of diet therapy – factors considered in planning therapeutic diets

Routine hospital diets – Clear fluid diet, full fluid diet, soft diet, regular normal diet, Preoperative diet and postoperative diet

UNIT II Obesity & Underweight

Obesity - etiology, assessment, types of obesity and principles of dietary management.

Under weight- etiology, nutrition and food requirements

UNIT III Diarrhoea & Constipation

Diarrhea- Etiology, types and dietary modification.

Constipation – Etiology, types and dietary modification.

UNIT IV Peptic Ulcer & Fever

Peptic ulcer- Etiology, symptoms and dietary modification

Fever- etiology, types, symptoms and dietary modification

UNIT V Diabetes Mellitus & Hypertension

Diabetic mellitus- causes, types, symptoms and dietary modification

Hypertension- causes, types, symptoms and dietary management

Textbook:

B. Srilakshmi, Dietetics, 7th Edition, 2014,New age International (P) limitedpublishers.

Reference books:

1. Krause's text book of nutrition and diet therapy, (2004), Macmillan Publishers.
2. Gopalan, C. Ramashasthri, B.V. and Balasubramanian-Nutritive Value of Indian Foods, NIN, ICMR, 1998.
3. Gu thrie and Boston, Introductory Nutrition, 1989, VIII Edition.
4. Robinson C.H. and Lawery M. Normal and therapeutic nutrition,Macmillan Publishing Co., NewYork, 1990.

Course Outcomes

CO. No.	Upon completion of the course, the students will be able to:	PSO	Cognitive level
CO-1	Understanding the concepts of therapeutic diet.	1,3,4,5	Understanding
CO-2	Practice diet counselling for various disease conditions.	3,4,5	Applying
CO-3	Point out the principles of dietary management in diarrhoea and constipation.	3,4,5	Analyzing
CO-4	Recommend the dietary modification in peptic ulcer and fever.	1,3,4,5	Evaluating
CO-5	Plan the diet based on various disease conditions.	1,3,4,5	Creating

Relationship Matrix

Semester	Code			Title of the course			Hours		Credits
IV	21USAN42			Diet Therapy			30		4
Course Outcomes (COS)	Programme Out Come (POS)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	✓	✓	✓	✓		✓		✓	✓	✓
CO-2	✓	✓	✓	✓				✓	✓	✓
CO-3	✓	✓	✓	✓				✓	✓	✓
CO-4	✓	✓	✓	✓		✓		✓	✓	✓
CO-5	✓	✓	✓	✓		✓		✓	✓	✓
	Number of matches (✓) = 38 Relationship = **High**									

SEMESTER – IV

Course Title	**HEALTH AND FITNESS**
Total Hrs.	**30**
Hrs./Week	**2**
Course Code	**21UNAN41**
Course Type	**NME-II**
Credits	**2**
Marks	**100**

General Objective:

This course covers the importance of diet in health and fitness.

Co. No.	**The learners will be able to:**
CO-1	Define the concept of health and fitness
CO-2	Understand the importance of physical activity and mental health.
CO-3	Focus on the importance of Nutritional Assessment in Physical Fitness.
CO-4	Evaluate the importance of weight management
CO-5	Construct the relationship between fitness and nutrition.

UNIT I

Health-Definitions, concept of health, changing concepts, dimensions of health, concept of well being, determinants of health, ecology of health, right to health, responsibility for health and indicators of health.

UNIT II

Physical, mental, social and positive health; Spectrum of health. Millennium development goals; Primary Health Care; Health situation in India.

UNIT III

Physical fitness- definition, factor affecting physical fitness, importance of physical fitness. Assessment of physical fitness- Body Weight, Height, BMI, Broka Index, Waist circumference, Hip Circumference, Waist to Hip Ratio.

UNIT: IV

Techniques For Obtaining Relevant Information **-** General Profile, Medical History and Clinical Information; Dietary Diagnosis - Assessing food and nutrient intakes; Lifestyles-physical activity and stress,

UNIT: V

The Counselor ethical Codes and Guidelines, The Counselor's legal Responsibility and dimensions of Confidentiality; Rights of Clients .

TEXT BOOK :

1. B. Srilakshmi, Nutrition Science, 6th Edition, 2018, New age International (P) limited publishers.
2. B.Srilakshmi, Dietetics, 7th Edition, 2014, New age International (P) limited publishers.

References Books :

1. K. Park Text book of Preventive and social medicine, 15th edition, MIS Banarsidas Bhano Publishers, Jabalpur, 1997.
2. Guthrie, H.A,, "Introductory Nutrition", 6th ed., Times Mirror/Mosby College Publ. – St Louis 1989.
3. Whitney E.N., Hamilton E.N. & Raffes S.R., "Understanding Nutrition", 5th ed. West Pub.Co. New York.

Course Outcomes

CO. No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive level
CO-1	Understand the significance of ethical codes and guidelines.	1,3,5	Understanding
CO-2	Apply knowledge to treat common health problems..	1,3,5	Applying
CO-3	Explain the relationship between fitness and nutrition.	1,3,4,5	Analyzing
CO-4	Assess the physical fitness with food and nutrient intakes.	1,3,5	Evaluating
CO-5	Organise camps to prevent public health problems in the society	1,5	Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UNAN41	HEALTH AND FITNESS	30	2

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓		✓		✓		✓		✓
CO-2	✓	✓	✓	✓		✓		✓		✓
CO-3	✓	✓		✓		✓		✓	✓	✓
CO-4	✓	✓	✓	✓		✓		✓		✓
CO-5	✓	✓	✓	✓				✓		
	Number of matches (✓) = 32 Relationship = **Medium**									

SEMESTER – IV

Course Title	**FIELDWORK / INTERNSHIP**
Course Code	**21UFZO41**
Course Type	**FW/I**
Credits	**2**
Marks	**100**

The following guidelines have been framed for the courses titled Fieldwork and Internship for all the U.G. Programmes.

- Fieldwork/Internship shall be in the fourth semester of each programme.
- A Department can opt for either Fieldwork or Internship.
- Fieldwork may be done individually or in groups not exceeding five per group.
- The minimum length of the Fieldwork report should be 15 to 20 pages in A4 size.
- Marks for the Fieldwork Report will be 100 divided as 60% for the Fieldwork and 40% for Viva-Voce Examination. 2 Credits will be awarded to the students who complete Internships and produce Internship Completion Certificate duly signed by the authority concerned.
- Fieldwork / Internship shall be allotted outside the working hours for a maximum of six days.

Scheme of Evaluation:

Fieldwork	**Internal**	**External**
Word of title / Topic	5	5
Objectives / Formulation including Hypothesis	5	5
Methodology / Techniques / Procedures adopted	15	15
Chapterization of the Fieldwork Report	15	15
Summary / Findings / Summation	5	5
Works Cited / Work Consulted / References / Annexures / Footnotes	10	10
Relevance of the Fieldwork to social needs	5	5
	60	**60**

SEMESTER – V

Course Title	**ANIMAL PHYSIOLOGY**
Total Hrs.	**75**
Hrs./Week	**5**
Course Code	**21UCZO51**
Course Type	**DSC-VII**
Credits	**4**
Marks	**100**

General Objectives:

To understand the importance of Bio molecules , structure and function of various organs in animals

Course Objectives:

CO No.	The learners will be able to:
CO-1	Recognize the digestion and absorption of biomolecules.
CO-2	Identify different blood components and structure of heart
CO-3	Differentiate among the nitrogenous wastes
CO-4	Evaluate the Physio - chemical properties of skeletal muscles
CO-5	Integrate the types and functions of endocrine glands

UNIT I - Nutrients and Digestion

Elements of Nutrition- Vitamins & Minerals.Digestion - Intracellular and Intercellular. Digestion and absorption of carbohydrate, protein and fat. Gastrointestinal Hormones.

UNIT II - Respiratory System and Circulatory System

Types of respiratory organs, respiratory pigments, transport and exchange of gases – control of respiration, anaerobiosis – respiratory quotient –Basic,Standard and Active Metabolism.

Blood - composition, function and coagulation. - Structure and function of human heart – ECG – Heart diseases

UNIT III - Excretory System

Types of nitrogenous wastes – Ammonotelism, Ureotelism and Uricotelism – Structure and function of human Kidney – Physiology of Urine formation .

Homeostasis - Osmoregulation in crustaceans (Astacus) and fishes (Marine and freshwater teleosts), .Mechanism of thermoregulation in ectotherms and endotherms.

UNIT IV – Muscular and Nervous system

Types of muscles - Ultra structure of skeletal muscle ; physico - chemical properties – mechanism of muscle contraction.

Structure and types of neurons - nerve impulse - conduction of impulse through nerve – synapse – myoneural junction - reflex action.

UNIT V - Endocrine systems and Chronobiology Endocrine glands – Pituitary, Thyroid, Parathyroid, Adrenal and Pancreas**.** Menstrual cycle and Oestrous cycle – the role of hormones – Menopause, Pregnancy and Parturition.Biological rhythms – exogenous and endogenous rhythms – concept of biological clocks - survey of biological rhythms in animals and human.

Textbook :

Agarwal,V.K. and Verma .P.S. 2000 –Animal Physiologyand Biochemistry, S. Chand & Company Limited.

Reference books :

1. Goel,K.A.,Sastri, K.V. 1982. Text Book of Animal Physiology, Rastogi Publications.
2. Arora, M.P., 2018. Animal Physiology . Himalaya Publishing House
3. Richard, W.Hill Gordon.2006 - Animal Physiology ANE Book Publishers

Course Outcomes

CO No.	Upon completion of this course, students will be able to :	PSO addressed	Cognitive level
CO-1	Classify the role and functions of different bio molecules.	1,3,4,5	Understanding
CO-2	Determine the physiology at cellular and system levels in vertebrates and invertebrates.	2,4	Applying
CO-3	Illustrate the physiology of respiratory, renal, endocrine and reproductive systems .	1,3,5	Analysing
CO-4	Assess the physiological parameters measured in Mammals.	2,4,5	Evaluating
CO-5	Report on the importance of proteins, carbohydrates and fats.	1,3,4,5	Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
V	**21UCZO51**	**ANIMAL PHYSIOLOGY**	**75**	**4**

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO-1	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO-2	✓		✓		✓		✓		✓	
CO-3		✓				✓		✓		✓
CO-4	✓		✓		✓		✓		✓	✓
CO-5	✓	✓		✓	✓	✓		✓	✓	✓
	Number of matches (✓) = …32…. Relationship = Medium									

SEMESTER – V

Course Title	**GENETICS**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UCZO52**
Course Type	**DSC-VIII**
Credits	**4**
Marks	**100**

General Objective:

The course focuses on to acquire knowledge on the basic principles of Mendelian inheritance, autosomal and allosomal anomalies.

Course Objectives:

CO No.	The learners will be able to:
CO-1	Understand the pattern of inheritance and types of blood groups based on multiple alleles.
CO-2	Apply the mathematical and computational tools in genetical studies.
CO-3	Compare and contrast the types of twins.
CO-4	Evaluate the chromosomal and gene mutation.
CO-5	Develop the mapping of chromosome in various species of bacteria.

UNIT I - Mendelian Inheritance

Genetics: scope and importance. Mendelian inheritance - Mendelian laws. Simple Mendelian traits in man.Multiple alleles - A, B, O blood groups, Rh factors in man. Multiple genic inheritance - skin colour in man. Phenotypic ratio-Co-dominance, Incomplete dominance, epistasis, lethal genes, Penetrance, Expressivity and Pleiotropism. Linkage, Crossing over.

