SADAKATHULLAH APPA COLLEGE

(AUTONOMOUS)

(Reaccredited by NAAC at an 'A' Grade with a CGPA of 3.40 out of 4.00 in the III cycle An ISO 9001:2008 Certified Institution)

RAHMATH NAGAR, TIRUNELVELI- 11.

Tamilnadu

DEPARTMENT OF ZOOLOGY

MY LORD
VOUCHSAFE ME WISDOM

CBCS SYLLABUS

For

B.Sc. Zoology

(Applicable for students admitted in June 2015 and onwards)

(As per the Resolutions of the Academic Council Meeting held on 23.02.2016)

CONTENTS

B.Sc. ZOOLOGY

COURSE STRUCTURE (CBCS)

(Applicable for students admitted in June 2015 onwards)

ALLIED I – Nutrition & Dietetics **ALLIED II – Plant Biology & Plant Biotechnology**

I SEMESTER				II SEMESTER			
P	**COURSE**	**H/W**	**C**	**P**	**COURSE**	**H/W**	**C**
I	Tamil / Arabic	6	3	**I**	Tamil / Arabic	6	3
II	English	6	3	**II**	English	6	3
III	Core–1	4	5	**III**	Core–3	4	5
	Core–2	3	4		Core–4	3	4
	Core Practical–I*	3	–		Core Practical–I*	3	3
	Allied I–Paper I	3	4		Allied I–Paper II	3	4
	Allied I–Practical*	3	–		Allied I–Practical*	3	2
IV	Environmental Studies	2	1	**IV**	Value Education I / II	2	1
	TOTAL	**30**	**20**		**TOTAL**	**30**	**25**
III SEMESTER				**IV SEMESTER**			
I	Tamil / Arabic	6	3	**I**	Tamil / Arabic	6	3
II	English	6	3	**II**	English	6	3
III	Core–5	3	4	**III**	Core–6	3	4
	Core Practical–II*	3	–		Core Practical–II*	3	3
	Allied II–Paper I	3	4		Allied II–Paper II	3	4
	Allied II–Practical*	3	–		Allied II–Practical*	3	2
IV	Skill Based Elective–1	3	2	**IV**	Skill Based Elective–2	3	2
	Non Major Elective–1	3	2		Non Major Elective–2	3	2
				V	Extension Activities	—	1
	TOTAL	**30**	**18**		**TOTAL**	**30**	**24**
V SEMESTER				**VI SEMESTER**			
III	Core–7	6	6	**III**	Core–10	6	6
	Core–8	5	5		Core–11	5	5
	Core–9	5	5		Core–12–Project	5	5
	Core Practical–III*	3	–		Core Practical–III*	3	3
	Core Practical–IV*	3	–		Core Practical–IV*	3	3
	Core Elective–1	5	6		Core Elective–2	5	6
	Core Elective Practical*	3	–		Core Elective Practical*	3	3
	TOTAL	**30**	**22**		**TOTAL**	**30**	**31**

* Practical Examination–End of even semester **G2–S**

B.Sc. Zoology (2015 – 2016 Onwards) (With Nutrition & Dietetics and Plant Biology & Plant Biotechnology Allied)						
DISTRIBUTION OF CREDITS, NO. OF PAPERS & MARKS						
Part	**Course**	**Semester**	**Hrs.**	**Credits**	**No. of Papers**	**Marks**
I	Tamil / Arabic	I to IV	24	12	4	400
II	English	I to IV	24	12	4	400
III	Core + Core Practical	I to VI	71	67	11+ 4	1500
	Core Elective + CE Practical + Project	V & VI	21	20	2 + 1 + 1	400
	Allied + Practical	I to IV	24	18	4 + 2	600
IV	Environmental Studies	I	2	1	1	100
	Social Value Education	II	2	1	1	100
	Skill Based Elective	III & IV	6	4	2	200
	Non Major Elective	III & IV	6	4	2	200
V	Extension Activities	I to IV	– –	1	1 (No Exam)	100
		TOTAL	**180**	**140**	**40**	**4000**

SEMESTER WISE DISTRIBUTION OF HOURS

Part	**I**	**II**	**III**				**IV**			**Total**
Sem	**T/A**	**ENG**	**Core + Pract**	**CE**	**PRO**	**Allied+ Pract**	**SBE**	**NME**	**VE/ES**	
I	6	6	7+3	–	–	3+3	–	–	2	**30**
II	6	6	7+3	–	–	3+3	–	–	2	**30**
III	6	6	3+3	–	–	3+3	3	3	–	**30**
IV	6	6	3+3	–	–	3+3	3	3	–	**30**
V	–	–	16+6	5+3	–	–	–	–	–	**30**
VI	–	–	11+6	5+3	5	–	–	–	–	**30**
TOT	**24**	**24**	**47+24=71**	**10+6=16**	**5**	**12+12= 24**	**6**	**6**	**4**	**180**

B.Sc. Zoology
(With Nutrition & Dietetics and Plant Biology & Plant Biotechnology Allied)
(Applicable for students admitted in June 2015 onwards)
TITLE OF THE PAPERS, CREDITS & MARKS

I SEMESTER

P	SUB	Title of the paper	S.CODE	H/W	C	MARKS		
						I	E	T
I	TA 1	இக்காலத் தமிழ்	15UTAL11	6	3	25	75	100
	AR 1	Applied Grammar and Translation – I	15UARL11					
II	EN 1	Prose, Poetry and Remedial Grammar-I	15UENL11	6	3	25	75	100
III	C 1	Animal Diversity – I – Invertebrata	15UZOC11	4	5	25	75	100
	C 2	Animal Diversity – II – Chordata	15UZOC12	3	4	25	75	100
	CP 1	Core Zoology Practical – I	–	3	–	Examination II Semester		
	AI 1	Food Science	15UFNA11	3	4	25	75	100
	AIP	Allied Nutrition & Dietetics Practical	--	3	-	40	60	100
IV	ES	Environmental Studies	15UEVS11	2	1	25	75	100
			TOTAL	**30**	**21**	**150**	**450**	**600**

II SEMESTER

I	TA 2	சமயத் தமிழ்	15UTAL21	6	3	25	75	100
	AR 2	Applied Grammar and Translation – II	15UARL21					
II	EN 2	Prose, Poetry and Remedial Grammar – II	15UENL21	6	3	25	75	100
III	C 3	Developmental Biology	15UZOC21	4	5	25	75	100
	C 4	Ecology and Evolution	15UZOC22	3	4	25	75	100
	CP 1	Core Zoology Practical – I	15UZOC2P	3	3	40	60	100
	AI 2	Applied Nutrition	15UFNA21	6	5	25	75	100
IV	AIP	Allied Nutrition and Dietetics Practical	15UFNA2P	3	2	40	60	100
	VE	Value Education – I	15USVE2A	2	1	25	75	100
		Value Education - II	15USVE2B					
			TOTAL	**30**	**24**	**190**	**510**	**700**

B.Sc. Zoology

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TITLE OF THE PAPERS, CREDITS & MARKS

III SEMESTER

P	SUB	Title of the paper	S.CODE	H/W	C	MARKS		
						I	E	T
I	TA 3	பயன்பாட்டுத் தமிழ்	15UTAL31	6	3	25	75	100
	AR 3	Prose and Letter Writing	15UARL31					
II	EN 3	One-Act Plays and Writing Skill	15UENL31	6	3	25	75	100
III	C 5	Cell & Molecular Biology	15UZOC31	3	4	25	75	100
	CP II	Core Zoology Practical – II	–	3	–	Examination IV Semester		
	AII 1	Allied Plant Diversity & Plant Pathology	15UBTA31	3	4	25	75	100
	AII P	Allied Botany Practical	–	3	–	Examination IV Semester		
IV	SBE1	Diet Therapy	15UZOS31	3	2	25	75	100
	NME1	Choose from the list	–	3	2	25	75	100
			TOTAL	**30**	**18**	**150**	**450**	**600**

IV SEMESTER

I	TA 4	சங்கத் தமிழ்	15UTAL41	6	3	25	75	100
	AR 4	*Quran* and *Hadeeth*	15UARL41					
II	EN 4	A Practical Course in Spoken English	15UENL41	6	3	25	75	100
III	C 6	Biochemistry	15UZOC41	3	4	25	75	100
	CP II	Core Zoology Practical – II	15UZOC4P	3	3	40	60	100
	AII 2	Allied Plant Physiology & Biochemistry	15UBTA41	3	4	25	75	100
	AII P	Allied Botany Practical	15UBTA4P	3	2	40	60	100
IV	SBE2	Medicinal Botany and Horticulture	15UZOS41	3	2	25	75	100
	NME2	Choose from the list	–	3	2	25	75	100
V	EX	Extension Activities (Choose from the list)	–	–	1	–	100	100
			TOTAL	**30**	**24**	**230**	**670**	**900**

V SEMESTER								
P	**SUB**	**Title of the paper**	**S.CODE**	**H/W**	**C**	**MARKS**		
						I	**E**	**T**
III	C 7	Animal Physiology	15UZOC51	6	6	25	75	100
	C 8	Genetics	15UZOC52	5	5	25	75	100
	C 9	Fundamentals of Biotechnology	15UZOC53	5	5	25	75	100
	CP III	Core Zoology Practical – III	–	3	–	Examination VI Semester		
	CP IV	Core Zoology Practical – IV	–	3	–	Examination VI Semester		
	CE 1	A) Aquaculture **OR**	15UZOE5A	5	6	25	75	100
		B) Dairy Farming	15UZOE5B					
	CEP	Core Elective Practical	–	3	–	Examination VI Semester		
			TOTAL	**30**	**22**	**100**	**300**	**400**
VI SEMESTER								
III	C 10	Immunology& Microbiology	15UZOC61	6	6	25	75	100
	C 11	Applied Biotechnology	15UZOC62	5	5	25	75	100
	C 12	Project	15UZOP61	5	5	25	75	100
	CP III	Core Zoology Practical – III	15UZOC6P1	3	3	40	60	100
	CP IV	Core Zoology Practical – IV	15UZOC6P2	3	3	40	60	100
	CE 2	A) Biostatistics & Computer Applications **OR**	15UZOE6A	5	6	25	75	100
		B) Poultry Science	15UZOE6B					
	CEP	Core Elective Practical	15UZOE6P	3	3	40	60	100
			TOTAL	**30**	**31**	**220**	**480**	**700**

B.Sc. Zoology Course Structure (CBCS)
(Applicable for students admitted in June 2015 and onwards)
TITLE OF THE PAPERS, CREDITS & MARKS

GROUP II COURSES (TWO YEAR LANGUAGE COURSES) (B.A. English, B.A. Islamic Studies, B.A. Tamil, B.Sc. Mathematics, B.Sc. Physics, B.Sc. Chemistry, B.Sc. Zoology, B.Sc. Microbiology and B.Sc. Nutrition and Dietetics)							
PART I – TAMIL							
SEM	**Title of the paper**	**S.CODE**	**H/W**	**C**	**I**	**E**	**T**
I	இக்காலத் தமிழ்	15UTAL11	6	3	25	75	100
II	சமயத் தமிழ்	15UTAL21	6	3	25	75	100
III	பயன்பாட்டுத் தமிழ்	15UTAL31	6	3	25	75	100
IV	சங்கத் தமிழ்	15UTAL41	6	3	25	75	100
		TOTAL	**24**	**12**	**100**	**300**	**400**
PART I – ARABIC							
SEM	**Title of the paper**	**S.CODE**	**H/W**	**C**	**I**	**E**	**T**
I	Applied Grammar and Translation – I	15UARL11	6	3	25	75	100
II	Applied Grammar and Translation – II	15UARL21	6	3	25	75	100
III	Prose and Letter Writing	15UARL31	6	3	25	75	100
IV	*Quran* and *Hadeeth*	15UARL41	6	3	25	75	100
		TOTAL	**24**	**12**	**100**	**300**	**400**
PART II – ENGLISH							
SEM	**Title of the paper**	**S.CODE**	**H/W**	**C**	**I**	**E**	**T**
I	Prose, Poetry and Remedial Grammar – I	15UENL11	6	3	25	75	100
II	Prose, Poetry and Remedial Grammar – II	15UENL21	6	3	25	75	100
III	One-Act Plays and Writing Skill	15UENL31	6	3	25	75	100
IV	A Practical Course in Spoken English	15UENL41	6	3	40	60	100
		TOTAL	**24**	**12**	**115**	**285**	**400**