UNIT II – Sex Linked Inheritance and Syndrome

Sex determination in man, Sex chromosomes and sex linked inheritance in man, sex influenced genes and sex limited genes. Non-disjunction in man (Klinefelter's syndrome, Turner's syndrome and Down's syndrome), Y linked inheritance – Holandric genes. Extra Chromosomal inheritance – Shell coiling in Snail and Kappa particles in Paramecium.

UNIT III – Human Genetics

Pedigree analysis, Human Chromosomes - Karyotype, ideogram, Human metabolic disorders & diseases- Phenyl ketonuria, Alkaptonuria, Albinism,Sickle cell anemia and Thalassaemia. One gene, one enzyme theory. Inbreeding and out breeding. Eugenics, Euthenics, Genetic Counseling, Twins – types and significance.

UNIT IV – Aberration of Chromosomes

Fine structure of gene –Cistron,Recon and Muton.Gene Mutation – types and effects (Deletion, Duplication, Inversion and Translocation) (Chronic Myeloid Leukemia) and deletion ("cry of cat" syndrome), Chromosomal mutation– Ploidy – Euploidy- Polyploidy and Aneuploidy. Chromosomal aberration - Structural aspects.

UNIT V – Microbial Genetics

Bacterial genetics, Conjugation, Transformation, Transduction and Sexduction, Mapping of Bacterial chromosome.

Viral Genetics –T_4Phage - Lytic and lysogenic cycle

TEXT BOOKS :

1.Verma, P. S. and Agarwal V .K. Genetics ,S ChandPublishing; Ninthedition,2010.

2.Bhamrah, H. S. A Text Book of Genetics. Anmol Publications Private Limited.1997.

REFERENCE BOOKS :

1. Singh B.D. Genetics, Kalyani publishers,2019.
2. Gupta P. K.Elements of Genetics. Rastogi Publications, 2008.
3. Gardner, E.J. Principles of Genetics.8th edition. John Wiley, 2015.
4. Verma, P.S. and Agarwal, V.K. Genetics. 9th revised edition S,Chand & Co Limited.2010.
5. Carroll S.B.; Doebley J.; Griffiths, A.J.F. and Wessler, S.R. An Introduction to Genetic Analysis. W. H. Freeman and Co. Ltd. (2018)

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Trace the basic laws of heredity citing Mendelian laws.	1,3,5	Understandin
CO-2	Discover the pattern of sex determination in humans and animals.	1,2,3,4	Applying
CO-3	Explain the genetic background in human metabolic disorders and twins.	1,2,3,5	Analysing
CO-4	Assess the difference between the types of gene mutation.	1,3,5	Evaluating
CO-5	Speculate on the consequences and impact of mutations on the community.	1,2,3,5	Creating

Relationship Matrix

Semester	Course Code		Title of the Course			Hours				Credits
V	21UCZO52		GENETICS			60				4
Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓		✓	✓	✓	✓		✓		✓
CO-2	✓	✓	✓		✓	✓	✓	✓	✓	
CO-3	✓	✓	✓	✓		✓	✓	✓		✓
CO-4		✓	✓	✓	✓	✓		✓		✓
CO-5		✓	✓		✓	✓	✓	✓		✓
	Number of matches (✓) = …37…. Relationship = High									

SEMESTER - V

Course Title	**AQUACULTURE**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UCZO53**
Course Type	**DSC-IX**
Credits	**4**
Marks	**100**

General Objective:

To familiarize students with different practices of aquaculture and develop entrepreneur skills in the respective field.

Course Objectives:

CO No.	The learners will be able to:
CO-1	Understand the varied practices in Aquaculture.
CO-2	Apply Cryopreservation techniques in aquaculture.
CO-3	Distinguish between the different types of integrated fish farming.
CO-4	Predict the different types of fish diseases.
CO-5	Propose innovative methods of fish Harvesting .

UNIT I - Introduction

Scope of Aquaculture - Aquaculture in India – Freshwater, Coastal and Marine aquaculture –Site selection- Pond construction - Maintenance of pond - Types of fish ponds- Nursery pond, Rearing pond and culture pond.

UNIT – II - Culture Practices

Biology of Indian major carps –Fin fish culture: collection of seeds and transportation of seeds – natural breeding, induced breeding, Marine prawn culture –*Penaeus monodon* - Transgenic fish production – Ploidy and Induction – Cryopreservation. Culture practices in Edible oyster: collection of seeds – induced breeding.

UNIT – III – Types of Culture

Types of culture: extensive - semi-intensive and intensive culture – monoculture - monosex culture – polyculture - cage culture - pen culture – seaweed culture - integrated fish farming – paddy cum fish culture - poultry cum fish culture - pig cum fish culture - sewage fed fish culture.

UNIT- IV - Fish Feed and Diseases

Fish feed: artificial feed – feed formulation – need - ingredients ratio – square method– pellets. Live feeds and their culture: *Artemia* and Rotifer – Seaweed culture. Fish Diseases: bacterial, viral, fungal, ecto and endo-parasitic diseases and nutritional deficiency diseases.

UNIT – V - Harvesting and Post-harvest Technology

Methods of fish harvesting – craft (Kattumaram and Trawlers) and gears (Gill net and trap net) used for inland and marine fisheries - Fish preservation – fishery by-products. Role of government organizations-CMFRI – CIFRI – FFDA - CIFT – CIFE - MPEDA – CIBA etc.

TEXT BOOKS :

1. Sandhu, G.S. 2010. A text book of fish and Fisheries of India. Wisdom Press, New Delhi.
2. N.Arumugam, Saras Publications, 114/35G, A.R.P. Camp Road, Periyavilai, Kottar Po, Nagercoil – 629002.

REFERENCE BOOKS :

1. Jhingran, V.G.(1997) Fish and fisheries of India. Hindustan Publishing Corporation (India), Delhi
2. Santhanam, R., N. Sukumaran and P. Natarajan.,(1990) A manual of freshwater aquaculture.Oxford & IBH Publishing Co. Pvt. Ltd., 66 Janpath, New Delhi – 110 001.
3. Sundararaj, V. and B. Srikrishnadhas,(2000) Cultivable aquatic organisms, Narendra Publishing House, 1417, Krishnan Dutt Street, Maliwara, Delhi – 110 006.
4. Pillai, T.V.R., Aquaculture and the environment. 1st edition, Fishing news Books, England, 1992.
5. Pandian, T.J., Sustainable indian fisheries, 2001
6. Samuel Paulraj., Shrimp farming techniques, problems and solutions-1995
7. Kurian, C.V and V.O. Sebastian. Prawns and prawn fisheries of India IV edition 1993
8. Victor, A.C., A. Chellam, S. Dharmaraj and T.S. Velayudhan, Manual on pearl oyster seed production, farming and pearl culture, CMFRI Special publication-1995
9. Vijayan, K.K. et al., 2007. Indian Fisheries: A progressive outlook. CMFRI Publications, Kochi.

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Describe the complete protocol of pond construction and management in freshwater Aquaculture.	1,2,4,5	Understanding
CO-2	Execute induced culture of breeding in Prawns.	1.2,3,4,5	Applying
CO-3	Identify the diverse culture systems of inland fisheries.	1.2,4,5	Analysing
CO-4	Assess the steps involved in artificial Fish Feed formulation.	1,2,4	Evaluating
CO-5	Devise suitable mechanism to use in fish harvesting.	1,2,4	Creating

Relationship Matrix

Semester	Course Code			Title of the Course			Hours				Credits
V	21UCZO53			AQUACULTURE			60				4
Course Outcomes (COS)	Programme Learning Outcomes (PLOs)						Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓		✓		✓	✓		✓	✓
CO-2	✓	✓		✓			✓	✓	✓	✓	✓
CO-3	✓	✓		✓			✓	✓		✓	✓
CO-4	✓	✓		✓			✓	✓		✓	
CO-5	✓	✓		✓	✓		✓	✓		✓	
	Number of matches (✓) = ……36 Relationship =High										

SEMESTER – V

Course Title	**ANIMAL PHYSIOLOGY AND GENETICS PRACTICALS**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UCZO5P1**
Course Type	**PRACTICAL - V**
Credits	**2**
Marks	**100/2**

General Objectives:

To study and demonstrate the various experiments to detect Blood groups, Nitrogenous waste products and effects of temperature on functional activities of Animals.

Course Objectives:

CO No.	The learners will be able to:
CO-1	Identify the rate of oxygen consumption in fish.
CO-2	Interpret various qualitative tests for findout nitrogenous waste products present of fish and mammals.
CO-3	Examine the monohybrid and dihybrid breedings
CO-4	Evaluate ABO blood grouping system
CO-5	Formulate Red blood cells and White blood cells in Humans

ANIIMAL PHYSIOLOGY

1. Rate of Oxygen consumption in a fish (to be done individually).
2. Effect of temperature on operculum movement of fresh water fish. Calculation of Q_{10}. (to be done individually).
3. Effect of temperature on salivary amylase activity.
4. Detection of Nitrogenous waste products of fish (ammonia), birds (uric acid)&mammals (urea) (to be done individually).
5. Estimation of Hemoglobin by hemoglobinometer
6. Estimation of RBC using Haemocytometer
7. Estimation of WBC using Haemocytometer
8. Human blood smear (Preparation and Observation of different blood cells)
9. Demonstration of blood pressure with Sphygmomanometer.
10. Models, charts and photos:
    a) Simplemuscletwitch
    b) Sphygmomanometer
    c) Haemoglobinometer
    d) Haemocytometer
    e) Reflex arc model
    f) ECG model
    g) Kymograph

GENETICS

1. Observation of Simple Mendelian traits in man - to be recorded.
2. Blood group to be analyzed in a population with a minimum of 30 students.
3. Breeding experiments to be illustrated with beads
   a) Monohybridb) Dihybrid
4. Observation and study of polygenic inheritance of quantitative traits to be interpreted in graphs.
   a) Height of students b) Weight of students
5. Spotters
   a) Syndromes – Down's syndrome, Turner's syndrome & Klinefelter's Syndrome.
   b) Sex linked Inheritance-Colour blindness, Hemophilia& Hypertrichosis
   c) DNA model
   d) Sickle cell anaemia
   e) Types of twins
   f) T_4Phage - Lytic cycle
   g) T_4Phage - lysogenic cycle
   h) Pedigree chart

COURSE OUTCOMES

CO No.	Upon completion of this course, students will be able to:	PSO addressed	Cognitive level
CO-1	Estimate the effect of temperature on opercular movement and the rate of oxygen consumption in a fish.	1,2,4,5	Understanding
CO-2	Examine various nitrogenous waste products of animals.	1,3,4	Applying
CO-3	Experiment the Mendelian traits and blood group in Man.	2,3,4,5	Analysing
CO-4	Evaluate RBC, WBC and Haemoglobin in man.	1,2,3,5	Evaluating
CO-5	Collaborate the multiple procedures in Physiology and Genetics.	1,2,4	Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
V	21UCZO5P1	ANIMAL PHYSIOLOGY AND GENETICS PRACTICALS	60	2

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓		✓	✓	✓	✓	✓		✓	✓
CO-2	✓	✓	✓		✓	✓		✓	✓	
CO-3	✓	✓		✓			✓	✓	✓	✓
CO-4		✓	✓	✓	✓	✓	✓	✓		✓
CO-5		✓	✓		✓	✓	✓		✓	
	Number of matches (✓) = …36…. Relationship = High									

SEMESTER – V

Course Title	**AQUACULTURE PRACTICALS**
Total Hrs.	**60**
Hrs./Week	**2**
Course Code	**21UCZO5P2**
Course Type	**Practicals-VI**
Credits	**2**
Marks	**100/2**

General Objective:

To acquire the skills in the field of aquaculture .