B.Sc. Zoology – CBCS SYLLABUS

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PART III – CORE, CORE ELECTIVE SUBJECTS AND PROJECT

SEM	SUB	Title of the paper	S.CODE	H/W	C	MARKS		
						I	E	T
I	C 1	Animal Diversity - I - Invertebrata	15UZOC11	4	5	25	75	100
	C 2	Animal Diversity - II - Chordata	15UZOC12	3	4	25	75	100
	CP 1	Core Zoology Practical - I	–	3	–	Examination II Semester		
II	C 3	DevelopmentalBiology	15UZOC21	4	5	25	75	100
	C 4	Ecology and Evolution	15UZOC22	3	4	25	75	100
	CP 1	Core Zoology Practical - I	15UZOC2P	3	3	40	60	100
III	C 5	Cell & Molecular Biology	15UZOC31	3	4	25	75	100
	CP II	Core Zoology Practical - II	–	3	–	Examination IV Semester		
IV	C 6	Biochemistry	15UZOC41	3	4	25	75	100
	CP II	Core Zoology Practical - II	15UZOC4P	3	3	40	60	100
V	C 7	Animal Physiology	15UZOC51	6	6	25	75	100
	C 8	Genetics	15UZOC52	5	5	25	75	100
	C 9	Fundamentals of Biotechnology	15UZOC53	5	5	25	75	100
	CP III	Core Zoology Practical - III	–	3	–	Examination VI Semester		
	CP IV	Core Zoology Practical - IV	–	3	–	Examination VI Semester		
	CE 1	A) Aquaculture **OR**	15UZOE5A	5	6	25	75	100
		B) Dairy Farming	15UZOE5B					
	CEP	Core Elective Practical	–	3	–	Examination VI Semester		
VI	C 10	Immunology & Microbiology	15UZOC61	6	6	25	75	100
	C 11	Applied Biotechnology	15UZOC62	5	5	25	75	100
	C 12	Project	15UZOP61	5	5	-	100	100
	CP III	Core Zoology Practical - III	15UZOC6P1	3	3	40	60	100
	CP IV	Core Zoology Practical - IV	15UZOC6P2	3	3	40	60	100
	CE 2	A) Biostatistics & Computer Applications **OR**	15UZOE6A	5	6	25	75	100
		B) PoultryScience	15UZOE6B					
	CEP	Core Elective Practical	15UZOE6P	3	3	40	60	100
			TOTAL	**92**	**85**	**525**	**1375**	**1900**

Part III – Allied Subjects for B.Sc. Zoology Students
Part III – Allied – I – Nutrition and Dietetics
Offered by the Department of Nutrition and Dietetics to B.Sc. Zoology Students

SEM	SUB	Title of the paper	S.CODE	H/W	C	MARKS		
						I	E	T
III	AI 1	Food Science	15UNDA11	3	4	25	75	100
	AI P	Food Science & Nutrition Practical	–	3	–	Examination IV Semester		
IV	AI 2	Applied Nutrition	15UNDA21	3	4	25	75	100
	AI P	Food Science & Nutrition Practical	15UNDA2P	3	2	40	60	100
TOTAL				**12**	**10**	**90**	**210**	**300**

Part III – Allied Subjects for B.Sc. Zoology Students
Part III – Allied – II – Plant Biology & Plant Biotechnology
Offered by the Department of Plant Biology & Plant Biotechnology to B.Sc. Zoology Students

SEM	SUB	Title of the paper	S.CODE	H/W	C	MARKS		
						I	E	T
III	AII 1	Plant Diversity & Plant Pathology	15UBTA31	3	4	25	75	100
	AII P	Allied Botany Practical	–	3	–	–	Examination IV Semester	
IV	AII 2	Plant Physiology & Biochemistry	15UBTA41	3	4	25	75	100
	AII P	Allied Botany Practical	15UBTA4P	3	2	40	60	100
TOTAL				**12**	**10**	**90**	**210**	**300**

Part IV – Skill-based Elective (For B.Sc. Zoology Students)

SEM	P	Title of the paper	S.CODE	H/W	C	MARKS		
						I	E	T
III	1	Diet Therapy	15UZOS31	3	2	25	75	100
IV	2	Medicinal Botany and Horticulture	15UZOS41	3	2	25	75	100
TOTAL				**6**	**4**	**50**	**150**	**200**

Part IV – Non – Major Elective (For Other Major Students)

SEM	P	Title of the paper	S.CODE	H/W	C	MARKS		
						I	E	T
III	1	Ornamental Fish Culture	15UZON31	3	2	25	75	100
IV	2	Apiculture	15UZON41	3	2	25	75	100
TOTAL				**6**	**4**	**50**	**150**	**200**

Part IV – EVS & Value Education (For All Major Students)

SEM	P	TITLE OF THE PAPER	S.CODE	H/W	C	MARKS		
						I	E	T
I	1	Environmental Studies	15UEVS11	2	1	25	75	100
II	2	Islamic Value Education **OR**	15USVE2A	2	1	25	75	100
		Value Education	15USVE2B					
			TOTAL	**4**	**2**	**50**	**150**	**200**

PART – V – Extension Activities

SEM	Extension Activities (Choose any one)	S.CODE	H/W	C	MARKS		
					I	E	T
I to IV	Enviro Club	15UEXEVC	–	1	–	100	100
	NCC	15UEXNCC					
	NSS	15UEXNSS					
	Physical Education	15UEXPHY					
	Red Ribbon Club	15UEXRRC					
	Sadakath Outreach Programme	15UEXSOP					
	Youth Red Cross	15UEXYRC					
	Youth Welfare	15UEXYWL					
	Total		**–**	**1**	**–**	**100**	**100**

PART – 1 TAMIL			
முதல் பருவம்			
Part – 1	இக்காலத் தமிழ்		15 UTAL11
Hrs/Week : 6	Hrs/Sem : 90	Hrs/Unit : 18	Credits : 3

நோக்கம் :

- தமிழ்ப் படைப்பிலக்கியங்களான புதுக்கவிதைகள், சிறுகதைகள் ஆகியவற்றை எழுத வைத்தல்.
- சமூகம் பற்றிய சிந்தனைகளைப் படைப்பிலக்கியங்கள் மூலம் ஏற்படுத்துதல்.

அலகு - 1

தமிழ்ச் செய்யுள் - புதுக்கவிதைகள்

1. அல்லாஹ் - மகாகவி பாரதியார்
2. தமிழுக்கு அமுதென்று பெயர் - பாவேந்தர் பாரதிதாசன்
3. பாடல் - பட்டுக்கோட்டை கல்யாணசுந்தரம்
4. ஆயிரம் திருநாமம் பாடி - கவிக்கோ அப்துல் ரகுமான்
5. தேசப்பிதாவுக்கு ஒரு தெருப் பாடகனின் அஞ்சலி - மு. மேத்தா
6. ஐந்து பெரிது ஆறு சிறிது - வைரமுத்து
7. மழை கொடுக்கும் - கவியரசு கண்ணதாசன்
8. எத்திசையிலிருந்து எறியப்பட்டது - கல்யாண்ஜி
9. சினேகிதனின் தாழ்வான வீடு - கலாப்பிரியா
10. தூக்கம் விற்ற காசுகள் - ரசிகவ்ஞானியார்
11. தோழர் மோசிகீரனார் - ஞானக்கூத்தன்
12. வயலும் வாழ்வும் - நா.முத்துக்குமார்
13. கடவுள் போற்றி - கவிமணி
14. நண்பனே - கலீல் ஜீப்ரான்

அலகு -2 (சிறுகதைக் களஞ்சியம்)

1. காஞ்சனை - புதுமைப்பித்தன்
2. கூறல் - வண்ணதாசன்
3. சொர்க்க கன்னிகை - கருணாமணாளன்
4. காலத்தின் ஆவர்த்தனம் - தோப்பில் முகமதுமீரான்
5. கனவில் உதிர்ந்த பூ - நாறும்பூநாதன்
6. ராஜமீன் - கீரனூர் ஜாஹிர்ராஜா
7. சங்காத்தி - தீன்

அலகு- 3 உரைநடை

1. படிப்பது சுகமே – வெ. இறையன்பு இ.ஆ.ப.
   நீயூ செஞ்சுரி புக் ஹவுஸ் (பி) லிட், சென்னை.

அலகு- 4 இலக்கிய வரலாறு

1. தமிழ்ப் புதுக்கவிதைகள் தோற்றமும் வளர்ச்சியும்
2. தமிழ்ச் சிறுகதைகள் தோற்றமும் வளர்ச்சியும்
3. தடம் பதித்த தமிழ்ச் சிறுகதையாசிரியர்கள்
4. தற்காலத் தமிழ்ப் புதுக்கவிதைகள், சிறுகதைகளின் போக்கு

அலகு- 5 இலக்கணம்

1. எழுத்து வகை பற்றிய விளக்கம்
   முதலெழுத்துகள், சார்பெழுத்துகள், சுட்டெழுத்துகள், வினாவெழுத்துகள்
2. மொழி முதல் எழுத்துக்கள், மொழி இறுதி எழுத்துகள்
3. வல்லினம் மிகுமிடங்கள், மிகா இடங்கள்

PART – 1 TAMIL			
இரண்டாம் பருவம்			
Part – 1	சமயத் தமிழ்		15 UTAL21
Hrs/Week : 6	Hrs/Sem : 90	Hrs/Unit : 18	Credits : 3

நோக்கம் :

- பலசமயக் கருத்துக்களை ஒப்பிட்டுச் சமய நல்லிணக்கத்தோடு மாணவர்கள் வாழ இப்பருவம் துணை புரிகிறது.
- தமிழ்நாடு அரசுப் பணியாளர் தேர்வாணையத் தேர்வுக்கு மாணவர்களை ஆயத்தப்படுத்துதல்

அலகு- 1

தமிழ்ச் செய்யுள் (துறை வெளியீடு)

<u>சைவம்</u>

1. தேவாரம்

திருநாவுக்கரசர்	-	மாசில் வீணையும்...
	-	நாமார்க்கும் குடியல்லோம்...
	-	அப்பன் நீ அம்மை நீ...
திருஞானசம்பந்தர்	-	தோடுடைய செவியன்...
	-	வேயுறு தோளி பங்கன்...
	-	மருந்தவை மந்திரம்...
சுந்தரமூர்த்தி நாயனார்	-	பித்தா பிறைசூடி...

2. திருவாசகம்

மாணிக்கவாசகர்	-	பால் நினைந்தூட்டும்...

3. திருவெம்பாவை - ஆதியும் அந்தமும் இல்லா...
4. திருமந்திரம்

திருமூலர்	-	ஒன்றே குலமும் ஒருவனே தேவனும்...

<u>வைணவம்</u>

5. பொய்கையாழ்வார் - வையம் தகளியா...

பூதத்தாழ்வார்	-	அன்பே தகளியா...
பேயாழ்வார்	-	திருக்கண்டேன்...

6. திருப்பாவை

   ஆண்டாள் - மார்கழித் திங்கள்...

7. வளையாபதி - மக்கட் செல்வம்

பௌத்தம்

8. புத்தபிரான் - மு.ரா.பெருமாள்

கிறித்தவம்

9. இயேசு காவியம் (சில பகுதிகள்)- கண்ணதாசன்

இஸ்லாம்

10. நபிகள் நாயக மான்மிய மஞ்சரி - சதாவதானி செய்குத்தம்பிப்பாவலர் (குறிப்பிட்ட பாடல்கள்)
11. குணங்குடி மஸ்தான் பாடல்கள் - பாசக்கயிற்று வலை
12. ஞானப் புகழ்ச்சி - தக்கலை பீர்முகமது அப்பா
13. அலகிலா அருளும் - இறையருட் கவிமணி. கா.அப்துல்கபூர்

நீதி இலக்கியங்கள்

14. திருக்குறள் (வான் சிறப்பு)
15. நாலடியார் - கல்வி கரையில
16. இன்னாநாற்பது - ஆன்றவித்த...