Course Objectives:

CO No.	The learners will be able to:
CO-1	Identify the salinity, alkalinity in water samples.
CO-2	Classify the fishes that yield profits.
CO-3	Differentiate between freshwater and marine planktons present in aquatic medium.
CO-4	Evaluate the COD and BOD in water samples.
CO-5	Propose methods to cure diseases in fishes.

1. Estimation of
   a) Salinity
   b) chlorinity
   c) BOD
   d) COD
   e) Free CO_2
   f) Alkalinity
2. Collection and Identification of economically important fishes – Catla, Eel, Shark and Sardine.
3. Collection and Identification of economically important crustaceans (*Penaeus,Macrobrachium* and Crab)
4. Collection and Identification of economically important seaweed (*Eichornia, Pistia,Sargassam* and *Ulva*)
5. Mounting of marine and freshwater planktons.
6. Identification of fish scales - Cycloid, Ctenoid and Placoid.
7. Examination of fishes for diseases and their control –Bacterial (Abdominal dropsy,Furunculosis) - Viral (spring viremia) – Parasitic (Argulus) –Fungal (Rot disease)

8. Instruments used in Aquaculture (secchi disc, van dorn bottle, conductivity meter, Turbidity meter) and their significance.
9. Visit to aquaculture farm.

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Identify the several methods practised in physical and chemical analysis of water.	1,2,4,5	Understanding
CO-2	Group the commercially beneficial fishes suitable for aquaculture.	1,4 ,5	Applying
CO-3	Distinguish between the freshwater and marine planktons.	1,2,3,4,5	Analysing
CO-4	Rank the economically important seaweeds.	1,2,4,5	Evaluating
CO-5	Solve fish diseases pertaining to Aquaculture.	1,2,4,5	Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
V	21UEZO5P2	AQUACULTURE PRACTICALS	60	4

Course Outcomes (COS)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓	✓		✓	✓		✓	✓
CO-2	✓	✓	✓			✓			✓	✓
CO-3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO-4	✓	✓		✓	✓	✓	✓		✓	✓
CO-5	✓	✓		✓	✓	✓	✓		✓	✓
	Number of matches (✓) = …40…. Relationship =High									

SEMESTER - V

Course Title	**EVOLUTION**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UEZO51A**
Course Type	**DSE-IA**
Credits	**4**
Marks	**100**

General Objective:

The course aims at the physiological and cultural evolution of human.

Course Objectives:

CO No.	The learners will be able to:
CO-1	Define the Morphological, Anatomical, embryological, physiological and Biochemical evidences of evolution.
CO-2	Discuss the trends in the evolution of humans.
CO-3	Determine the modern synthetic theory with classical evolutionary theories.
CO-4	Evaluate the role of variation in Evolution.
CO-5	Investigate the significance of revolution in Reptiles.

UNIT – I Origin of life

Chemical and biological evolution - Urey & Miller Experiment. Evidences in favour of evolution – Comparative Morphology, Anatomy, embryology, physiology and Biochemistry

UNIT – II Palaentologial evidences

Palaentologial evidence – fossilization – dating of fossils. Geological time scale. Fossils in India - Zoogeographical realms.. Micro and Macro Evolution. Coevolution. Evolutionary trends.

UNIT – III Theories of Evolution

Lamarckism, Darwinism, Neo-Lamarckism, Neo-Darwinism, Mutation theory of De Vries and Modern synthetic theory.

UNIT – IV Variation and Human evolution

Variation-sources of variability – mutation, recombination & hybridization –Population genetics -Hardy-Weinberg law, isolating mechanisms: Speciation.) Mimicry and Colouration and Adaptive Radiation.

UNIT V Evolution of higher forms

Evolutionary significance of Reptiles–major types of Dinosaurs and reason for extinction, Affinities of Archaeopteryx, outlines of evolution of horse and man. Important Fossils of Human Evolution. Cultural Evolution of Man,Future Evolution of Man,

Textbooks:

1. N. Arumugam,(2020) , Organic Evolution,Saras Publication
2. Veer Bala Rastogi (2017) Organic Evolution (Evolutionary Biology) Medtech; 13 th edition

Reference books:

1.B.L. Chaudhary (2018) Organic Evolution Scientific Publishers,India
2.Veer Bala Rastogi. Organic Evolution-2014. Kedar Nath Ram Nath Educational publications.
3.Arora (2013) . Text Book Of Organic evolution, M P Himalaya Pub.House.
4.Mandal (2005) Introduction to Evolutionary Biology Oxford & IBH Pub. Co
5.Kenneth Kardong (2005) Vertebrates: Comparative Anatomy, Function, Evolution, McGraw Hill Education; edition

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	List out the evidences of evolution.	1,3	Remembering
CO-2	Discuss the numerous forms of trends in the process of evolution.	1,3,5	Understanding
CO-3	Discuss various theories of evolution	1,2,4	Understanding
CO-4	Distinguish various laur.. mechanism in evolution	1,2,3,5	Analysing
CO-5	Assess the role of Mimicry and Colouration in Evolution.	1,3,4,5	Evaluating

Relationship Matrix

Semester	Course Code		Title of the Course			Hours			Credits	
V	21UEZO51A		Evolution			60			4	
Course Outcomes (COS)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓		✓		✓	✓		✓		
CO-2	✓	✓	✓		✓	✓		✓		✓
CO-3	✓	✓			✓	✓		✓		
CO-4	✓	✓		✓	✓	✓	✓	✓		✓
CO-5	✓	✓	✓		✓	✓		✓	✓	✓
	Number of matches (✓) = …33…. Relationship =High									

SEMESTER – V

Course Title	**WILDLIFE CONSERVATION AND MANAGEMENT**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UEZO51B**
Course Type	**DSE-I-B**
Credits	**4**
Marks	**100**

General Objective:

To equip students with adequate knowledge of various biodiversity monitoring methodologies and conservation and management of Wildlife.

Course Objectives:

CO No.	The learners will be able to:
CO-1	Define the conservation of wild life
CO-2	Discuss the impact of habitat destruction.
CO-3	Determine the Damage caused by wildlife in India and its mitigation.
CO-4	Evaluate the exponential and logistic growth rates of wildlife.
CO-5	Investigate the population vulnerability.

Unit-I-Introduction to WildLife

Value of wildlife and its need for conservation. Definition and importance of wildlife, Causes of depletion of wildlife. Factors responsible for the extinction of animals; Types of protected areas. Wildlife Sanctuaries and National Parks in India-general strategies and issues.

Unit-II- Importance of WildLife conservation

Wildlife conservation, ethics and importance of conservation, Impact of habitat destruction and fragmentation on wildlife, Biological parameters

such as food, cover, forage and their impact on wild life. Identification and estimation of wild animals by faecal sample analysis and census methods..

Unit-III-Wildlife conservation

Objectives- strategies and issues; Captive breeding techniques and translocation and reintroduction- Inviolate area and critical habitats and their impact on wildlife; Different terrestrial habitats of wildlife in India- Restoration of degraded habitat- Damage caused by wildlife in India and its mitigation.

Unit-IV- Rehabilitation and management

Type of wildlife management-manipulative and custodial- Management of over abundant wild animal populations causing damages to nearby inhabitants and their crops and animals, Tools and techniques to control the menace of wild animals; man wildlife conflict resolution and mitigation. Habitat manipulation– control and regulation of grazing. Weed eradication- Major diseases of domestic and wild animals and their control and impact of wild life tourism.

Unit-V - Population Attributes

Theories of population dispersal, Population vulnerability analysis and its components Animal movement, concept of home range and territory; Tracking movement by remote sensing. Predator-prey models and impact of predation. Population attributes; concepts of exponential and logistic growth rates of wildlife, Density dependent and independent population regulation.

Reference books:

1. Caughley, G., and Sinclair, A.R.E. (1994) Wildlife Ecology and Management. Blackwell Science.
2. Woodroffe, R., Thirgood, S. and Rabinowitz, A. (2005) People and Wildlife, Conflict or Co-existence? Cambridge University.
3. Bookhout, T.A. (1996) Research and Management Techniques for Wildlife and Habitats (5th edition) The Wildlife Society, Allen Press.
4. Sutherland, W.J. (2000) The Conservation Handbook: Research, Management and Policy. Blackwell Sciences 95
5. Hunter M.L., Gibbs, J.B. and Sterling, E.J. (2008) Problem solving in Conservation Biology and Wildlife Management: Exercises for Class, Field, and Laboratory. Blackwell Publishing. P

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Highlight the fundamental principles of Wildlife ecology Evidences of evolution.	1,3	Remembering
CO-2	Comment the modern scope of scientific inquiry in the field of wildlife.	1,3,5	Understanding
CO-3	Present the analysis and interpretation of wildlife conservation management.	1,3	Applying
CO-4	Distinguish the local, regional and national conservation and management issue.	1,2,5	Analysing
CO-5	Review the writing, speaking, and critical thinking skills needed to become a wildlife technician	1,4,5	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
V	21UEZO51B	Wildlife Conservation and Management	60	4

Course Outcomes (COS)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓		✓		✓	✓		✓	✓	
CO-2	✓	✓	✓	✓	✓	✓	✓	✓		✓
CO-3	✓		✓		✓	✓		✓		
CO-4	✓	✓		✓	✓	✓	✓	✓		✓
CO-5	✓	✓	✓		✓	✓		✓	✓	✓
	Number of matches (✓) = …35…. Relationship =High									

SEMESTER - V

Course Title	**ANIMAL HUSBANDRY AND ITS MANAGEMENT**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UEZO51C**
Course Type	**DSE-I-C**
Credits	**4**
Marks	**100**

General Objective:

The course provides intensive study in livestock production and management and conservation practices.

Course Objectives:

CO No.	The learners will be able to:
CO-1	Define the Scope and Issues in Animal husbandry
CO-2	Discuss the Nutritional requirements in livestock
CO-3	Determine the Common Feed stuffs Systems in animals.
CO-4	Evaluate the method of Selecting the live stocks.
CO-5	Investigate the Basic tools for genetic improvement. .

Unit I: Animal products and breeding systems

Scope of Livestock Industry; Livestock Enterprises; Issues in Animal Agriculture. Animal Products: Importance of Animal Products; Beef; Pork; Lamb; Poultry Products. Advanced Reproduction and Breeding: Reproductive Systems, Common Breeding Systems including cattle Breeding, Swine, Sheep and Goat Breeding, Hormones and Cycles and effect of environment. Reproductive Technologies.

Unit II: Energy requirements

Nutritional requirements: Energy requirements for maintenance, growth, milk, egg, wool, and meat production. Carbohydrates & Fats, Protein, Minerals & Vitamins, Water etc.

Unit III Common Feed stuffs

Common Feed stuffs Systems for expressing energy value of foods in ruminants, pigs and poultry. Direct and indirect calorimetry. Advanced Ration Formulations.

Unit IV: Maintenance of breeds

Common Breeds of Livestock: Breeds of Cattle, swine, sheep, goat and poultry: Selecting live stocks; Facilities and Equipment; Housing, Maintenance and health care; Management of breeding stocks and products. Vaccination programmes and Deworming programmes.

Unit V: Marketing and related issues

Planning and Marketing; Culling, Forward Contracting, Backgrounding. Quality control; Future prospects. Basic principles of Genetics and tools for genetic improvement. Current issues affecting the livestock industry.

Recommended readings

1. Taylor, R.E and Field, T.G. (2004).Scientific Farm Animal Production: An Induction to Animal Science. Prentice-Hall
2. Acker, D. and Cunningham, M. (1998). Animal Science & Industry. Prentice-Hall.
3. Blakely, J. and Bade, D. (1985). The Science of Animal Husbandry. Prentice-Hall.
4. Cambell, J. and Lasley, J. (1975).The Science of Animals that Serve Mankind. McGraw-Hill.
5. Cooper, E. L. (1990). Agriscience: Fundamentals & Applications Delmer: Albany.
6. American Youth Horse Council (1999) Handbook: A Guide to Equine Care and Management.
7. Morrison, F. (1949). Feeds and Feeding (8th edition) Morrison: Ithaca.

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Highlight the Importance of Animal Products	1,2	Remembering
CO-2	Comment the Energy requirements for maintenance and growth.	1,5	Understanding
CO-3	Present the energy value of foods in various live stocks.	1,4	Applying
CO-4	Distinguish the Breeds of Cattle and poultry	1,2,3,4	Analysing
CO-5	Review the Marketing and Quality control	1,4,5	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
V	21UEZO51C	ANIMAL HUSBANDRY AND ITS MANAGEMENT	60	4

Course Outcomes (COS)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1			✓	✓	✓	✓		✓	✓	
CO-2		✓	✓		✓	✓		✓		✓
CO-3	✓			✓	✓	✓		✓	✓	
CO-4	✓	✓		✓	✓	✓	✓	✓		✓
CO-5	✓		✓		✓	✓		✓	✓	✓
	Number of matches (✓) = …33…. Relationship =High									

SEMESTER – V

Course Title	**FUNDAMENTALS OF BIOTECHNOLOGY**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UEZO52A**
Course Type	**DSE-II-A**
Credits	**4**
Marks	**100**

General Objective:

1. To be trained at the basic principles, scope and importance of biotechnology.

Course Objectives:

CO	The learners will be able to:
CO-1	Observe the forms of cloning vectors
CO-2	Describe the gene cloning by a choice of methods
CO-3	Interpret several cell culture techniques
CO-4	Distinguish between the techniques of Hybridization, PCR and DNA sequencing
CO-5	Create an awareness on intellectual property rights and safety issues involved in handling transgenic organisms

UNIT I - Tools of Biotechnology

History, Scope and Importance of Biotechnology - Basic concepts of Genetic Engineering, Restriction enzymes, Cloning vectors: Bacterial plasmid vector (pBR^{322}),phage vector (Lambda and M 13) –Plant Vector (T_1Plasmid)Animal vector (SV40) –Cosmids -Transposons as vectors –Yeast Artificial Chromosomes (YAC) – Bacterial Artificial Chromosomes (BAC).

UNIT II- Gene cloning

Gene cloning: - Integration of DNA fragments into the vector – Gene transfer methods,Transformation and Transfection - Biolistics transformation - Protoplast fusion - Liposome mediated transfer - Electroporation - DNA transfer by calcium phosphate method – Microinjection. Screening and Selection of recombinants- Replica plating method - Blue and white method - Insertional inactivation -Antibiotic resistance -Hybridization techniques.

UNIT III -Cell culture

Animal cell culture: Cell types – Requirements for animal cell culture - substrate, media and gases - Cell culture techniques - primary cell culture, basic technique of mammalian cell culture - sterilization and prevention of contamination. Stem cell culture: embryonic stem cell culture - Methods to produce differentiated cells – Application of stem cells.

UNIT IV - Techniques in Biotechnology

Hybridoma technology - monoclonal antibody production. Blotting technique –Southern blotting, Western blotting and Northern blotting. Construction of DNA library, DNA probe, DNA sequencing, PCR.

UNIT V- Transgenesis

Transgenesis - Technique of transgenic animal production- Gene targeting, Gene knockout. Applications of transgenic animals- transgenic sheep, fish, mosquito and Cow. Bioethics: Bio safety and Patenting of Biotech product and IPR.

Textbooks

1. Sathiyanarayana U., (2017). Biotechnology. Book and Allied (P) Ltd, Kolkata.
2. R. C. Dubey, 2014.A text book of Biotechnology, S. Chand & Co.New Delhi

Reference Books

1. Arora. M. Biotechnology (2nd Edition), Himalaya Publishing House, Ramdoot, Dr.Bhalero Marg, Giraon, Mumbai. – 400 004.
2. Gupta, P.K.Elements of Biotechnology. Rastogi Publications, Gangotri, Shivaji Road, Meerut - 250 002.
3. Jogdand, S. N. Gene Biotechnology (5th Edition) Himalaya Publishing House, Ramdoot, Dr. Bhalero Marg, Giraon, Mumbai. – 400 004.
4. Joshi, P. Genetic Engineering, Student Edition., Agrobios (India), Behind Nasrani Cinema, Chopasani Road, Jodpur – 342 002.
5. Kumar, H. D. Modern Concept of Biotechnology, Vikas Publishing House Private Ltd.576, Maszid Road, Jangpura, New Delhi – 100 014.
6. Sambamurty. A.V.S.S. Molecular Biology, Narosa Publishing Home, India Singh, B.D. Biotechnology Expanding horizon, Kalyani Publishers, India.

Course Outcomes

CO	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Define the fundamental concepts of genetic engineering	1,2,3,4	Remembering
CO-2	Compare the multiple methods involved in gene cloning	2,3,4	Understanding
CO-3	Examine the significance of animal cell and the stem cell culture	2,3,4,5	Applying
CO-4	Distinguish among the different blotting techniques	2,4,5	Analysing
CO-5	Adapt recent means in biotechnology	2,3,4,5	Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
V	21UEZO52A	FUNDAMENTALS OF BIOTECHNOLOGY	60	4

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓		✓	✓	✓	✓	✓	
CO-2	✓	✓	✓		✓		✓	✓	✓	
CO-3	✓	✓	✓		✓		✓	✓	✓	✓
CO-4	✓	✓	✓		✓		✓		✓	✓
CO-5	✓	✓	✓	✓	✓		✓	✓	✓	✓
	Number of matches (✓) = 39 Relationship = High									

SEMESTER – V

Course Title	**ENVIRONMENTAL TOXICOLOGY**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UEZO52B**
Course Type	**DSE-II-B**
Credits	**4**
Marks	**100**

General Objectives:

- To equip students with the skills to critically evaluate and understanding of the effects of chemicals on human health and environment.

Course Objectives:

CO	The learners will be able to:
CO-1	Define the basic concept of toxicology
CO-2	Discuss the process of eco-toxicology.
CO-3	Interpret the acute and chronic toxicity
CO-4	Distinguish the impact of various toxic chemicals in the Environment
CO-5	Evaluate the toxic effect on human and environment

Unit 1. Toxicology

Introduction- History of toxicants - Principles of toxicology – toxicants and toxicity, factors affecting toxic substances- their types – degradable and non-degradable toxicants.

Unit 2. Eco-toxicology

Introduction to eco-toxicology- the route and transport of toxicants by air, water and food- chain- biotransformation, bioconcetration and bio-magnification; Influence of ecological factors on the effects of toxicology. Global dispersion of toxic substances – dispersion and circulating mechanisms of pollutants.

Unit 3. Acute and chronic toxicity

Lethal and sub-lethal doses; Analysis of NOEL, LD50 and MLD; Dose-response relationship; Detoxification process –mechanisms – organs of detoxification. Carcinogens, mutagens and teratogens; Toxicity testing procedures.

Unit 4. Chemical toxicology :

Toxic chemicals in the Environment; Impact of Toxic chemicals on enzymes and biochemical effect of arsenic, cadmium, lead, mercury, carbon monoxide, nitrogen oxides, sulphur dioxide and cyanide.

Unit 5. Man and Environmental Toxins

Routes of toxicants to human body – inhalation, skin absorption, oral, injection; ADME – adsorption, distribution, metabolism and excretion; Response to toxin exposures – dose-response relationship, frequency and cumulative response. Environmental diseases: Asbestosis, silicosis, synopsis, asthma, fluorosis and allergis and epidemiological issues – Malaria, Kala azar, water borne diseases

References Books :

1. Calow.P. 1994. Handbook of Ecotoxicology. Blackwell Scientific Publications, London
2. Chatterji,M., M.Munasinghe and R.Ganguly. 1998. Environment and Health in Developing Countries. A.P.H.Publishing House, New Delhi.
3. Forbes,V.E. and T.L.Forbes. 1994. Ecotoxicology in Theory and Practice. Chapman & Hall, London.
4. Hayes, W.A. 2001. Principles and Methods of Toxicology, CRC, USA.
5. Jacobson-Kram,D. 2006. Toxicological testing handbook: Principles, Applications and Data Interpretation, Taylor and Francis, New York.
6. Klaassen,C.D. and Watkins,J.B. 2003. Essentials of Toxicology, McGrawHill Professional, New Delhi.
7. Levin,S.A. and M.A.Harwell, J.R.Kelley and K.D.Kemball. 1989. Ecotoxicology: Problems and Approaches. Springer-Verlag, New York.
8. Manahan,S.E. 2000. Environmental Chemistry, Lewis Publishers, New York.
9. Pery,G. 1980. Introduction to Environmental Toxicology, Elsevier, Amsterdam.
10. Walker,C.H., R.M.Sibly, S.P.Hopkin and D.B.Peakall. 2012. Principles of Ecotoxicology, CRC Press, New York.
11. Wright,D.A. and Welbourn,P. 2002. Environmental Toxicology, Cambridge University Press, London.

Course Outcomes

CO	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Highlight the importance of toxicology	1,2,4,5	Remembering
CO-2	Relate the biotransformation of toxin on environment	1,2,5	Understanding
CO-3	Explain the acute and chronic process of toxin	1,3,5	Applying
CO-4	Correlate the toxic effects of chemicals	1,2,3,5	Analysing
CO-5	Comment the mechanism of toxin on human and environment	1,2.3,5	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
V	21UEZO52B	ENVIRONMENTAL TOXICOLOGY	60	4

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO2	PLO 3	PLO 4	PLO 5	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓		✓	✓	✓		✓	✓
CO-2	✓	✓	✓	✓		✓	✓			✓
CO-3	✓	✓	✓		✓	✓		✓		✓
CO-4	✓	✓	✓	✓		✓	✓	✓		✓
CO-5	✓	✓	✓			✓	✓	✓		✓
	Number of matches (✓) = 37 Relationship = High									

SEMESTER – V

COURSE TITLE	**ENDOCRINOLOGY**
TOTAL HRS.	**60**
HRS./WEEK	**4**
COURSE CODE	**21UEZO52C**
COURSE TYPE	**DSE-IIC**
CREDITS	**4**
MARKS	**100**

GENERAL OBJECTIVES

- To make the students to learn the objectives and scope of endocrinology and their functions.