அலகு- 2 புதினம்

"கல்மரம்" - திலகவதி

அலகு - 3 உரைநடை (தமிழ்த் துறை வெளியீடு)

1. நபிகள் நாயகம் (ஸல்) அன்பின் தாயகம்
2. சதக்கத்துல்லாஹ் அப்பா அவர்களின் வாழ்வும் பணியும்
3. கவி.கா.மு.ஷெரிப் - த.மு.சா காசாமைதீன்
4. கவிக்கோ அப்துல்ரகுமானின் கவிதைகள்
5. தமிழ் இலக்கியங்களில் மனிதநேயச் சிந்தனைகள்
6. இணையத்தில் தமிழ்

அலகு- 4 (போட்டித் தேர்வுத் தயாரிப்பு)

இலக்கிய வரலாறு

1. சைவம், வைணவம், கிறித்துவம், இசுலாம் வளர்த்த தமிழ்
2. புகழ் பெற்ற தமிழ் நூல்கள், நூலாசிரியர்கள்
3. தமிழ்நாடு அரசுப் பணியாளர் தேர்வாணையம் நடத்தும் போட்டித் தேர்வுக்குரிய பொதுத்தமிழ் பாடத்திட்டம் - ஓர் அறிமுகம்

அலகு- 5 இலக்கணம்

வேர்ச்சொல் அறிதல், அகரவரிசைப்படி மாற்றியமைத்தல், செய்வினை, செய்யப்பாட்டுவினை, தன்வினை, பிறவினை, உடன்பாடு, எதிர்மறை, செய்தி வாக்கியம், கலவை வாக்கியம், பெயர்வினை, இடை, உரிச்சொற்களின் இலக்கணம் மற்றும் பெயர்ச்சொல், வினைச்சொல் வகைகள், லகர, ளகர, ணகர, ரகர, றகர வேறுபாடுகள்.

PART – 1 TAMIL			
மூன்றாம் பருவம்			
Part – 1	பயன்பாட்டுத் தமிழ்		15 UTAL31
Hrs/Week : 6	Hrs/Sem : 90	Hrs/Unit : 18	Credits : 3

நோக்கம் :

- தமிழின் காப்பிய இலக்கிய வளத்தை மாணவர்களுக்கு உணர்த்துதல்
- இந்திய ஆட்சிப் பணித்தேர்வுக்கு மாணவர்களை ஆயத்தப்படுத்துதல்
- செய்தி வெளிப்பாட்டு உத்திகளைக் கற்றுத் தந்து மாணவர்களை ஊடகவியலாளர்களாக மாற்றுதல்.

அலகு- 1

தமிழ்ச் செய்யுள் (துறை வெளியீடு)

1. சிலப்பதிகாரம் - வழக்குரைக் காதை
2. மணிமேகலை - பாத்திரம் பெற்ற காதை
3. பெரியபுராணம் - மெய்ப்பொருள் நாயனார் புராணம்
4. கம்பராமாயணம் - சுந்தரகாண்டம் (ஊர் தேடு படலம்)
5. இயேசு காவியம் - சிலுவைப்பாடு
6. சீறாப்புராணம் - மதினத்தார் ஈமான் கொண்ட படலம்
7. குத்பு நாயகம் - வண்ணக் களஞ்சியப் புலவர்

(காப்பியப் பாவிகம் மட்டும்)

அலகு- 2

இந்திய ஆட்சிப் பணிக்குத் தயார்படுத்தும் நோக்கிலமைந்த பயன்பாட்டுக் கட்டுரை நூல். **ஐ.ஏ.ஏஸ் தேர்வும் அணுகுமுறையும் -வெ.இறையன்பு இ.ஆ.ப.** நியூ செஞ்சுரி புக் ஹவுஸ், அம்பத்தூர், சென்னை – 98.

அலகு- 3

ஊடக அறிமுகம்

இதழியல் அறிமுகம்

சமூகமும் இதழ்களும்

வானொலி, தொலைக்காட்சி நிகழ்ச்சிகளை அமைக்கும் முறை

சிறப்புக் கட்டுரை எழுதுதல்

இதழ்களின் அடிப்படைக் கொள்கைகள் தற்கால நாளிதழ்களில் தமிழ்

அலகு - 4

தமிழ் இலக்கிய வரலாறு

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

அலகு - 5

இலக்கணம்

(தமிழ்நாடு அரசுப் பணியாளர் தேர்வாணையத்தின் பொதுத் தமிழ் இலக்கணப் பகுதி)

பிழைத் திருத்தம், சந்திப் பிழைகள், ஒருமை – பன்மைப் பிழைகள், மரபுப் பிழைகள், வழுவுச் சொற்களை நீக்குதல், பிறமொழிச் சொற்களை நீக்குதல், வேர்சொல்லைச் தேர்வு செய்தல்

பார்வை நூல்கள் :

தமிழ் இலக்கிய வரலாறு	-	முனைவர்.சு.ஆனந்தன் கண்மணிப் பதிப்பகம், திருச்சி – 02.
இதழியல் நுணுக்கங்கள்	-	செண்பகா பதிப்பகம் சென்னை – 17. தொலைபேசி : 24331510
குத்பு நாயகம் ஆய்வுரை	-	டாக்டர்.மு.அப்துல்கரீம் உலக தமிழாராய்ச்சி நிறுவனம், சென்னை.
சீறாப்புராணம் மூலமும் பொழிப்புரையும்	-	ஹாஜி எம்.முகமது யூசுப் இரண்டாம் பாகம்

PART – 1 TAMIL			
நான்காம் பருவம்			
Part – 1	சங்கத் தமிழ்		15 UTAL41
Hrs/Week : 6	Hrs/Sem : 90	Hrs/Unit : 18	Credits : 3

நோக்கம் :

- சங்கத் தமிழ் குறித்த சிந்தனைகளை மாணவர்களுக்கு ஏற்படுத்துதல்
- இணைய ஊடகத்தில் தமிழ் இடம் பெற்றுள்ள இடத்தினை உணர்த்தி மாணவர்களை இணையத்தைப் பயன்படுத்த வைத்தல்

அலகு- 1

தமிழ்ச் செய்யுள் (துறை வெளியீடு)

நற்றிணை, குறுந்தொகை, ஐங்குநுறூறு, பதிற்றுப்பத்து, பரிபாடல், கலித்தொகை, அகநானூறு, புறநானூறு மற்றும் பத்துப் பாட்டில் முல்லைப்பாட்டு முழுவதும்

அலகு- 2

உரைநடை

சிற்பியே உன்னைச் செதுக்குகிறேன் - வைரமுத்து

அலகு- 3

இணையத் தமிழ் (தமிழ்த்துறை வெளியீடு)

இணையத் தமிழ் - முனைவர் ச.மகாதேவன்

இரண்டாம் பதிப்பு - பேரா.அ.மு.அயூப்கான்

முனைவர்.அ.சே.சேக்சிந்தா

- இணையம் - ஓர் அறிமுகம் - உலகளாவிய தமிழ்
- வலைத்தளங்கள் - இணையத்தளத்தேடு பொறி
- இணையப் பயன்பாடு - தமிழில் வலைப் பூக்கள்

அலகு- 4

இலக்கிய வரலாறு

எட்டுத் தொகை, பத்துப் பாட்டு நூல்கள்

அலகு- 5

இலக்கணம்

- தமிழர் வாழ்வில் அகமும் புறமும்
- ஐவகை நிலங்களின் முதல், கரு, உரிப் பொருட்கள்
- அறத்தொடு நிற்றல்
- களவு, கற்பு விளக்கம்

புறத்திணைகள் : 12 அறிமுகம்

பார்வை நூல்கள்

தமிழ் இலக்கிய வரலாறு

முனைவர் சு.ஆனந்தன்

கண்மணி பதிப்பகம்

திருச்சி – 620002.

இணையத் தமிழ் (தமிழ்த்துறை வெளியீடு)

சதக்கத்துல்லாஹ் அப்பா கல்லூரி

திருநெல்வேலி.

Part - I ARABIC			
Applicable for Group II Courses (Two Year Language Courses) such as B.A. English, B.A. Tamil, B.A. Islamic Studies, B.Sc., Mathematics, B.Sc., Physics, B.Sc., Chemistry, B.Sc, Zoology, B.Sc, Microbiology and B.Sc., Nutrition and Dietetics.			
PAPER-I	***APPLIED GRAMMAR AND TRANSLATION-I***		**1UARL11**
Hrs/ Week: 6	**Hrs/ Sem: 90**	**Hrs/ Unit: 18**	**Credits: 3**

Unit I :-

Lessons 1 to 5 (Reader)

Unit II :-

Lessons 6 to 10

Unit III :-

Grammar Portions

1) Al Mufrad wal- muthanna wal jam'
2) Huroof ul Jarr
3) Asmaa – ul Ishaarah.
4) Adawaatul Istifhaam
5) Ad Damaair – ul – Munfasilah Val Muthasilah
6) Al-Idaafah
7) Al Mubtada wal khabar
8) As-sifatu wal mausoof
9) Al mudhakkar wal muannath
10) Asmaa-ul-mausool

Unit IV :-

Lessons 11 to 15

Unit V :-

Lessons 16 to 20

TEXT BOOKS

1) Duroosul Lughatil Arabiya Part – I (Reader) - Lessons 1 to 20 only by Dr.V. Abdur Rahim. Available at Islamic foundation Trust, 78 Perambur High Road , Perambur, Chennai- 600 012.

2) An-Nahwul Waadih Ibtidayee – Part I (Grammar, selected topics only) by Ali Al-jaarim and Mustafa Ameen. Available at Hilal Book House , Tirurkad, Angadipuram, Kerala.

Semester - II		
PAPER-II	***APPLIED GRAMMAR AND TRANSLATION-II***	**15UARL 21**
Hrs/ Week: 6	**Hrs/ Sem: 90**	**Hrs/ Unit: 18**	**Credits: 3**

Unit I :-

Lessons 1 to 3 (Reader)

Unit II :-

Lessons 4 to 7

Unit III :-

Grammar Portions

1) Inna wa Akhavaatuha.
2) Ismut Tafleel
3) AlMali wal Mularee
4) Al-Amr wan Nahi
5) Al Fa-il
6)Al Maf-ool
7) Al-Asmaul Mausool
8) Taqseemu Fihl ila As-saheeh wal Muhtal
9)Ismul Maf'ool
10) Ismul Faa'il.