Course Objectives:

CO No.	The learners will be able to:
CO-1	Understand the concepts and scope of Endocrinology.
CO-2	Sketch the thyroid and parathyroid glands.
CO-3	Analyse the biological Actions of Adrenalilne and Noradrenaline
CO-4	Evaluate the Endocrine disorders of Islets of Langerhans.
CO-5	Develop the ways to cure different diseases of endocrine glands.

Unit I:INTRODUCTION TO ENDOCRINOLOGY AND PITUITARY

Introduction, objectives and scope of endocrinology- Classification and characteristic features of Hormones , Structure of Hypothalamus and pituitary Gland – Hormones of pituitary Gland Adenohypophysis . Pars Intermedia, Neurohypophysis , Hypothalamic Regulation for Release of pituitary Hormones. endocrine disorders pituitary Gland

Unit II: THYROID GLANDS

Structure of Thyroid Gland – Biosynthesis of Thyroid Hormones Biological functions of Thyroxine , Regulation of Thyroid Secretion Thyroid

Dysfunction-parathyroid Glands Biological Action of parathyroid Hormones – parathyroid Dysfunction.

Unit- III:ADRENAL GLANDS

Structural features – Hormones of Adrenal Cortex Biological Action of Adrenalilne and Noradrenaline – Emergency Hormones. Endocrine disorders of Adrenal glands.

UNIT- IV : ISLETS OF LANGERHANS

Islets of Langerhans – Insulin-Biosynthesis of Insulin Regulation of the secretion of Insulin-Biological Action of Insulin Mechanism of Action of Insulin , Endocrine disorders of Islets of Langerhans.

Unit V : REPRODUCTIVE ENDOCRINOLOGY

Structure of mammalian testis and ovary - male and female sex accessory organs - hormones of testis and ovary - Oestrous and menstrual cycle – hormones of pregnancy - Placental Hormones- parturition - hormonal control of lactation.

Reference Books :

1. Mac E Hadley, 1992 Endocrinology, Third edition, prentice Hall, New Jersy

2. Matsumoto A. and Ishi S., 1992 (eds). Atlas of endocrine organs, vertebrates and Invertebrates springier verlag, Germany

3. Wilson J.D and Foster D.W 1992, William's textbook of endocrinology, 8th edition, WB saunders company, Philadelphia

4. World health organization, Technical report series, 1992, oral contraceptives and neoplasia WHO, Geneva

5. Turner, C.D and Bagnarr, J.T., 1094, General Endocrinology, 6th Edition, WB Saunder's company, Philadelphia (Saunder's International Students edition)

6. Lamming, G.E. 1984. Marshall's physiology of Reproduction ; Reproductive cycles of vertebrates. Churchill livingstone, Edinburgh.

7. Prakash S Lohar Endocrinology, Hormones and Human Health.

Course Outcomes

CO No.	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Understand the characteristic features of Hormones.	1,2,3,5	Understanding
CO-2	Integrate the features of Thyroid Gland.	1,2,3	Applying
CO-3	Categorize the features of Adrenalilne and Noradrenaline.	1,2,3,4,	Analysing
CO-4	Comment the features of different disorders of Islets of Langerhans.	1,2,3	Evaluating
CO-5	Solve the diseases pertaining to endocrine glands.	1,2,3,4,5	Creating

Relationship Matrix

Semester	Course Code			Title of the Course		Hours				Credits
V	21UEZO52C			Endocrinology		60				4
Course Outcomes (COS)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO3	PLO4	PLO5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓		✓		✓	✓	✓		
CO-2	✓	✓		✓		✓	✓	✓		
CO-3	✓	✓		✓		✓		✓	✓	✓
CO-4	✓	✓	✓	✓		✓	✓	✓	✓	
CO-5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Number of matches (✓) = ……37. Relationship =High									

SEMESTER - VI

Course Title	**IMMUNOLOGY & MICROBIOLOGY**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UCZO61**
Course Type	**DSC-X**
Credits	**4**
Marks	**100**

General Objective:

To understand the significance of Immune system, Lymphoid organs, Lymphocytes, Sterilization and Culture techniques

Course Objectives:

CO No.	The learners will be able to:
CO-1	Define the innumerable forms of Immunity and Lymphoid organs
CO-2	Interpret the Immunocytes and Immune response
CO-3	Differentiate amongst a variety of Immunogobulins
CO-4	Evaluate the procedures in the process of staining
CO-5	Formulate culture techniques

UNIT I – Introduction

History and scope of Immunology - Immunity - Types of Immunity - Innate and acquired, Passive and Active. Lymphoid organs - Primary and secondary lymphoid organs - Thymus, Bone marrow, Bursa of Fabricius, Spleen, Tonsil, Lymph node, Peyer's patches.

UNIT II – Lymphocyte and Immune Response

Lymphocyte as unit of immune system – Stem cells, T cells and its types - B cells and macrophages. Immune response :Primary and secondaryresponse – Humoral immune response(B cell activation) – Cell mediated immune response (T cell activation) .

UNIT III – Immunoglobulin and Immune Diseases

Immunoglobulin - Structure, function and biological properties of Immunoglobulin classes. Interaction of antigen and anti body interactions-Auto immune diseases **–** Causes, Classification with one example each, Diagnosis and Treatment. Hypersensitivity-factors,symptoms and types. Tumour Immunology- Causes,properties and types- Immune response to tumour, factors involved in tumour immunity,Diagnosis and treatment of tumours.

UNIT IV – Introduction to Microbiology

Definition and Scope. History of Microbiology,Importance and Application of Microbiology. General structure of bacteria and viruses- Ultra structure of Eubacteria. Motility of bacteria-Hanging drop method Morphology and structure of TMV, HIV and lambda bacteriophage. Types of stains-simple stains, negative stains and Differential stains.

UNIT V – Sterilization and culture techniques of Microbes

Bacterial growth, Sterilization techniques, Culture media-General Purpose Media, Selective and Differential media. Isolation of microbes-Pure

culture techniques-Dilution plating,Streak plate and spread plate. Continuous and Batch culture techniques..Methods of bacterial identification- morphological, physiological, biochemical and serological properties.

TEXT BOOKS:

1. Rao, C. V. 2017-An Introduction to Immunology,Narosa PublishingHouse.
2. Purohit, S.S., 2005. A Text Book of Microbiology, Agrobios Publishers

REFERENCE BOOKS – IMMUNOLOGY

1. Berry A. K. A 2016 -Text Book of Immunology, EMKEY Publications.
2. Cazenave, P. A.and G.P.Talwar.1991- Immunology–Pauster's heritage, New Age International Publishers.
3. George Pinchuk, 2002. Immunology, TataMc .Graw – Hill Publishing Company
4. Joshi, K. R.and N. O. Osamo.2002 - Immunology and Serology, Agrobios Publishers
5. Kuby .2007- Text Book of Immunology, W.H.Freeman & company pvt Ltd

REFERENCE BOOKS – MICROBIOLOGY .

1. Powar and Daginawala. 2019-General Microbiology, Himalaya Publishinh House
2. Ananthanarayanan R and Panickar. J (2010).Textbook of Microbiology, Universities Press Publishers
3. Kalaiselvan, P .T .2004 –Microbiology and Biotechnology, A Laboratory Manual, MJP Publishers

Course Outcomes

CO No.	Upon completion of this course, students will be able to :	PSO addressed	Cognitive level
CO-1	Identify Active and Passive immunity	1,2,4,5	Remembering
CO-2	Generalize primary and secondary immune response	1,3,5	Understanding
CO-3	Illustrate Anti-gen and Anti-body interactions	1,3,4	Applying
CO-4	Analyse the hanging-drop technique and staining procedures	2,3,5	Analysing
CO-5	Create the pure culture and Batch culture techniques	1,2,4,5	Creating

Relationship matrix

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UCZO61	IMMUNOLOGY&AND MICROBIOLOGY	60	4

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓			✓	✓	✓	✓		✓	✓
CO-2	✓	✓	✓		✓	✓		✓		✓
CO-3	✓	✓	✓	✓		✓	✓		✓	
CO-4				✓	✓		✓	✓		✓
CO-5		✓	✓		✓	✓	✓		✓	✓
	Number of matches (✓) = …33…. Relationship = High									

SEMESTER – VI

Course Title	**BIOSTATISTICS & COMPUTER APPLICATIONS**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UCZO62**
Course Type	**DSC-XI**
Credits	**4**
Marks	**100**

General Objectives:

The course centers on the concepts and scope of biostatistics and basics of computer applications.

Course Objectives:

CO. No.	The learners will be able to:
CO-1	List the primary, secondary and data-sampling methods
CO-2	Classify the grouped and ungrouped data
CO-3	Interpret the data into table and graph
CO-4	Differentiate between the types of computer
CO-5	Develop computer- aided statistical techniques

UNIT I – Introduction

Introduction -Scope of Biostatistics -Collection of Data – primary and secondary data-sampling methods - Variables - Discrete and continuous presentation of Data – Classification and Tabulation – Partsand typesof tables - Diagrams and Graph: diagrams -Line diagram, Bar diagram, Pie diagram, graphs –Histogram, Frequency polygon and frequency curve.ogives

UNIT II - Measures of central tendencyand Dispersion

Calculatation for grouped and ungrouped data -measures of central tendency-Mean, median, mode, measures of dispersion – range,standard deviation and standard error, coefficient of variationand Variance. Test of Independence- Chi – square test and goodness of fit.

UNIT III – Probability and Correlation

Probability-definition-theories-Binominal, poisson and normal distribution, students 't' test and applications - correlation and Karl Pearson's correlation coefficient – rank correlation-simple regression. One way and two-way ANOVA

UNIT IV - Introduction to Computer

Types of computer, generation of computer, components of computer – input devices, output devices, DSCPU and memory units.

UNIT V - Introduction to M.S.Office

Basicconcepts of internet – E-mail, browsing, Web applications of computer. Microsoft excel – spreadsheet and presentation software- tool bars- cell character format – cell filling – worksheet – alignment of data and summation – calculation of average and percentage- graphic representation-line graph and bar diagram.

Textbooks

1.Gurumani, N .(2015) –An Introduction to Biostatistics (Computer Application included) MJP Publishers, Tamil Nadu Book House, 47, Nallathambi Street, Triplicane, Chennai

2.Arumugam, N. 2010. Biostatistics, Computer Applications, Bioinformatics and Instrumentation, Saras Publication, Nagercoil

Reference Books - Biostatistics

1. Palanisamy. S. and M. Manoharan 1990 Statistical Methods for Biologists, Palani Paramount Publications, Palani

2. Gurumani, N. 2005. An Introduction to Biostatistics, 2nd edition, MJP Publishers, Chennai

3. Agarwal S.K. 2008. Biostatistics, APH Publishing Corporation. New Delhi

REFERENCE BOOKS - COMPUTER APPLICATIONS

1. Rajaram, V. NEEHARIKA ADABALA–(2014) Fundamental of computers, Kindle Edition
2. Krishnamoorthy, R.- Computer programming and applications
3. Ram, B. – Computer structure and architectu

Course Outcomes

CO	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Tabulate the data and create graphical and diagrammatic representation for the data	1,3,4,5	Remembering
CO-2	Express the formulae of measures of central tendency	1,4,5	Understanding
CO-3	Examine the test of significance using, 't' test and ANOVA	3,4,5	Applying
CO-4	Explain the basics components of computer	4,5	Analysing
CO-5	Create innovative presentations using software tools	4,5	Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UCZO62	Biostatistics & Computer Applications	60	4

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO-2	✓	✓		✓	✓	✓			✓	✓
CO-3	✓	✓	✓		✓			✓	✓	✓
CO-4	✓	✓			✓				✓	✓
CO-5	✓	✓		✓	✓				✓	✓
	Number of matches (✓) = 34 Relationship = High									

SEMESTER - VI

Course Title	**APPLIED ZOOLOGY**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UCZO63**
Course Type	**DSC-XII**
Credits	**4**
Marks	**100**

General Objective:

To develop entrepreneur skills in the fields of Sericulture, Apiculture, Poultry, Vermiculture and Dairy farming.

Course Objectives:

CO No.	The learners will be able to:
CO-1	Understand the concepts of apiculture and methods of Bee keeping.
CO-2	Apply novel technological methods in Silkworm rearing and Cocoon reeling.
CO-3	Compare the Indigenous and exotic dairy Cattle Breeds.
CO-4	Consider Poultry- farming as a Self-Employment venture.
CO-5	Propose new techniques in vermiculture.

UNIT I: Apiculture

Apiculture:Classification of bees,Members of Bee colony – queen, drones and worker- functions of the members. Bee keeping – primitive and modern methods – artificial hives - Langstroth hive and Newton's hive – their advantages - appliances used in apiaries.Extraction of honey-preservation and storage of honey – nutritive value- medicinal value .Bee wax Bee venom – – method of extraction – characteristics and uses. Importance of bee colonies in crop pollination. Enemies of bees – greater wax moth, lesser wax moth, ants, wasps, lice, beetles and birds – their control.

UNIT II Sericulture

Sericulture: Types of silk; Silkworms and their host plants; Mulberry silkworm culture; Life history of silkworm;Structure of silk gland and secretion of silk

Silkworm rearing technology, appliances used,Spinning, harvesting and storage of cocoons and Reelingmulberry plant diseases and their control. Natural enemiesof silk worm and their control.

UNIT III: Dairy Management

Introduction to common dairy animals. Techniques of dairy management. Milk and milk products. Dairy Cattle Breeds – Indigenous and exotic – Dairy Cattle – Nutrition – Physiology –Breeding Techniques – Artificial insemination,Frozen Semen technology. Common Cattle Diseases.

UNIT IV: Poultry farming

Classification of Fowls based on their use – Broilers and Commercial layers. Principles of poultry breeding, Management of breeding stock and broilers, Processing and preservation
of eggs. Feed formulations for chicks. Nutritive value of egg and meet. Incubation and hatching of eggs.Poultry diseases - Viral, Bacterial, Fungal, Protozoan.Management of a modern Poultry Farm, progressive plans to promote Poultry as a Self-Employment venture

UNIT V: Vermiculture; Maintenance of reared animals

Introduction of Vermiculture . Vermiculture techniques. Biology of Eisenia foetida. Rearing of earthworms, Equipments , used in vermiculture, Bedding, Essential parameters for Vermiculture and Management. Methods of Harvesting (Manual & Mechanical). Vermiwash Collection, Composition and use. Economic Importance of Vermicomposting.

Textbooks :

1. Banerjee(2016) Applied Zoology, New Central Book Agency;
2. Shukla, G.S and V.B. Upadhyay(2010)Economic Zoology,Rastogi Publications.
3. Vasantharaj David, B.(2012) Elements of Economic Entomology,7th edition.Namrutha publications

Reference books :

1. Rhonda Sherman(2018), The worm farmers handbook, Chelsea green publishing company
2. S. Sarkar, G Kundu, K K Chaki(2016) Introduction To Economic Zoology,1st edition, New Central Book Agency (NCBA);
3. S Chaudhuri (2017), Economic Zoology,1st edition , New Central Book Agency (NCBA);
4. Banerjee (2016) Applied Zoology New Central Book Agency; Mary Violet Christy,(2014) Vermitechnology, MJP Publisher
5. B.S. Tomar, (2007)A Textbook Of Applied Zoology, Emkay Publications

Course Outcome

CO. NO.	Upon completion of the course, the students will be able to :	PSO'S addressed	COGNITIVE LEVEL
CO-1	Summarize the primitive and modern methods of Bee keeping.	1,2,4,5	Remembering/ Understanding
CO-2	Establish the practices in rearing silkworms.	1,2,4,5	Applying
CO-3	Analyse the process of Artificial Insemination and Frozen Semen technology.	1,2,4,5	Analysing
CO-4	Consider the Poultry farming as a category of entrepreneurship	1,2,4	Evaluating
CO-5	Develop a project for vermicompost.	1,4,5	Creating

Relationship Matrix

Semester	Course Code		Title of the Course			Hours			Credits	
VI	21UCZO63		Applied Zoology			60			4	
Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓		✓	✓	✓	✓	✓		
CO-2	✓	✓	✓	✓		✓	✓	✓	✓	
CO-3	✓	✓		✓	✓	✓	✓	✓	✓	
CO-4	✓	✓	✓	✓		✓	✓	✓	✓	✓
CO-5	✓	✓	✓	✓	✓			✓	✓	✓
	Number of matches (✓) = …40…. Relationship = High									

SEMESTER - VI

Course Title	**IMMUNOLOGY AND MICROBIOLOGY AND APPLIED ZOOLOGY PRACTICALS**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UCZO6P1**
Course Type	**PRACTICAL-VII**
Credits	**2**
Marks	**100/2**

General Objective:

To examine the Lymphoid organs, Immuno - diffusion, Blood grouping, Sterilization techniques and life cycle of Honey bees and Silk worms

Course Objectives:

CO No.	The learners will be able to:
CO-1	List the Lymphoid organs in Rat and immune diffusion
CO-2	Differentiate simple staining and gram staining
CO-3	Practice serial dilution techniques
CO-4	Experiment in the process of grouping Rh and ABO blood
CO-5	Reorganize the mouth parts of Honey Bee by mounting technique

IMMUNOLOGY & MICROBIOLOGY

1) Lymphoid organs in Rat (Demonstration) – Model/ chart/ CD. Students have to draw the diagram and write a detailed account of the lymphoid organs in rat in the observation note book.
2) Double immunodiffusion and radial immuno diffusion. (Demonstration)
3) Rh and ABO blood grouping.
4) Cleaning and sterilization.
5) Preparation of culture media for microbes (Nutrient agar, broth)
6) Serial dilution technique. (Demonstration)
7) Distribution of microbes in soil, water and air. (Demonstration)
8) Aseptic transfer of microbes and pureculture of bacteria, preservation and maintenance (Demonstration)
9) Simple staining of Bacteria.
10) Gram staining of Bacteria.
11) WIDAL Slide Test (Demonstration)
12) Microscopic counting of microbes using Haemocytometer (Demonstration only).
13) Spotters-Colony counter, Inoculation loop, Petri dishes**,** Laminar air flow chamber, Autoclave.

APPLIED ZOOLOGY PRACTICAL

1. Mounting of mouth parts of honey bee
2. Identification of queen bee, worker bee and drone
3. Dissection of silk gland in silkworm.
4. Life cycle of mulberry silkworm, *Bombyx mori* (model/chart/specimens)
5. Identification of different breeds of cattles (model/chart/specimens)

6. Determination of the specific gravity of milk by using a mercury lactometer.
7. Test for good quality eggs (Floating test, cracking test) and
8. Test for fertilized and unfertilized eggs (Light test, Cracking test).
9. External morphology of poultry birds (model).
10. Identification of diseases of fowls (model/chart/specimens)
11. Project report on visit to dairy farm / Poultry farm

COURSE OUTCOMES

CO No.	Upon completion of this course, students will be able to:	PSO addressed	Cognitive level
CO-1	Identify lymphoid organs of rat.	1,2,4,5	Remembering
CO-2	Classify between Simple and Gram staining.	2,3,4,5	Understanding
CO-3	Examine the viable cell count by serial dilution technique	1,3,4	Applying
CO-4	Experiment among Human blood groups	2,3,5	Analysing
CO-5	Collaborating the queen ,drone and worker bee	1,2,4	

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UCZO6P1	IMMUNOLOGY AND MICROBIOLOGY AND APPLIED ZOOLOGY PRACTICALS	60	2

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓		✓	✓	✓	✓	✓		✓	✓
CO-2	✓	✓	✓		✓		✓	✓	✓	✓
CO-3	✓			✓		✓		✓	✓	
CO-4	✓	✓	✓	✓	✓		✓	✓		✓
CO-5		✓	✓		✓	✓	✓		✓	
	Number of matches (✓) = …35…. Relationship = High									

SEMESTER – VI

Course Title	**BIOSTATISTICS & COMPUTER APPLICATIONS PRACTICALS**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UCZO6P2**
Course Type	**Practical-VIII**
Credits	**2**
Marks	**100/2**

General Objective:

To acquire knowledge in biostatistics through collection, classification and tabulation of data

Course Objectives:

CO	The learners will be able to:
CO-1	Define the measure of central tendency
CO-2	Understand the concept of correlation and co-efficient of the given data
CO-3	Illustrate the collected data in graphical mode
CO-4	Evaluate the goodness of fit using coin tossing
CO-5	Develop the skills in computer integrated statistical methods

BIOSTATISTICS & COMPUTER APPLICATIONS PRACTICALS

1. Study of probability with 2 coins tossing experiments.
2. CalculationofMean, Median, Mode, Variance,Standard deviation and Standard error using Neem leaves.
3. Calculation of Correlation Co efficient - Height and weight of students
4. Testing goodness of fit using coin toss (Chi square test)
5. Preparation of a questionnaire and collection of primary data by survey method.
6. Diagrammatic presentation of data - simple bar diagram and pie diagram(using given data)
7. Graphical presentation of data – histogram, frequency polygon and frequency curve(using given data).
8. Preparation of slides using M.S PowerPoint.
9. Spotters
   1) Bar diagrams,
   2) Pie diagrams,
   3) Histogram.
   4) Input devices – Key board, Mouse
   5) Output devices – Monitor, printer,
   6) CPU – Central Processing Unit

Course Outcomes

CO	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Find the mean, median, mode, SD, SE and variance	1,2,3	Remembering
CO-2	Estimate the chi-square test using coin toss	1,2,3	Understanding
CO-3	Determine the probability using coins	1,2,3	Applying
CO-4	Organize slides using Microsoft PowerPoint	5	Analysing
CO-5	Devise the input and output devices.	5	Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UCZO6P2	BIOSTATISTICS & COMPUTER APPLICATIONS PRACTICALS	60	2

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO2	PLO 3	PLO 4	PLO 5	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓			✓	✓	✓		
CO-2	✓	✓	✓			✓	✓	✓		
CO-3	✓	✓	✓			✓	✓	✓		
CO-4			✓		✓					✓
CO-5			✓		✓					✓
	Number of matches (✓) = 24 Relationship = Low									

SEMESTER – VI

Course Title	**APPLIED BIOTECHNOLOGY**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UEZO61A**
Course Type	**DSE-III-A**
Credits	**4**
Marks	**100**

General Objective:

To understand and apply the biotechnological methods in the protection of environment, genetic improvement of agricultural plants, aquatic resources and livestock for the welfare of human beings.