Unit IV

Lessons 8 to 11

Unit V

Lessons 12 to 15

TEXT BOOKS

1. ***Duroosul Lughatil Arabiya*** *Part – II (Reader) Lessons 1 to 15 only by Dr.V. Abdur Rahim. Available at: Islamic foundation Trust, 78 Perambur High Road , Perambur, Chennai-600 012.*
2. ***An-Nahwul Waadih Ibtidayee*** *–Part I &II (Selected Grammar Portions only) by Ali Al-jaarim and Mustafa Ameen. Available at: Hilal Book House , Tirurkad, Angadipuram, Kerala.*

Semester III			
Paper – III	**Prose and Letter Writing**		**15UARL31**
Hrs/Week:6	**Hrs/Sem:90**	**Hrs/Unit : 18**	**Credits:3**

Unit I

Lessons 1 to 9

الحركة - الكلمة - أنواع الكلمة – المركبات - الفراشة والزهرة - الزيارة - في السوق - المحطة - القطار -

Unit II

Lessons 10 to 17

أسرة العم - دكان الفواكه - جنينة الحيوانات - نزهة طيبة - اللعب - السفر بالطائرة - العودة من الحج - حفل ديني

Unit III

Lessons 18 to 25

سرقة الزهرة - نظام الحجرة - العبادة - محادثة - الخطاب - رحلة الي دهلي - منظر الحقول - البريد –

Unit IV

Lessons 26 to 31

حديث الاطفال - دكان البقال - الصيدلية - الزمن - الساعة (ألف)– الساعة (ب)

Unit V

Kinds of letters - **رسالة الي الوالد لطلب الفلوس للرسوم - رسالة طلب الاجازة – رسالة طلب وظيفة الي شركة** *(page no 14)* **– رسالة الاستفسار عن البضاعة – رسالة شكوي عن نقص البضاعة– رسالة الي مدير البنك –** *Glossary of Words*

TEXT BOOKS

1. **Al Qira't- ul- Waaliha** Part- II By: Waheeduz Zamaan Al-Keeranavi **القراءة الواضحة – الجزء الثاني - وحيد الزمان الكيرانوي** (lessons 1 to 31only) Available at: Husainiya Bookstall, Deoband, Utterpradesh.
2. Letter Writing in Arabic (For schools and colleges) (selected letters only) by Dr. Syed Karamathullah Bahmani – Available at: Published by Alif Books & Prints, Chennai – 600 014.

Semester IV			
PAPER-IV	**QURAN AND HADEETH**		**15UARL41**
Hrs/ Week: 6	**Hrs/ Sem: 90**	**Hrs/ Unit: 18**	**Credits: 3**

Unit I

Verses from 1 to 9 from (Sura – al – Hujraat)

Unit II

Verses from 10 to 18 from (Sura – al – Hujraat)

Unit III

Codification and Compilation of Hadeeth Literature, Life History of Imam Bukhari, Muslim, Tirmidi, Abu Dawood, Nasaee and Ibn Majah & Hadeeth 1 to 10

Unit IV

Hadeeth 11 - 20

Unit V

Verses from 12 to 19 from (Sura – Luqman)

TEXT BOOKS:

1. **Tafseer Suratul Hujuraath and Suraah Luqman** (verses from 12-19) – A study material prepared by Dept. of Arabic, Sadakathullah Appa College , Rahmath Nagar, Tirunelveli-11.

2. **Hadeeth:** Ahadeeth Sahlah An Explana *Hadeeth: Sharhu Ahadeeth Sahlah An explanatory translation of Dr. V. Abdur Rahim's Ahadeeth Sahalah with grammatical notes.* Available at: Islamic foundation Trust, 78 Perambur High Road , Perambur, Chennai- 600 012.

PART – II ENGLISH
TWO – YEAR LANGUAGE COURSE
B.A. English, Tamil, History, Islamic Studies, B.Sc. Mathematics, Physics, Chemistry, Zoology, Microbiology and Nutrition and Dietetics

I SEMESTER			
EN1	**PROSE, POETRY AND REMEDIAL GRAMMAR - I**		**15UENL11**
Hrs/ Week: 6	**Hrs/ Sem: 90**	**Hrs/ Unit: 18**	**Credits: 3**

Objectives:

1. To answer comprehensive questions on passages of moderate level of difficulty.
2. To analyse the prescribed prose pieces and to attempt a critical appreciation of the poems.
3. To write grammatically.

UNIT I – PROSE

1. Letter to a Teacher - Nora Rossi and Tom Cole (Trans.)
2. Spoken English and Broken English - George Bernard Shaw
3. Voluntary Poverty - M.K. Gandhi

UNIT II – PROSE

4. A Snake in the Grass - R.K. Narayan
5. The Civilization of Today - C.E.M. Joad
6. Kamala Nehru - Jawaharlal Nehru

UNIT III – POETRY

1. On His Blindness - John Milton
2. Upon Westminster Bridge - William Wordsworth
3. When I have Fears - John Keats

UNIT IV – FUNCTIONAL GRAMMAR

1. Articles and Nouns (Units 68-80 of *Intermediate English Grammar*)
2. Pronouns and Determiners (Units 81–90 of *Intermediate English Grammar*)

UNIT V – FUNCTIONAL GRAMMAR

3. Reported Speech (Units 46-47 of *Intermediate English Grammar*)
4. Questions and auxiliary verbs (Units 48-51 of *Intermediate English Grammar*)
5. 'ing' and the infinitive (Units 52-67 of *Intermediate English Grammar*)

TEXTBOOKS:

1. T. Srirama, Colin Swatridge. ed. *College Prose and Poetry*. TRINITY, New Delhi: Trichy, 1989 (rpt. 2014).
2. Raymond Murphy. ed. *Intermediate English Grammar*. New Delhi : Cambridge University Press, 1994 (rpt. 2006).

II SEMESTER			
EN2	**PROSE, POETRY AND REMEDIAL GRAMMAR - II**		**15UENL21**
Hrs/ Week: 6	**Hrs/ Sem: 90**	**Hrs/ Unit: 18**	**Credits: 3**

Objectives:

1. To answer comprehensive questions on passages of moderate level of difficulty.
2. To analyse the prescribed prose pieces and to attempt a critical appreciation of the poems.
3. To write grammatically.

UNIT I – PROSE

1. With the Photographer - Stephen Leacock
2. Professions for Women - Virginia Woolf
3. On Letter Writing - Alpha of the Plough

UNIT II – PROSE

4. The Night the Ghost Got In - James Thurber
5. The Donkey - Sir. J.Arthur Thomson
6. A Cup of Tea - Katherine Mansfield

UNIT III – POETRY

1. The Flower - Alfred Lord Tennyson
2. Homage to a Government - Philip Larkin
3. Obituary - A.K. Ramanujan

UNIT IV – FUNCTIONAL GRAMMAR

1. Present and Past (Units 1-6 of *Intermediate English Grammar*)
2. Present Perfect and Past (Units 7-18 of *Intermediate English Grammar)*
3. Future (Units 19-22 of *Intermediate English Grammar)*

UNIT V – FUNCTIONAL GRAMMAR

4. Future (Units 23-25 of *Intermediate English Grammar)*
5. Modals (Units 26-36 of *Intermediate English Grammar)*
6. Conditionals and 'Wish' (Units 37-40 of *Intermediate English Grammar)*
7. Passive (Units 41-45 of *Intermediate English Grammar)*

TEXTBOOKS:

1. T. Srirama, Colin Swatridge. ed. *College Prose and Poetry*. TRINITY, New Delhi: Trichy, 1989 (rpt. 2014).
2. Raymond Murphy. ed. *Intermediate English Grammar*. New Delhi: Cambridge University Press, 1994 (rpt. 2006).

III SEMESTER			
EN3	**ONE – ACT PLAYS AND WRITING SKILL**		**15UENL31**
Hrs/ Week: 6	**Hrs/ Sem: 90**	**Hrs/ Unit: 18**	**Credits: 3**

Objectives:

1. To expose the conversational patterns to students and enable them to make use of the patterns in a given practical situation.
2. To write sentences in English grammatically.

UNIT I – ONE – ACT PLAYS

1. Refund - Fritz Karinthy
2. Reunion - W.ST.John Tayleur
3. The Never Never Nest - Cedric Mount

UNIT II – ONE – ACT PLAYS

4. Aladdin and His Magic Lamp - Y. Sayed Mohammed
5. Tippu Sultan - Y. Sayed Mohammed
6. The Merchant of Evergreen Venice - Y. Sayed Mohammed

UNIT III – WRITING SKILL

1. **Messages** (Pages 1-9 of *Written English for You* be taught and the tasks given 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 of *Written English for You* 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 Complaint
   iii) Letters of Applications

3. **Letters – 2** (Pages 36-40 of *Written English for You* be taught and the tasks given in pages 38 and 40 should be accomplished in the *Record of Writing*)
   i) Letters to inform your plan of visits
   ii) Letters of Request
   iii) Letters of Apology

UNIT IV – WRITING SKILL

4. **Essays** (Pages 66-79 be taught and the tasks 1-3 given in pages 79 - 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) Transitional paragraph.
vii) Concluding paragraph.
viii) What can be the length of an Essay?
ix) Why am I writing this Essay?
x) Who am I writing for?
xi) How to begin an Essay?
xii) How to organize an Essay?
xiii) What to avoid in writing an Essay?

5. **Narrating** (Pages 109-116 of *Written English for You* be taught. The tasks 1 and 2 given in pages 115 - 116 should 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 a different viewpoint 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 given in pages 172 -178 should 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 text book **Written English**.

TEXTBOOKS:

1. Y. Sayed Mohammed. ed. *The Lamp of India*. Tirunelveli: Muhammed Taahaa Publications, 2011.
2. G. Radhakrishna Pillai. ed. W*ritten English for You*. Chennai: Emerald Publishers, 1990 (rpt. 2008).
3. Compiled by a Board of Editors. *A Book of Plays*. Chennai: Orient Blackswan, 2010.

IV SEMESTER			
EN4	**A PRACTICAL COURSE IN SPOKEN ENGLISH**		**15UENL41**
Hrs/ Week: 6	**Hrs/ Sem: 90**	**Hrs/ Unit: 18**	**Credits: 3**

Objectives:

1. To express students' needs orally in a fluent, simple and direct style.
2. To pronounce words intelligibly.
3. To use the right intonation pattern in 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, etc., & Pronunciation Practice : Vowels (Chapter 4 – 8 of *A Course in Spoken English*)

UNIT III

Developing descriptive competency, narrative competency, arguing competency, compering competency and Pronunciation Practice: Diphthongs (Chapter 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.

Textbook, Workbook, Record Note:

1. Nihamathullah. A. et al. *A Course in Spoken English*. Tirunelveli: MSU, 2005. (rpt. 2010).
2. A Workbook for A Course in Spoken English.
3. Spoken English Practice Record.

Evaluation Scheme:

I Internal Oral Examination	:	15 Marks	The best two of the three CIA test marks will be added up
II Internal Oral Examination	:	15 Marks	
III Internal Oral Examination	:	15 Marks	
Loud Reading	:	5 Marks	
Listening Test	:	5 Marks	
Internal Marks	**:**	**40 Marks**	
External Oral Examination	:	50 Marks	
Record Note	:	05 Marks	
Workbook	:	05 Marks	
		60 Marks	

B.Sc. (ZOOLOGY) - CBCS SYLLABUS (2015 – 2016) (Applicable for students admitted in June 2015 onwards)		
PART III – CORE ,CORE ELECTIVE & PROJECT		
I SEMESTER		
Core 1	**ANIMAL DIVERSITY-1 (INVERTEBRATA)**	**15UZOC11**
Hrs/ Week: 4	**Hrs / Sem :4 x 15 = 60 Hrs./Unit:12**	**Credits :5**

Objectives:

- To understand the basic classification of Invertebrata.
- To impart special attention to the general characters of various classes along with in-depth type studies of various phyla.

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, pathogeny and control measures of *Entamoeba histolytica.*, *Plasmodium malariae*.

UNIT II

Porifera: General characters and classification upto classes with examples

General topic: Canal system in sponges.

Coelenterata: General characters and classification upto classes with examples.

Type study: Obelia - External characters and life history only.

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

UNIT III

Platyhelminthes: General characters and classification upto classes with example.

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

Aschelminthes: General characters and classification upto classes with example

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

UNIT IV

Annelida: General characters and classification upto classes with examples.

Type study: Earthworm – external morphology and reproduction.

General topic: Metamerism in Annelids, Vermiculture and methods for the preparation of vermi compost.

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

Type study: Cockroach- Morphology and nervous system

General topic: Beneficial insects (Honey Bee, Silkworm,).

UNIT V

Mollusca: General characters and classification upto classes with examples.