Course Objectives:

CO	The learners will be able to:
CO-1	State the scope and applications of biotechnology
CO-2	Observe the modern practices of biotechnology
CO-3	Establish the process of primary and secondary metabolites production
CO-4	Distinguish between the types of vaccine and biosensor
CO-5	Grade the sources of bioinformatics and nanotechnology

UNIT I - Environmental Biotechnology

Introduction – solid and liquid wastes, Bio-technological methods for waste water treatment – Preliminary, Primary, Secondary, Tertiary treatment (Aerobic & anaerobic treatment).Bioremediation: Definition – types of Xenobiotics, Bio-degradation of pesticide, Role of genetically engineered microorganisms in bioremediation- super bug. Biotechnological methods for pollution detection.

UNIT II - Agricultural and Live stock Biotechnology

Somatic cell hybridization and Micro-propagation - Genetic manipulation of 'nif' gene and 'nod' gene for nitrogen fixation. Transgenic plants – their advantages & disadvantages.Biofertilizers – Rhizobium and Azotobacter. Single Cell Protein (SCP)

UNIT III - Bioprocess Technology

Bioreactors, Fermentation Process – Metabolites – Primary Metabolites –Ethanol Production – Secondary Metabolites– Enzyme Production – Galactosidase. Biogas – production, Advantages & disadvantages.

UNIT IV - Biotechnology and health care

Human Genome Project- principle and application. Vaccines - Recombinant Vaccines, DNA Vaccines.Gene therapy- types – vectors used in gene therapy. DNA finger printing technique and applications.Bio sensors – Types – applications.

UNIT V – Bioinformatics and Nanotechnology

Introduction, Definition, History – Biological databases- National Center for Biotechnology and Informatics (NCBI); European Bioinformatics Institute (EBI) sequence alignment and database searching- protein database – SWISSPORT & PIR – Sequencing similarity search tools– BLAST and FASTA – applications.

Nano technology – definition, classification. methods of synthesis – solgel method and bacterial synthesis,application in biology.

Textbooks :

1. Sathyanarayana U., (2017). Biotechnology. Book and Allied (P) Ltd, Kolkata.
2. SinghB .D (2015),BiotechnologyKalyaniPublishers.Mahalakshmistreet, T.Nagar,Chennai – 600017.
3. Dubey R.C. (2014), A Text bookofBiotechnology. S.Chand& Co Ltd . 7361,Ramnagar, New Delhi – 110055.

Reference books :

1. Arora M.P.-Biotechnology (IInd Edition) Himalaya Publishing House, Ramdoot. Dr. Bhalerao Marg, Girgaon Mumbai – 400004.
2. Gupta P.K - Elements of Biotechnology. Rastogi Publications, Gangotri, Shivaji Road, Mererut – 2500002
3. Herren, R.V. Introduction to Biotechnology, Thomson Learning, Alps Buildings,Ist Floor, 56 Janpath, New Delhi – 110001.
4. Joshi.P- Genetic Engineering. Student Edition, Agrobios (India) Behind NasraniCinema, Chopasani Road, Jodhpur – 342002
5. Prakash S. Lohar- Biotechnology, M.J.P.Publishers, TamilnaduBook house47, Nallathambi Street Triplicane – 600005.
6. Trivedi P.C - Advances in Bio-technology, Agrobios(India) Behind Nasrani Cinema, Choprasani Road Jodhpur – 342002.
7. Vikaspruthi - Basic Biotechnology, ANE Books India,Avantika Nivas,19,Doraisamy Road T.Nagar Chennai – 600017.
8. Yount.L –Genetics & Genetic Engineering, Orient Longman Limited PostBox No : 310, 160 Anna Salai, Chennai – 600002.
9. Shanmugam - Nanobiotechnology – MJP publication, Chennai

Course Outcomes

CO	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Identify the principles of waste water treatment and bioremediation	2,3,4,5	Remembering
CO-2	Compare the techniques of somatic hybridization and trans-genesis	3,4,5	Understanding
CO-3	Practice the use of bio-fuel and biogas	2,3,4,5	Applying
CO-4	Explain the principle and application of human genome project	1,3,4,5	Analysing
CO-5	Assess the application of bioinformatics and nanotechnology	4,5	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UEZO61A	APPLIED BIOTECHNOLOGY	60	4

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO2	PLO 3	PLO 4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓	✓	✓	✓			✓	✓	✓	✓
CO-2	✓	✓	✓		✓			✓	✓	✓
CO-3	✓	✓	✓				✓	✓	✓	✓
CO-4	✓	✓	✓	✓		✓		✓	✓	✓
CO-5	✓	✓	✓		✓				✓	✓
	Number of matches (✓) = 36 Relationship = High									

SEMESTER – VI

Course Title	**MEDICAL MICROBIOLOGY**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UEZO61B**
Course Type	**DSE-III-B**
Credits	**4**
Marks	**100**

General Objective:

The course teaches normal microflora, infection, types and its transmission, epidemiology, pathogenesis, diagnosis, prevention and treatment of bacterial and viral infections, fungal and parasite diseases.

Course Objectives:

CO	The learners will be able to:
CO-1	Explain the normal flora and its importance.
CO-2	Demonstrate on epidemiology, pathogenesis, diagnosis and treatment of bacterial diseases.
CO-3	Apply the diagnostic methods and the treatment for viral diseases.
CO-4	Classify the superficial, subcutaneous systemic mycoses, and opportunistic mycoses.
CO-5	Interpret the parasitic infections including amoebiasis, giardia and malaria.

UNIT I: BASICS OF MEDICAL MICROBIOLOGY

Introduction- Importance of Medical Microbiology, Koch's postulates. Normal flora of the human body - Normal microflora of skin, throat, gastrointestinal tract, Host pathogen interaction: Infection, Invasion, Pathogenicity, Virulence and Toxigenicity. Nosocomial infections. Collection, transport and culturing of clinical samples.

UNIT II: MEDICAL BACTERIOLOGY

Introduction - Epidemiology, pathogenesis, laboratory diagnosis, prevention and treatment of the following bacteria- *Streptococcus pyogenes, E.coli*, *Shigella*, *Salmonella, Vibrio cholerae, Mycobacterium tuberculosis*, *Treponema palladium, Neisseria gonorrheae*

UNIT III: MEDICAL VIROLOGY

Introduction- Epidemiology, Pathogenesis, Laboratory diagnosis, Prevention and treatment of the following virus – Hepatitis B virus , Influenza Virus, HIV, COVID- 19, Rabies virus-Polio virus- Dengue fever

UNIT IV: MEDICAL MYCOLOGY

Introduction- Epidemiology, pathogenesis, laboratory diagnosis, prevention and treatment of the following fungal infections—

Dermatophytosis, Cutaneous mycoses (*Tinea pedis*), Superficial mycosis, Subcutaneous and Systemic mycosis (Candidiasis) and opportunistic mycosis.

UNIT V: MEDICAL PARASITOLOGY

Introduction- Epidemiology, Pathogenesis, Laboratory diagnosis, Prevention and treatment of the following parasitic infections-*Entamoeba histolytica*, Giardiasis, *Plasmodium malariae*, *Trichomonas vaginalis* Leishmaniasis.

Textbooks:

1. Pelczar, J. *et al.,Microbiology*- McGraw- Hill Inc, New York. 1993
2. Anathanarayanan, R., and Panicker, J. *Text book of microbiology*. Orient Longmans, India. 2000.
3. Pasha C., and Muthenna, P. *A text book of medical microbiology*, KedarNath Ram Nath, Meerut. 2019.
4. Mukherjee, K.L. *Medical Laboratory Technology Vol I-III.* Mc Graw Hill Publishing Co, Ltd, New Delhi. 2010.
5. Rajan, S. *Medical microbiology*. MJP publisher, Chennai. 2007.

Reference Books:

1) Sherris, K.J.R. *Medical Microbiology 7th edition.* McGraw- Hill Inc, New York.2018.
2) Prescott, L.M. *et al.,Microbiology 7th edition.* McGraw- Hill Inc, New York. 2008.

Course Outcomes

CO No	Upon completion of this course, students will be able to:	PSO addressed	Cognitive level
CO-1	Outline the importance of medical microbiology.	1, 3,5	Understanding
CO-2	Demonstrate the epidemiology, pathogenesis, diagnosis and treatment of bacterial diseases.	1, 4,5	Applying
CO-3	Apply the diagnostic methods and the treatment for viral diseases.	1, 2,4,5	Applying
CO-4	Analyze the superficial, subcutaneous systemic mycoses, and opportunistic mycoses.	1, 2,3,4,5	Analyzing
CO-5	Intrepret the parasitic infections including amoebiasis, giardia and malaria.	1, 3,4,5	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UEZO61B	Medical Microbiology	60	4

Course Outcomes (COS)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO 1	PLO 2	PLO 3	PLO4	PLO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO-1	✓		✓	✓	✓	✓			✓	✓
CO-2	✓	✓	✓	✓					✓	✓
CO-3	✓	✓	✓		✓	✓	✓	✓	✓	
CO-4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO-5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Number of matches (✓) = 41 Relationship = High									

SEMESTER – VI

Course Title	**ENVIRONMENTAL BIOTECHNOLOGY**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UEZO61C**
Course Type	**DSE-III-C**
Credits	**4**
Marks	**100**

General Objectives:

To gain knowledge and applications of biotechnology with reference to environment

Course Objectives:

CO	The learners will be able to:
CO-1	Define the fundamentals of environmental biotechnology
CO-2	Describe the process of fermentation.
CO-3	Experiments the environmental biomonitoring
CO-4	Value the transgenic plants
CO-5	Design the production of products by the biotechnology process

UnitI: Environmental Biotechnology

Introduction, Scope and role of Environmental Biotechnology, Integrated approach in environmental biotechnology - Immobilization, Degradation and Monitoring of Pollutants from water, air and soil origin.

Unit II: Fermentation in environmental Biotechnology

Introduction and Importance of fermentation-Types of bioreactor, design of bioreactor; Types of fermentation: Batch, Continuous and Fed-batch system; Batch culture and kinetics; Continuous culture – types, multistage systems, feedback systems; Comparison of batch and continuous culture – biomass productivity, metabolite productivity, continuous culture and biomass productivity, Fed-batch culture – types and applications Strain improvement: Methods of strain improvement in fermentation.

Unit :III Environmental Monitoring

Definition and environmental monitoring process; Sampling – land (site) sampling, water sampling, air sampling, Analysis – physical, chemical and biological analysis methods and process Use of microbial population for environmental monitoring – recombinant DNA technology and proteomics Monitoring pollution; Bioindicators; Biomarkers – biochemical indicators, immunochemistry, genetic indicators; Biosensors – mechanism, principle and Environment Impact Assessment

Unit :IV Agricultural Biotechnolgy

Application of biotechnology in agriculture – Detection and diagnostics, Micropropagation; Somatic cell genetics – production of callus and suspension cultures, production of protoplasts, somaclonal variation, protoplast fusion, haploid production Transgenic plants: Production of transgenic plants – complete process, vectors used, transformation methods used; Types of GM Plants and Products obtained from GM Plants.

Unit : V

Industrial Biotechnology

Introduction, history, Isolation and screening, Primary and Secondary screening, Production strains, Production media, Inoculum preparation and inoculum Development, Introduction to Fermenter, Industrial sterilization, Scale up fermentations, Types of fermenters, Acetator and cavitator, product recovery, Industrial production of penicillin, production of microbial insecticides, production of Biopolymers, Biofuels, biogas, production of Bioplastics, Biosurfactants, and Biofertilizers,

Reference Books :

1. Evans, G.G. & Furlong, J. 2010. Environmental Biotechnology: Theory and Application (2nd edition). Wiley-Blackwell Publications.
2. Scagg, A.H. 2005. Environmental Biotechnology. Oxford University Press. Reference Books:
3. Jordening, H.J. & Winter J. 2005. Environmental Biotechnology: Concepts and Applications. John Wiley & Sons.
4. Lodish, H.F., Baltimore, D., Berk, A. Zipursky, S.L. Matsudiara, P. & Darnell, J. 1995. Molecular Cell Biology. W.H. Freeman.
5. Nelson, D.L. & Cox, M.M. 2013. Lehninger's Principles of Biochemistry. W.H. Freeman.
6. Rittman, B.E. & McCarty, P.L. 2001. Environmental Biotechnology. Principles and Applications. McGraw-Hill, New York.

7. Snustad, D.P. & Simmons, M.J. 2011. Principles of Genetics (6th edition). John Wiley & Sons.
8. Wainwright, M. 1999. An Introduction to Environmental Biotechnology, Springer.

Course Outcomes

CO	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Define integrated approach in environmental biotechnology	1,2,4,5	Remembering
CO-2	Relate the fermentation in fermentor.	1,2,5	Understanding
CO-3	Explain the monitoring of pollution	1,3,5	Analysing
CO-4	Assess the application of biotechnology in agriculture	1,2,3,5	Evaluating
CO-5	Devise the industrial biotech products	1,2.3,5	Creating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
VI	18UEZO61C	ENVIRONMENTAL BIOTECHNOLOGY	60	4

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	✓	✓	✓		✓	✓	✓		✓	✓
CO-2	✓	✓	✓	✓		✓	✓			✓
CO-3	✓	✓	✓		✓	✓		✓		✓
CO-4	✓	✓	✓	✓		✓	✓	✓		✓
CO-5	✓	✓	✓			✓	✓	✓		✓
	Number of matches (✓) = 37 Relationship = High									

SEMESTER - VI

Course Title	**PROJECT**
Total Hrs.	**60**
Hrs./Week	**4**
Course Code	**21UEZO62**
Course Type	**DSE-IV**
Credits	**4**
Marks	**100**

GUIDELINES:

1. The project may be done individually or in groups not exceeding five per group.
2. The minimum length of the project should be 30 pages in A4 size.
3. Marks for the project report will be 100 divided as 60% for the project and 40% for Viva-Voce Examination.

EVALUATION SCHEME:

The Project will be evaluated by both the Internal and External Examiners. Each Examiner will evaluate for 100 marks. The average mark obtained by the candidate is considered marks for the Project Report. The allocation of marks for Project is as follows:

Scheme of Evaluation:

Project	Internal	External
Word of title / Topic	5	5
Objectives / Formulation including Hypothesis	5	5
Review of Literature	10	10
Methodology / Techniques / Procedures adopted	15	15
Summary / Findings / Summation	10	10
Works Cited / Work Consulted / References / Annexures / Footnotes	10	10
Relevance of project to social needs	5	5
	60	**60**

SEMESTER VI

Course Title	**MUSHROOM CULTURE TECHNOLOGY**
Total Hrs.	**30**
Hrs./Week	**2**
Course Code	**21USBT61**
Course Type	**SEC V**
Credits	**2**
Marks	**100**

General Objectives:

To make students aware of the growing techniques,medicinal, nutritional, national and international market value of mushrooms.

Course Objectives:

CO	The learners will be able to:
CO-1	Recall the various types and categories of mushrooms.
CO-2	Understand the ways to cultivate mushrooms.
CO-3	Practice and usethe available technologies of mushroom cultivation.
CO-4	Relate the nutritional and medicinal value associated with mushroom besides explaining the storage methods.
CO-5	Measurethe preparation of various mushroom dish with medicinal and nutritional value.

UNIT – I

Introduction and history of mushroom cultivation in India. Medicinal value of Mushrooms; Edible & Poisonous Mushrooms in India. Research centers--National level and regional level.

UNIT – II

Cultivation technology, spawn preparation, mushroom bed preparation. Factors affecting the mushroom bed preparation -- low cost technology, composting technology in mushroom production- spent mushroom substrate (SMS).

UNIT – III

Cultivation technology of Oysters, Button and Milky mushrooms.

UNIT – IV

Nutrition of mushroom- proteins, amino acids, mineral elements nutrition-carbohydrates, crude fibre content- vitamins. Storage - short term storage, long term storage drying.

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UNIT – V

Food preparation, Types of food prepared from mushroom - Mushroom sabji, Mushroom Achar, Mushroom soup, Mushroom Cutlet, Samosa, Curry, Soup Powder and Idly chutney powder.

Field visit to Mushroom farm and One day Training on Mushroom cultivation.

Guest Lecturer on Mushroom Cultivation

TEXT BOOK:

Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.

REFERENCE BOOKS :

1. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
2. Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.
3. Paul Stamets, J.S. and Chilton, J.S. (2004). Mushroom Cultivator: A practical guide to growing mushrooms at home, Agarikon Press.
4. Shu-Ting Chang, Philip G. Miles, Chang, S.T. (2004). Mushrooms: Cultivation, nutritional value, medicinal effect and environmental impact, 2nd ed, CRC press.
5. Tewari, Pankaj Kappor, S.C. (1998) Mushroom cultivation, Mittal Publications, Delhi.

Course Outcomes

CO	Upon completion of the course, the students will be able to:	PSOs Addressed	Cognitive Level
CO-1	Differentiate the various types and categories of mushrooms.	2,3,4,5	Understanding
CO-2	Understand the process involving the cultivation of mushrooms.	1,2,3,4	Understanding
CO-3	Practice the cultivation of different types of mushrooms.	2,3,4	Applying
CO-4	Evaluate the nutritional value of mushrooms.	2,3,4,5	Evaluating
CO-5	Recommend themselves and others about mushroom farming for self-employment.	2,3,4,5	Evaluating

Relationship Matrix

Semester	Course Code	Title of the Course	Hours	Credits
VI	21USBT61	MUSHROOM CULTURE TECHNOLOGY	30	2

Course Outcomes (COs)	Programme Learning Outcomes (PLOs)					Programme Specific Outcomes (PSOs)				
	PLO1	PLO2	PLO3	PLO4	PLO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	✓	✓	✓	✓	-	-	✓	✓	✓	✓
CO-2	✓	✓	✓	✓	✓	✓	✓	✓	✓	-
CO-3	✓	✓	✓	✓	-	-	✓	✓	✓	-
CO-4	✓	✓	✓	✓	-	-	✓	✓	✓	✓
CO-5	✓	✓	✓	✓	✓	-	✓	✓	✓	✓
	Number of matches (✓) = 41 Relationship = **High**									

THE SCHEME OF EXAMINATIONS UNDER CHOICE BASED CREDIT SYSTEM

- The medium of instruction in all the UG and PG Programmes is English and Students shall write the CIA Tests and the Semester Examinations in English. Three CIA Tests for one hour each will be conducted. For the calculation of CIA Tests marks the average of the best two tests will be taken. The portion for each test can be 1.5 units of the unitized syllabi.
- Two assignments for the Undergraduate Programmes and one assignment and one seminar for the Postgraduate Programmes are compulsory.
- Two Practical Examinations will be conducted for CIA at the end of the semester and the average will be taken.

Distribution of Marks for the Students admitted into the UG and PG Programmes from the academic year 2021-2022

CIA Tests and Semester Examinations

Undergraduate, Certificate, Diploma and Advanced Diploma Programmes						
Course Type	TOTAL MARKS	CIA TESTS MAX.MARKS	SEMESTER EXAMINATION Max. Marks	PASSING MINIMUM		
				CIA	SEM. EXAM	OVERALL
Theory	100	25	75	Nil	30	40
Practical (2Hrs.)	50	20	30	Nil	12	20
Practical (4Hrs.)	100	40	60	Nil	24	40
Project	100	Nil	Report- 60 Marks Viva-Voce- 40 Marks	Nil	Nil	100

Postgraduate Programmes						
Course Type	TOTAL MARKS	CIA MARKS	SEMESTER EXAM	PASSING MINIMUM		
				CIA	SEM. EXAM	OVERALL
Theory	100	40	60	Nil	30	50
Practical	50	20	30	Nil	15	25
Practical (for PG Maths only)	100	40	60	Nil	30	50
Project Report	150	Nil	Project Report- 90 Marks Viva-Voce Examination - 60 Marks	Nil	Nill	150

CIA TESTS

Distribution of Marks

Components	Tests (A)			Assignment (B)	Seminar (C)	Record Note (D)	Total (A+B+C+D)
	I	II	III	5	-	-	25
UG-Theory	20	20	20				
	The Average of the Best Two Tests:20						
PG-Theory	30	30	30	5	5	-	40
	The Average of the Best Two Tests:30						
UG-Practical (2 hrs)	15	15		-	-	5	20
	The Average of the Tests: 15						
UG-Practical (4 hrs)	30	30		-	-	10	40
	The Average of the Tests: 30						
PG-Practical	15	15		-	-	5	20
	The Average of the Tests: 15						
PG-Practical (Maths only)	30	30		-	-	10	40
	The Average of the Tests: 30						

Question Pattern for CIA Test (Theory)

Programme	Question Paper Pattern			Total (A+B+C)
	Part-A	Part-B	Part-C	
UG	MCQs-8x0.5=4 marks	Internal Choice (Either or type). 2x4=8 marks Answer should not exceed 250 words	Internal Choice (Either or type) 1x8=8 marks Answer should not exceed 500 words	20
PG	MCQs-20x0.5=10 marks	Internal Choice (Either or type) 3x4=12 marks Answer should not exceed 250 words	Internal Choice (Either or type) 1x8=8 marks Answer should not exceed 500 words	30

End Semester Examination (ESE)

The students who have put in the required number of days of attendance are eligible to appear for the End Semester Examinations irrespective of whether they have passed in the CIA Tests or not. They have to pay the examination fees for all the current courses and the arrear courses, if any, and submit the application form before the due date specified for the purpose. For any reason, the

dates will not be extended. Hall tickets will be issued only for those who have paid the fees. The question papers for the End Semester Examinations for all the theory courses of the UG and the PG Programmes will be set for 75 marks.

Question Pattern for End Semester Examinations (Theory)

Programme	Question Paper Pattern			Total (A+B+C)
	Part-A	**Part-B**	**Part-C**	
UG	MCQs- 30x0.5=15 marks	Internal Choice (Either or type) 5x4=20 marks Answer should not exceed 250 words	Internal Choice (Either or type) 5x8=40 marks Answer should not exceed 500 words	**75**
PG	MCQs- 30x0.5=15 marks	Internal Choice (Either or type) 5x4=20 marks Answer should not exceed 250 words	Internal Choice (Either or type) 5x8=40 marks Answer should not exceed 500 words	$\mathbf{(\frac{x}{75} x\ 60)}$ **60**

The Question Paper Pattern for the End Semester Examinations (Practical)

The Question Paper Pattern is designed by the respective departments.