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. Invertebrate Zoology - S. Chand & Co. Limited, 7361, Ram Nagar, Qutub Road, New Delhi – 110 055.
2. Kotpal, R. L. 2007. Modern Text Book of Zoology – Invertebrates, Rastogi Publications,Meerut

REFERENCE BOOKS - INVERTEBRATA

1. Arora, M. P. Non – chordates, Himalaya Publishing House, Ramdoot, Dr. Bhalero Marg, Girgaon, Mumbai – 400 004 .
2. Bhamrah, H. S. et al. A text Book of Invertebrates – Anmol Publications Private Ltd. 4374 / 4B, Ansari Road, Daryaganj, New Delhi – 110 002.
3. Ekambaranatha Iyer .M.A. Manual of Zoology – Part I - Invertebrata - S.Viswanathan Printers and Publishers Pvt. Ltd. Chennai.
4. Ekambaranatha Iyer. M. and Anathakrishnan T. N. A Manual of Zoology - Vol . I – Invertebrata - S. Viswanathan Printers and Publishers Pvt. Ltd. Chennai.
5. Nair N.C ,Leelavathy S. ,Soundara Pandian.N,, Murugan. T, Arumugam, N . A Text Book of Invertebrates- Saras publications, 114 / 35G, A.R.P.Camp Road, Periavilai , Kottar Post., Nagercoil .

I SEMESTER		
Core 2	**ANIMAL DIVERSITY-II (Chordata)**	**15UZOC12**
Hrs/ Week: 3	**Hrs / Sem :3 x 15 = 45 Hrs./Unit:9**	**Credits :4**

OBJECTIVES:

To exemplify the intermediary position of prochordates between invertebrates and vertebrates

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

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 – Respiratory System – Urinogenital System.

General Topics: (i) Accessory respiratory organs in fishes. (ii) Migration of 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

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: Adaptations of aquatic mammals.

Text Book

1. E.L.Jordan and P.S. Verma. 2010. Chordate Zoology. 6th edition S. Chand & Company Ltd, New Delhi.
2. Kotpal, R. L. 2007. Modern Text Book of Zoology – Vertebrates, Rastogi Publications,Meerut

REFERENCE BOOKS

1. Ekambaranatha Iyer .M.A., Manual of Zoology – Part II – Chordata - S.Viswanathan Printers and Publishers Pvt. Ltd. Chennai.
2. Ekambaranatha Iyer . M. and Anathakrishnan T. N. A Manual of Zoology - Vol . II – Chordata - S. Viswanathan Printers and Publishers Pvt. Ltd. Chennai.
3. S. N. Prasad, Vasantika Kashyap. 1989. A Textbook of Vertebrate Zoology, 13th edition New Age International, New Delhi.
4. H.S. Bhamrah,Kavita Juneja. A text Book of Chordates – Anmol Publications Private Ltd, New Delhi.

II SEMESTER		
Core 3	**DEVELOPMENTAL BIOLOGY**	**15UZOC21**
Hrs/Week: 4	**Hrs/Sem: 4 x 15 = 60 Hrs/UNIT:12**	**Credits :5**

Objectives:

- To study the principles of developmental zoology and understand the various steps that lead to the formation of a new progeny.
- To observe the progression of spermatogenesis, oogenesis, cleavage and cleavage patterns, gastrulation, organogenesis, types of placenta and regeneration.

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 - 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, types, Regeneration in *Planaria* and Amphibians. - Morphogenetic field and gradient hypothesis.

TEXT BOOKS

Verma . P. S. and V. K. Agarwal. Chordate Embryology – S. Chand & Company Ltd. 7361, Ram Nagar , Qutab Road , New Delhi – 110 055.

REFERENCE BOOKS - DEVELOPMENTAL & EXPERIMENTAL ZOOLOGY

1. Arora , M. P . Embryology, Himalaya Publishing House, Ramdoot, Dr. Bhalero Marg, Giraon, Mumbai 400 004.
2. Berril , N. J. Developmental Biology, Tata Mc. Graw – Hill Publishing Company Limited No. 444 / 1, Sri Ekambara Naiker Industrial Estate,Alapakkam, Porur, Chennai-600 116.
3. Diwan . Avian Embryology, Anmol Publications Private Limited, 4374 / 4 B,Ansari Road, Daryaganj, New Delhi – 108 002.
4. Diwan,-Mammalian Embryology, Anmol Publications Private Limited, 4374 / 4 B, Ansari Road, Daryaganj, New Delhi – 110 002.

II SEMESTER		
Core 4	**ECOLOGY AND EVOLUTION**	**15UZOC22**
Hrs/Week: 3	**Hrs/Sem: 3 x 15 = 45 Hrs/UNIT:9**	**Credits :4**

Objective : To understand the principles and applications of Ecology to know the origin of species.

UNIT – I

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

UNIT – II

Ecosystem –Definition Structure – Pond ecosystem – Primary production – Secondary production –Food chain – Food web – Trophic levels – Energy flow – Pyramid of biomass – Pyramid of energy

UNIT – III

Community Ecology: Characteristics, Ecological succession.

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

UNIT IV

Evolution **–** Chemical, molecular evolution and culture evolution in Human – Theories of Evolution – Lamarckism, Darwinism, Neo-Lamarckism, Neo-Darwinism, mutation theory of De Vries, modern synthesis theory.

UNIT V

Variation - sources of variability – mutation, recombination & hybridization - Population genetics - Hardy-Weinberg law, isolating mechanisms: Speciation. Human evolution (fossil evidences only) Mimicry, co- evolution.

Text books:

1. P.S.Verma, V.K.Agarwal . Environmental biology, S.Chand & Co. New Del
2 Text book of Ecology & Animal Distribution by P.S.Verma V.K.Agarwal S.Chand & Co. New Delhi.
3. Veer Bala Rastogi. Organic Evolution-2014. Kedar Nath Ram Nath Educational publications.

Books for reference:

1. Odum, E.P., 1971 – Fundamentals of Ecology., W.B. Saunders Company, Philadelphia.
2. Clarke.G.L (1954) Elements of Ecology, John wiley & Son Inc. New York.
3. Ananthakrishnan.T.N and S.Viswanathan Principles of Animal Ecology
4. Koromondy E.J.(1976) Concepts of Ecology – Meeven.
5. Kendeigh, S.C., 1961 – Animal Ecology, Prentice Hall

6. Rastogi, V.B. and M.S. Jayaraj, 1989 – Animal Ecology and distribution of animals, Kedarnath Ramnath.
7. Sharma, P.D., 1990 – Ecology and Environment, Rastogi Publications, Meerut.
8. Southwick, C.H., 1976 – Ecology and Quality of Environment D. Van Nostrand Co.
9. Verma, P.S. and V.K. Agarwal, 1996 – Principles of Ecology, S.Chand & Co., New Delhi.
10. S.S. Purohit, D.H. Shanmi and A.K.Agarwal, 2004 – Environmental Sciences : A New Approach, Agrobix, Jodhpur.
11. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad.
12. Krishnamurthy, K.V. 2003, Introduction to Biodiversity. Oxford and IBH
13. Jagerstein, G. Evolution of Metazoan life cycle,Academic Press, New York & London.
14. Veer Bala Rastogi. Evolutionary Biology. 2014. Kedar Nath Ram Nath Educational publications.
15. G. L. Stebbins. Process of organic evolution . 1966. Published by Prentice Hall

I & II SEMESTERS		
CP-I	**ZOOLOGY CORE PRACTICAL I ***	**15UZOC2P**
Hrs / Week : 3	**Hrs / Sem : 3 X15 = 45**	**Credit : 3**

***Examination at the end of II Semester**

ANIMAL DIVERSITY I AND II, DISSECTION AND MOUNTING

1. Earth worm - Body setae,
2. Cockroach - Nervous system
3. Shark - Placoid scales,
4. Museum specimens, slides, models and charts:

Paramecium, Obelia colony, *Fasciola*, *Taenia solium*, *Ascaris* - male and female, *Chaetopterus,* Octopus, Star fish, Amphioxus, Ascidian, Balanoglossus, Tornaria larva, , Petromyzon, Narcine, Hippocampus,Draco, Rhacoporus, Chamaeleon, Enhydrina, Cobra, King Fisher ,Pigeon, Bat .

DEVELOPMENTAL BIOLOGY PRACTICAL

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) Chick embryo – 24, 48, 72 & 96 hrs.
f) Contraceptive devices – Condom, Copper T and Pills (Mala-D).
g) Placenta in mammals – Diffuse, Discoidal, Zonary and Cotyledonary .

ECOLOGY AND EVOLUTION

1. Estimation of Dissolved oxygen in two water samples.
2. Mutualism- Hermit crab and Sea anemone and Commensalism – Echeneis and Shark

Museum specimens, slides, models and charts

3. a) Nauplius larva b) Zoea larva c) Mysis larva
4. Animals of Evolutionary significance

a) Peripatus b) Limulus

5. Colouration

A) Chamaeleon b) Lycodon

6. Mimicry

a) Phyllium b) Stick insect

7. Mutation

a) Ancon sheep b) Peppered moth

III SEMESTER			
Core 5	**CELL & MOLECULAR BIOLOGY**		**15UZOC31**
Hrs / Week : 3	**Hrs / Sem : 3 x 15 = 45**	**Hrs./Unit:9**	**Credits : 4**

Objectives:

1. To learn the cytological techniques, structure and functions of various cellular components.
2. To understand the integrated activity of the animal cell.
3. To understand the molecular basis of cell structure, DNA structure and functions.

UNIT I - Introduction

Cell biology – introduction - cell types - prokaryotes & eukaryotes. Microscopy - detailed study of compound, phase contrast, 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

UNIT III – Cell Division

Ultra structure, chemical composition and functions of Nucleus, Nucleolus. Chromosomes-types -Special type of chromosomes. 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.

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

UNIT V – Genetic Code and Protein Synthesis

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

TEXT BOOK

Agarwal, V. K. Molecular Biology, S.Chand & Co.Limited, 7361, Ram Nagar, Qutub Road, New Delhi – 110 055.

REFERENCE BOOKS

1. Lodish et al., Molecular Biology, 6th edition, W.H.Freeman and Comapany, Newyork.
2. Agarwal, V. K. Cell Biology, S. Chand & Co. Limited, 7361, Ram Nagar, Qutub Road, New Delhi – 110 055.
3. Arora, M. P. Molecular Biology. Himalaya Publishing House, Ramdoot, Dr. Bhalero Marg, Giraon, Mumbai 400 004.
4. Kumar, M. D. Molecular Biology, Vikas Publishing House Private Ltd . 576, Maszid Road, Jangpura, New Delhi – 100 014 .
5. De Robertis , E.D,P., W. N. Nowinki and F. A. Saez. Cell Biology. – W. B. Saunders & Co. Philadelphia.
6. Powar, C.B., Cell Biology, Himalaya Publishing House, Mumbai.
7. Gupta, M.L. and Jangir, M.L., Student Edition, Jodhpur.
8. Jeyaraj and Rastogi, Cell Biology, Wiley Eastern Limited, New Delhi.

IV SEMESTER			
Core 6	**BIOCHEMISTRY**		**15UZOC41**
Hrs / Week : 3	**Hrs / Sem : 3 x 15 = 45**	**Hrs./Unit:9**	**Credits : 4**

Objectives:

1. To gain knowledge about the basics of biochemistry along with the principles and techniques.
2. To learn the classification, structure and metabolism of carbohydrates, proteins and fats.

UNIT I - Basic concepts of Biochemistry

Atomic structure, Chemical bonds – Ionic, Covalent & Hydrogen bond – vanderWaal's force, pH value - Acid & base concept. Chemical equilibrium - buffers.

UNIT II – Bioenergetics

Oxidation – reduction reactions, Redox potential, Properties, Chemical nature & biological significance of water. Introduction and importance of Bioenergetics - energy and its forms, laws of thermodynamics.

UNIT III – 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, Glycogenolysis and Glycogenesis

UNIT IV – Proteins and Lipids

Classification, structure and biological significance - Amino acid, Proteins and Lipids.

Enzymes – classification and mechanism of enzyme action.

UNIT V – Instrumentation

Basic instruments – Principle and applications of pH meter, Colorimeter, Spectrophotometer. Electrophoresis – Agarose Gel Electrophoresis (AGE) Polyacrylamide Gel Electrophoresis (PAGE) , Centrifuge, Chromatography – Paper Chromatography and Thin Layer Chromatography (TLC).

TEXT BOOK

Ambika Shanmugam, Fundamentals of Biochemistry for Medical Students, Nagaraj and Company Private limited, Chennai.

REFERENCE BOOKS

1. Lubert Stryer, Biochemistry, W.H.Freeman & company, Newyork.
2. Agarwal, G. R . Kiran Agarwal & O. P. Agarwal – Text Book of Biochemistry (Physiological chemistry), Krishna Prakashan Media (P) Limited, 11 Shivaji Road, Meerut – 250 001.
3. Berry, A . K. A - Text Book of Biochemistry. EMKEY Publications, Post Box No. 9410, B -19, East Krishna Nagar , Swami Dayanand Marg , New Delhi – 110 051.
4. David T . Plummer,- An Introduction to Practical Biochemistry. Tata Mc. Graw Hill Publishing Company Limited, No.444 / 1 Sri Ekambara Naicker Industrial Estate, Alapakkam Porur, Chennai – 600 116 .
5. Jeyaraman , J. – Laboratory Manual in Biochemistry. New Age International Publishers , 4835/24 , Ansari Road , Darya Ganj, New Delhi. – 110 002.

III & IV SEMESTERS		
CP-II	**ZOOLOGY CORE PRACTICAL II***	**15UCZOC4P**
Hrs / Week : 3	**Hrs / Sem : 3 x 15 = 45**	**Credit : 3**

CELL & MOLECULAR BIOLOGY PRACTICAL

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
   c) Fish 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.

BIOCHEMISTRY PRACTICAL

1. Beer's and lambert's law verification using Colorimeter
   a) Protein b) Carbohydrate.
2. Separation of Aminoacid using paper Chromatography.
3. Separation of Aminoacid using Thin layer Chromatography.
4. Qualitative tests for Carbohydrates, Proteins & Lipid.
5. pH measurement of any two samples with the help of pH meter.
6. Demonstration of Electrophoresis.
7. **Charts/Models:**
   a) Glucose
   b) Aminoacid
   c) Steroid
   d) Electrophoresis unit
   e) Colorimeter
   f) pH meter
   g)Chromatogram.

V SEMESTER			
Core 7	**ANIMAL PHYSIOLOGY**		**15UZOC51**
Hrs / Week : 6	**Hrs / Sem: 6 x 15 = 90**	**Hrs / Unit : 18**	**Credits : 6**

Objectives :

- To learn the various aspects of animal physiology with an in-depth study of its mechanism.
- To study the structure and function of various organs such as the heart, brain, lungs and kidney.
- To explore the complicated endocrine system, sense organs and internal biological clocks present in living systems.

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-biological oxidation - anaerobiosis – respiratory quotient –Basic,Standard and Active Metabolism.

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

UNIT III - Excretory System

Types of nitrogenous wastes – Ammonotelism, Ureotelism, 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

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

Nervous System: 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.

TEXT BOOKS

Agarwal , R. A. A. K. – Srivastava and Kaushal Kumar, Animal Physiology and Biochemistry, S. Chand & Company Limited, 7361 Ram Nagar, New Delhi.

REFERENCE BOOKS

1. Goel ,K.A.,Sastri , K. V. –A Text Book of Animal Physiology, Rastogi Publications, Shivaji Road, Meerut. – 250 002.
2. Arora, M.P., Animal Physiology (6 th Edition) Himalaya Publishing House, Ramdoot, Dr. BhaleroMarg, Giraon, Mumbai. – 400 004 .
3. Goyal, K. A.,and K.V. Sasthri, - Animal Physiology (6th revised Edition), Rastogi Publications, Gangotri, Shivaji Road, Meerut - 250 002 .
4. Hill - Animal Physiology, ANE Book India, Awantika Niwas, 19, Doraiswamy Road, T. Nagar, Chennai.
5. 5.Best and Taylor

V SEMESTER			
C8	**GENETICS**		**15UZOC52**
Hrs / Week : 5	**Hrs / Sem : 5 x 15 = 75**	**Hrs./Unit:15**	**Credit:5**

Objectives:

- To facilitate the student to understand the structure of genes and the concept of human genetics.

UNIT I - Mendelian Inheritance

Mendelian laws. Multiple alleles - A, B, O blood groups, Rh factors in man. Multiple genes - skin colour in man. Phenotypic ratio - Co-dominance, Incomplete dominance. 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, sex limited genes, non-disjunction in man (Klinefelter's syndrome, Turner's syndrome, Down's syndrome), Y linked inheritance – Holandric genes.

UNIT III – Aberration of chromosome

Human chromosomes – Karyotype, ideogram, Simple Mendelian traits in man, Inborn errors of metabolism – Phenyl ketonuria, Alkaptonuria, Albinism.

Chromosomal aberration - Structural aspects.

UNIT IV – Gene Concept

Fine structure of gene - Intron, Exon, Mucon and Recon. Gene Mutation – types and effects (Deletion, Duplication, Inversion and Translocation) - Ploidy, Euploidy and Polyploidy, Aneuploidy.

Inbreeding and Out breeding, Eugenics, Euthenics, Genetic Counseling.

UNIT V – Microbial Genetics and Human Metabolic Disorders

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

Viral Genetics – Lytic and lysogenic cycle

Genetics of Human metabolic disorders & diseases; inherited disorders - Sickle cell anemia, Thalassaemia. One gene-one enzyme theory.

TEXT BOOKS:

Power, C .B. Genetics - I, Himalaya Publishing House, Ramdoot, Dr. Bhalero Marg, Giraon, Mumbai 400 004

REFERENCE BOOKS

1. Arora, M. P. and S. Shandu . - Genetics. (5 th Edition) Himalaya Publishing House, Ramdoot, Dr. Bhalero Marg, Giraon, Mumbai 400 004.
2. Bhzamrah, H. S.and C . M. Chaturvedi A Text Book of Genetics. Anmol Publications Private Limited, 4374 / 4 B, Ansari Road, Daryaganj, New Delhi 110 002.
3. Gupta P. K. Elements of Genetics. Rastogi Publications , Gangotri, Shivaji Road, Meerut .- 250 002.
4. Parihar, P. A. - A Text Book of Basic and Molecular Genetics. Student Edition, Agrobios (India), Behind Nasrani Cinema, Chopasani Road, Jodpur – 342 002.
5. Sanjay Mandal, -Fundamentals of Human Genetics. New Central Book Agency, (P) Ltd . 8 / 1 Chintamoni Das Street, Kolkata – 700 009.
6. Verma, P.S., Agarwal, V.K. Genetics. 9th revised edition S,Chand & Co Limited, New Delhi

V SEMESTER			
C9	**FUNDAMENTALS OF BIOTECHNOLOGY**		**15UZOC53**
Hrs / Week : 5	**Hrs / Sem : 5 x 15 = 75**	**Hrs./Unit:15**	**Credit:5**

Objectives

- To learn the basic principle behind techniques involved in biotechnology.
- To impart awareness on intellectual property rights and safety issues involved in handling of transgenic organisms.
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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), Bacteriophage vector (Lambda and M 13) –Plant (CaMV) and Animal viral vector (SV40) - Transposons as vectors –Yeast Artificial Chromosomes (YAC) – Bacterial Artificial Chromosomes (BAC).

UNIT II - Gene cloning

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

UNIT IV - Techniques in Biotechnology

Somatic cell hybridization. Hybridoma technology - monoclonal antibody production. Hybridization technique, Blotting technique (Southern, Western and Northern) -DNA library, DNA probe, 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.

TEXT BOOKS

1. Sathiyanarayana U., (2005). Biotechnology. Book and Allied (P) Ltd, Kolkata.
2. R. C. Dubey, 2009.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 (5 th Edition) Himalaya Publishing House, Ramdoot, Dr. BhaleroMarg, 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
7. Singh, B.D. Biotechnology Expanding horizon, Kalyani Publishers, India

V SEMESTER			
CE1A	**AQUACULTURE**		**15UZOE5A**
Hrs / Week : 5	**Hrs / Sem : 5 x 15 = 75**	**Hrs./Unit:15**	**Credit:6**

Objectives

To enumerate the aquaculture potential and practices in India and augment food production from aquatic resources through aquaculture

UNIT I- Introduction

Scope of Aquaculture - Aquaculture in India – Freshwater, Coastal and Marine aquaculture - Preparation of ponds - 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 products – High value products from processing waste– 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.

REFERENCE BOOKS

1. Jhingran, V.G. Fish and fisheries of India. Hindustan Publishing Corporation (India), Delhi
2. Santhanam, R., N. Sukumaran and P. Natarajan., A manual of freshwater aquaculture. Oxford & IBH Publishing Co. Pvt. Ltd., 66 Janpath, New Delhi – 110 001.
3. Sundararaj, V. and B. Srikrishnadhas, 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.
10. Mohan Joseph Modayil and Pillai, N.G.K. 2007. Status and perspectives of Marine fishery research in India. CMFRI Publications, Kochi.
11. Mohan Joseph Modayil and Jayaprakash, A.A. 2003. Status of exploitory marine fisheries research of India. CMFRI Publications, Kochi.

V SEMESTER			
CE1B	**Dairy Farming**		**15UZOE5B**
Hrs / Week : 5	**Hrs / Sem : 5 x 15 = 75**	**Hrs./Uni:15**	**Credit: 6**

Objective:

- To study the importance of livestock, Economical importance and productivity of dairy animals, Prevention and control of livestock diseases and marketing the dairy products

Unit 1:

Community health: concept of health components Determination. Basic health services for a community – responsibility for community health – indicators of a healthy community state of health of India.

Unit 2:

Nutrition and health: Importance of nutrition. Food requirements – sources of food requirement, source, function and nutritional value of all types of food stuffs – Recommended allowances of vitamins – requirements of minerals – caloric requirements – balance diet nutritional requirement of special groups – nutritional diseases – Assessment of nutritional status Food hygiene – Social aspects of nutrition.

Unit 3:

Environment and health: Water basic health need – uses of water – sources of water supply – water pollution water borne diseases – purification of water – Air pollution – Sources – Pollution Air pollution in India – Indications – Health effects prevention and control, ventilation – standards, types, housing – human requirement – standards, sanitation – refuse disposal – classification of refuse methods of disposal – excrete disposal – importance extent of problem in India methods of excreta disposal – social aspects of excreta disposal in India.

Unit 4:

Concept of disease- phases of diseases prepathogenic and pathogenesis – agents of disease – human host – Role of environment in disease – relationship between agent, host and environment – multiple factors of disease - Disease cycle spectrum of disease levels of prevention of disease – primary, secondary and tertiary, screening for disease control and eradication.

Unit 5:

Common diseases – Arthropod borne diseases – Classification of vectors of diseases method of transmission – Control insecticides – Biological control. Epidemics – classification of communicable diseases – dynamics – mode of transmission clinical features and

control of small pox, measles, mumps, influenza, diphtheria, whooping cough, poliomyletis, cholera, typhoid, hepatitis.

Text books:

1. Text book of Preventive and social medicine be E. pal Panarsidar Bhanot – M.A. 1268 Napier town
2. Breeding & improvement of farm animals: Rice, Victor. Arthar Tata Mc. Graw Hill.

Reference books:

1. Principles of dairy chemistry – Jenness. Robert and Stute Patton Wiley Eastern.
2. Artifical in semination of farm animals, Perry Enos (Edition) Oxford & I B H
3. Breeding & improvement of farm animals: Rice, Victor. Arthar Tata Mc. Graw Hill.
4. Livestock & Poultry Production – Singh, Harbans & Earl Moore – Prentice Hall of India.
5. Sanitariane Hand Book (Theory and Administrative pras Publication) Osleans New (USA)
6. St. John Ambulance Associations Text Books
    a) First Aid to the injured.
    b) A preliminary course of First Aid to the injured
7. First Aid in Accidents by Dr. V. Rama Rao. Published Krishnan Bros. Thambu chetty street, Chennai.

VI SEMESTER			
Core 10	**IMMUNOLOGY & MICROBIOLOGY**		**15UCZOC61**
Hrs / week : 6	**Hrs / Sem :6 x 15 = 90**	**Hrs / unit : 18**	**Credits : 6**

Objective:

- To understand and perceive the importance of the immune system, lymphoid organs lymphoid cells and immunoglobulin.
- To understand the nature of the microbes and to know the beneficial and harmful effects of microbes.

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 – immunoglobulin and Immune Diseases

Immunoglobulin - Structure, function and biological properties of Immunoglobulin classes. Interaction of antigen and anti body- Auto immune diseases **–** Causes, Classification with one example each, Diagnosis and Treatment. Hypersensitivity, Tumour Immunology.

UNIT III – 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 secondary response - Humoral immune response (B cell activation) – Cell mediated immune response (T cell activation) .

UNIT IV - Scope and importance of microbiology

. General structure of microbes: Bacteria and Virus. Bacterial growth, Sterilization techniques, Culture media. Isolation of microbes , Pure culture, Continuous and Batch culture techniques – Growth curve.

UNIT V – Applied Microbiology

Food microbiology: Food poisoning, food spoilage and food preservation.

Industrial microbiology: Penicillin production.

Soil microbiology: Role of soil microbes in nitrogen fixation (Rhizobium), Biofertilizers (Acetobacter and Blue Green Algae).

Medical microbiology: Causative agents, Symptoms, treatment and prevention of the following Bacterial and viral diseases.

Bacterial diseases: Diphtheria, Tuberculosis, Typhoid, Leprosy, Syphilis, Dysentery.

Viral diseases: AIDS, Poliomyelitis, Chicken pox, Measles, Hepatitis.

TEXT BOOKS:

1. Rao, C. V.- An Introduction to Immunology, Narosa Publishing House, Private Limited, 35 –36 Greams Road , Thousand Lights, Chennai .
2. Purohit, S.S., AText Book of Microbiology, Student Edition, Agrobios (India) Behind Nasrani Cinema, Chopasani Road, Jodhpur.

REFERENCE BOOKS – IMMUNOLOGY

1. Berry A. K. A -Text Book of Immunology, EMKEY Publications , B - 19,East Krishna Nagar, Swami Dayanand Marg, Delhi – 110 051 .
2. Cazenave, P. A. and G. P.Talwar. - Immunology – Pauster's heritage, New Age International Publishers, 4835 / 24 Ansari Road, Darya Kanj, New Delhi.
3. George Pinchuk - Immunology, Tata Mc .Graw – Hill Publishing Company Limited, 7, West Patel Nagar, New Delhi.
4. Joshi, K. R. and N. O. Osamo. - Immunology and Serology, Student Edition, Agrobios (India) Behind Nasrani Cinema, Chopasani Road, Jodhpur.
5. Kuby- Immunology, ANE Books India, Avantika Niwas, 19 Doraiswamy Road, T.Nagar ,Chennai.
6. Mani., A Narayanan.L. M., Selvaraj. A. M ., Arumugam. N . – Immunology & Microbiology, Saras Publications, 114 / 35 G, A. R. P.Camp road, Nagercoil.

REFERENCE BOOKS – MICROBIOLOGY

1. Arora, M. P. Microbiology, Himalaya Publishing House, Ramdoot, Dr. Bhalerao Marg, Girgaon, Mumbai.
2. Dubey, R. C. and D. K. Maheswari.- A Text Book of Microbiology, S. Chand & Company Limited. 7361 Ram Nagar, Qutab Road, New Delhi.
3. Kalaiselvan, P .T . - Microbiology and Biotechnology , A Laboratory Manual, MJP Publishers, Tamil Nadu Book House, 47, Nallathambi Street, Triplicane, Chennai.
4. Meenakumari, S. Microbial Physiology, MJP Publishers, Tamil Nadu Book House, 47, Nallathambi Street, Triplicane, Chennai .
5. Power and Dagimawala, - General Microbiology Vol .– I (20th Edition) Himalaya Publishing House, Ramdoot, Dr. BhaleraoMarg, Girgaon, Mumbai.

VI SEMESTER			
Core 11	**APPLIED BIOTECHNOLOGY**		**15UZOC62**
Hrs / Week : 5	**Hrs / Sem : 5 x 15 = 75**	**Hrs / Unit : 15**	**Credits : 5**

Objectives:

- To understand the application of various biotechnological innovations for the protection of environment and for the genetic improvement of agricultural plants, aquatic resources and live stock and for the welfare of human beings
- To learn about the application of bioinformatics and nanotechnology

UNIT I - Environmental Biotechnology

Introduction – solid and liquid wastes, Bio-technological methods for waste treatment – Preliminary, Primary, Secondary, Tertiary treatment (Aerobic & anaerobic treatment).

Bioremediation: Definition – types Xeno biotics, Bio-degradation of pestiside, Role of genetically engineered microorganisms in bioremediation- super bug. Phyto-remediation of contaminated soil. Biotechnological tools for pollution monitoring.

UNIT II - Agricultural and Live stock Biotechnology

Somatic hybridization & Micro-propagation - Genetic manipulation of nif gene and 'nod' gene for nitrogen fixation. Genetically modified crops – their advantages & disadvantages.

UNIT III - Bioprocess Technology

Bio reactors, Fermentation Process – Metabolite production – Primary Metabolites – Biofuels – Ethanol Production – Secondary Metabolites– Enzyme Production – Galactosidase.

Biogas – production, Advantages & disadvantages.

UNIT IV - Biotechnology and health care

Human Genome Project- principal and application. Vaccines - Recombinant Vaccines, DNA Vaccines. gene therapy- types – vectors used in gene therapy. DNA sequencing, chromosome walking and jumping. DNA finger printing technique and applications. Bio sensors – Types – Applications.

UNIT V – Bioinformatics and Nanotechnology

Introduction, Definition, History – scope and application of bioinformatics – role of bioinformatics in life sciences - protein database – SWISSPORT & PIR – search tools – BLAST and FASTA – applications.

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

TEXT BOOK

1. Sathiyanarayana U., (2005). Biotechnology. Book and Allied (P) Ltd, Kolkata.
2. Singh B .D - Biotechnology Kalyani Publishers. Mahalakshmi street T. Nagar, Chennai – 600017.
3. Dubey R.C. - A Text book of Biotechnology (4th Edition). S.Chand & Co Ltd . 7361, Ramnagar, New Delhi – 110055.

REFERENCE BOOKS - APPLIED BIOTECHNOLOGY

1. Arora M.P.- Biotechnology (II nd Edition) Himalaya Publishing House, Ramdoot. Dr. Bhalerao Mar g, 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 Nasrani Cinema, Chopasani Road, Jodhpur – 342002
5. Prakash S. Lohar - Biotechnology , M.J.P. Publishers , Tamilnadu Book house 47, Nallathambi Street Triplicane – 600005.
6. Trivedi P.C - Advances in Bio-technology, Agrobios (India) Behind Nasrani Cinema, Choprasani Road Jodhpur – 342002.
7. Vikas pruthi - Basic Biotechnology,ANE Books India,Avantika Nivas,19, Doraisamy Road T.Nagar Chennai – 600017.
8. Yount. L – Genetics & Genetic Engineering , Orient Longman Limited Post Box No : 310, 160 Anna Salai, Chennai – 600002.
9. Shanmugam - Nanobiotechnology – MJP publication, Chennai

VI SEMESTER		
C 12	**PROJECT**	**15UZOP61**
Hrs / Week: 5	**Hrs / Sem: 75**	**Credit: 5**

OBJECTIVES:

At the end of the semester the students should be able to:

1. Identify the potential areas of research in his/her field;
2. Collect data from various sources including the internet, analyze them, make new connections and link them to life.
3. Read and write originally and usefully.

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.

Evaluation scheme:

The project will be evaluated by both Internal and External Examiners. Each Examiner will evaluate for 100 marks. The allocation of marks for project is as follows:

Project	Internal	External
Word of title	5	5
Objectives / Formulation including Hypothesis	5	5
Review of literature	10	10
Relevance of project to social needs	5	5
Methodology / Technique / Procedure adopted	20	20
Summary / Findings / Summation	5	5
Works cited / Annexure / Footnotes	10	10
Total	**60**	**60**

V & VI SEMESTERS		
CP-III	**ZOOLOGY CORE PRACTICAL III**	**15UZOC6P1**
Hrs / Week : 3	**Hrs / Sem : 3 x 15 = 45**	**Credits : 3**

***Examination at the end of IV Semester**

ANIIMAL PHYSIOLOGY PRACTICAL

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. Detection of Nitrogenous waste products of fish, birds &mammals. ammonia, uric acid and urea (to be done individually).
4. Demonstration of blood pressure with Sphygmomanometer.
5. Models, charts and photos:
   a) Simple muscle twitch b) Sphygmomanometer
   c) Haemoglobinometer d) Haemocytometer
   e) Reflex arc model f) ECG model
   g) Kymograph

GENETICS PRACTICAL

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) Monohybrid b) 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, Haemophilia & Hypertrichosis
c) DNA model
d) Sickle cell anaemia

FUNDAMENTALS OF BIOTECHNOLOGY PRACTICAL

1. Separation of genomic DNA by AGE - Demonstration.
2. Separation of protein by PAGE - Demonstration .
3. Models, charts and photos:
   a) pBR 322 b) Ti plasmid
   c) Lambda phage d) M 13
   e) CaMV f) Restriction enzymes
   g) Recombinant DNA h) Gene cloning
   i) Electroporation Unit j) Blotting techniques
   k) Stem cells l) Dolly
   m) Animal cloning n) Transgenesis
   o) Gene knock out p) Somatic cell fusion
   q) Agarose

V & VI SEMESTERS		
CP-IV	**ZOOLOGY CORE PRACTICAL IV**	**15UZOC6P2**
Hrs / Week : 3	**Hrs / Sem : 3 x 15 = 45**	**Credits : 3**

*** Examination at the end of VI Semester**

IMMUNOLOGY & MICROBIOLOGY PRACTICAL

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

APPLIED BIOTECHNOLOGY PRACTICAL

1. Estimation of BOD in two Water samples (Demonstration).
2. Protoplast preparation & fusion (Demonstration only).
3. Estimation of O_2 / CO_2 in any effluent / Sewage.
4. Isolation of plasmid (Demonstration only).
5. Models, charts photos and slides:
   Anaerobic digester , Filter – Biosensor , Callus , Explant , Micro Propagation, Protoplast fusion, Fermenter , Enzyme (Structure), Recombinant DNA , Human Genome Sequence , Penicillin Structure , Rhizobium , Blue green algae (Nostoc), and Azolla.
6. Visit to Biotechnology laboratory

VI SEMESTER			
CE2A	**BIOSTATISTICS & COMPUTER APPLICATIONS**	**15UZOE6A**	
Hrs / Week : 5	**Hrs / Sem : 5x 15 = 75**	**Hrs./Unit:15**	**Credit:6**

Objectives:

- To understand and perceive the learner about the applied areas of advanced bioscience like biostatistics and computer applications
- To impart the knowledge on computer – intensive bio-statistical methods.

UNIT I – Introduction

Collection of Data – primary and secondary data-sampling methods - Variables - Discrete and continuous presentation of Data – Classification and Tabulation – Parts of tables - Diagrams and Graph: Line diagram, Bar diagram, Pie diagram, Histogram, Frequency polygon and frequency curve.

UNIT II - Measures of central tendency

Mean , median, mode, standard deviation and standard error and Variance. Test of Independence- Goodness of Fit- Chi – square test.

UNIT III – Probability and Correlation

Probability-definition-theories-Binominal poisson and normal distribution, students‘ t ’ test and applications -
– correlation and correlation coefficient-simple regression ANOVA – oneway and two way

UNIT IV - Introduction to Computer

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

UNIT V - Introduction to M.S.Office

Basic concepts 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.

TEXT BOOK

1. Palanichamy and Manoharan. Biostatistics for Biology. Palani Paramout Publications.

2. Gurumani, N . - An Introduction to Biostatistics (Computer Application included) 2nd Edition, MJP Publishers, Tamil Nadu Book House, 47, Nallathambi Street, Triplicane, Chennai .
3. Gopi.A ,Meena .A., Arumugam . N , Sundaralingam.R. and V. Kumerasan. Biostatistics, ComputerApplication and Bioinformatics. (3rd Edition) Saras publications , 114 / 35G , A.R. P. Camp Road , Periavilai , Kottar Post. , Nagercoil.

REFERENCE BOOKS - BIOSTATISTICS

1. Arora and Mathan, Biostatistics (5th Edition) . Himalaya Publishing House, Ramdoot, Dr . Bhalerao Marg, Girgaon Mumbai – 400004.
2. Parihar and Parihar - Biostatistics and Biometry, Student Edition, Agrobios (India) Behind Nasrani Cinema, Chopasani Road, Jodhpur – 342002.
3. Pranab Kumar Banergee, - Introduction to Biostatistics (2nd Edition) S.Chand & Co. Ltd . 7361, Ramnagr , New Delhi – 110055.
4. Saha, T. K. - Biostatistics in Theory and Practice EMKEY Publications, B -19, East Krishna Nagar, Swami Dayanand Marg, Delhi – 110 051 .

REFERENCE BOOKS - COMPUTER APPLICATIONS

1. Rajaram, V. – Fundamental of computers
2. Krishnamoorthy, R.- Computer programming and applications
3. Ram, B. – Computer structure and architecture

VI SEMESTER		
CE 2B	**POULTRY SCIENCE**	**15UZOE6B**
Hrs / Week : 5	**Hrs / Sem : 5 x 15 = 75 Hrs./Unit:15**	**Credits : 6**

Objectives:

- To make scope for self employment opportunities after their graduation in their career.

UNIT I

Definition, poultry in India- a survey- historical review- progress through 5 year plans. Types of poultry birds, choosing a commercial laying stock, sexing in day old chicks, poultry housing – general principles of building poultry house, deep litter system – principles of built up litter system, droppings pit- feeders and waters-nest boxes. Laying cages, Californian cages, management of cage birds.

UNIT II

Poultry manure-volume, composition and values, nutritional content of ages. Managements of chicks, growers, layers and broilers. Lighting for chicks, growers, layers and broilers. Summer and winter managements.

UNIT III

Debeaking, forced moulting, poultry nutrition- energy – gross energy, digestible energy and metabolizable energy, fibre level in poultry feeds, protein and amino acid requirements for chicks, growers, layers and broilers – symptoms of excessive dietary levels and deficiency. Brief account of carbohydrates and fats as energy sources – essential fatty acids – deficiency symptoms – requirements of vitamins and inorganic minerals for chicks, growers and layers – deficiency symptoms – supplementation of vitamins and minerals in poultry feed.

UNIT IV

Non-nutritive feed additives- merits and demerits of additives – feed stuffs for poultry – south Indian feed ingredients and agro-industrial by products in relation to M.E. level, protein level, amino acid level, minerals (C and P) and fibre contents.

UNIT V

Causes, symptoms, transmission, treatment, and management of the following diseases: New CASTLE disease, fowl pox, laryngobronchitis, Avian leucosis complex and Gumboro disease. Pullorum, fowl cholera, mycoplasmosis and coccidosis and lice. Avian flu virus H5B virus.

TEXT BOOK

1. Poultry Keeping – M.R. Gnanamani

REFERENCE BOOKS - POULTRY SCIENCE

1. The Rearing of Pullets – Bulletin No. 54, Her majesty's stationary office, London.
2. Intensive Poultry Managements for egg production. Bulletin No. 152. Her majesty's stationary office, London.
3. Nutrition of the Chicken – M.L.Scott et al.,
4. Diseases of Poultry – Biester – Oxford and IBH
5. Applied Zoology- Arumugam, N. et al., Saras publication

V & VI SEMESTER		
CE 2B	**CORE ELECTIVE PRACTICAL***	**15UZO6EP**
Hrs / Week : 3	**Hrs / Sem : 3 x 15 = 45**	**Credits : 3**

*** Examination at the end of VI Semester**

AQUACULTURE PRACTICAL

1. Estimation of water samples.
   a) Salinity,
   b) Dissolved oxygen and
   c) Alkalinity
2. Collection and Identification of economically important fishes – Catla, Eel, Shark and Sardine.
3. Collection and Identification of economically important crustaceans (Penaeus and Macrobrachium)
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. Visit to aquaculture farm.

BIOSTATISTICS & COMPUTER APPLICATIONS PRACTICAL

1. Study of probability with 2 coins tossing experiments.
2. Calculation of Mean, 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 slides using M.S PowerPoint.
6. Bar diagram, Pie diagram, Histogram.
7. Spotters:
   1) Input – Key board, Mouse 2) output – Monitor, printer 3) CPU

Allied I – Nutrition and Dietetics (Offered by the Department of Nutrition and Dietetics to B.Sc. Zoology Students)			
I SEMESTER			
AI 1	**FOOD SCIENCE**		**15UFNA11**
Hrs/Week: 3	**Hrs/Sem: 3x15 = 45**	**Hrs./UNIT: 9**	**Credit: 4**

Objectives:

To enable students

- To understand the vital link between nutrition and health.
- To gain knowledge of nutrition and their role in body's smooth functioning.
- To gain practical experience in different methods of cooking.
- To get insights on food adulterants

UNIT I

a. Definition of health, food and nutrition – Classification of food according to functions – Food groups: Basic V, IV, VII – Food pyramid.
b. Preparation techniques – Different methods of cooking and their influence on nutrient retention.

UNIT II

a. Cereals and millets – Structure of a cereal and nutritive value of rice, wheat, maize, jowar, bajra and ragi – Par boiling and its advantages.
b. Pulses, – Nutritive value – Germination of pulses and its advantages; Factors influencing cooking quality of pulses.

Unit III

a. Nuts and oil seeds – Nutritive value of groundnuts, soybeans, sesame, coconut.
b. Kinds of fats and oils – Mustard oil, sunflower oil, Safflower oil, Factors affecting oil absorption.
c. Stages of sugar cookery.

UNIT IV

a. Vegetables – Classification according to structure – Nutritive value, principles of cooking vegetables – pigments in vegetables and changes during cooking.
b. Fruits – Nutritive value, Classification – Browning reaction
c. Commonly used Condiments and spices – uses and abuses.

d. Beverages – hot and cold beverages.

UNIT V

a. Milk – Nutritive value – different types of milk and milk products.
b. Egg – Structure and nutritive value – uses of egg in cookery.
c. Flesh foods – Nutritive value – methods of selection of fish, poultry, and meat.
d. Food Adulteration – common food adulterants and its Harmful effects.

REFERENCE BOOKS:

1. Food Facts and Principles – Manay, S.N. and Shadakshalaswamy, New Age International Publications, 1996.
2. Food Science, Potter, AVI publishing Company, New York, USA – 1992.
3. Foundation of Food Preparation, peck am, McMillan Company, London 1994.
4. Food Science, Sri Lakshmi, Wiley Eastern Ltd. – 2005
5. Food Science, Usha Chandra Shekar – 2003
6. Food Science, Marion Bennion
7. Food Chemistry, Mayer
8. Practical Manuel – Mohini Sethi
9. Practical Manuel – Sri lakshmi
10. Nutritive value of Indian foods – G. Gopalan

II SEMESTER			
AI 2	**APPLIED NUTRITION**		**15UFNA21**
Hrs/Week: 3	**Hrs/Sem: 3x15=45**	**Hrs./UNIT: 9**	**Credit: 4**

OBJECTIVES:

To enable students

- To gain knowledge about the methods of assessment of nutritional status
- To gain knowledge and skill on various methods of different food groups and their nutritive value
- To gain knowledge and skill on various methods of nutritional assessment for different age groups.

UNIT I

a. Menu planning – Factors affecting menu planning.
b. Assessment of Nutritional status – Methods – Clinical examination, Anthropometric measurements, Diet surveys, vital statistics. Biochemical examination.

UNIT II

Energy – Unit of energy – Bomb calorimeter, Physiologic energy value of food – BMR – definition, Determination, Factors affecting BMR, Determination of energy during activity, SDA – Specific Dynamic Action.

UNIT III

A. Carbohydrates – Classification, functions, sources and requirements.
B. Lipids – Classification, functions, sources and requirements.
C. proteins – Classification, functions, sources and requirements.
D. Protein energy mal nutrition and Kwashiorkor – causes, symptoms and diet therapy.

UNIT IV

a. Fat soluble Vitamins A,D,E,K – Functions, Sources Requirements and deficiency
b. Water soluble Vitamins C and B group vitamins.

UNIT V

a. Minerals – Functions, Sources requirements and deficiency of Ca, P, Na, K, Fe, Zn, Selenium, Fluorine, Iodine.

REFERENCE BOOKS:

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

I & II SEMESTERS		
AI P	**ALLIED NUTRITION AND DIETETICS PRACTICAL**	**15UFNA2P**
Hrs/Week: 3	**Hrs/Sem: 3 x 15 = 45**	**Credit: 2**

*** Examination at the end of II Semester**

1. Group experience different methods of cooking with common recipes.
   a. Cereals
   b. Pulses
   c. Vegetables
   d. Fruits
   e. Milk

2. Planning menu for the following age groups
   a. Preschool children
   b. Adolescent boys and girls
   c. Adult men and women
   d. Pregnant mothers
   e. Nursing mothers
   f. School going children with packed lunch.
   g. College going girl – diet for Anemia

3. Tests for detecting food adulteration.

4. Identification of food groups.

5. Identification of different stages of sugar cooking.

6. Demonstration of bread and cake making.

7. Spotter – Deficiency diseases of vitamins and minerals

8. Report of Nutrition assessment
   a. Clinical and anthropometric assessment among rural school children
   b. Conducting 24 Hrs recall method in a community.

9. Visit to Food industry, bakery unit, CFTRI, observing school lunch program and ICDS programme.

Record and the report of the nutritional assessment to be submitted at the time of practical examination.

Allied II – Botany (Offered by the Department of Botany to B.Sc. Zoology Students)			
III SEMESTER			
AII 1	PLANT DIVERSITY & PLANT PATHOLOGY		15UBTA31
Hrs/Week: 3	Hrs/Sem: 3x15=45	Hrs./UNIT: 9	Credit: 4

Objectives

To enable the students

- To have a general understanding about the diverse group of plants and observe the variations among the plants.
- To identify the different plants by morphological and anatomical studies.
- To have a comprehensive knowledge of Algae, Fungi, Bryophyte, Pteridophyte, Gymnosperm and Angiosperm and to identify the plant diseases.

UNIT I Algae & Fungi

Algae – Salient features of algae: Caulerpa – Distribution, structure, reproduction & life cycle. Economic importance of algae – Benefecial role (Agriculture, Industry & Medicine). Fungi – Salient features of fungi: Agaricus – Distribution, structure, reproduction & life cycle. Economic importance of fungi.

UNIT II Lichens & Bryophytes

Lichen – Salient features of lichen – Types – Crustose, Foliose, Fruiticose – Economic importance of lichen. Bryophytes – Salient features of Bryophyte. Marchantia – Distribution, structure reproduction & life history.

UNIT III Pteridophytes & Gymnosperms Hrs: 9hrs

Pteridophytes – Salient features Pteridophyte. Marsellia – Structure, reproduction & life cycle.(Sporocarp structure only). Gymnosperms – Salient features gymnosperm. Pinus – Structure, reproduction & life cycle. Economic importance of gymnosperms.

UNIT IV Taxonomy Hrs: 9hrs

Brief account on Artificial, Natural & Phylogenetic Classifications. Study of the following families – Caesalpiniaceae, Apocyanaceae, Euphorbiaceae.

UNIT V Plant Pathology Hrs: 9hrs

Introduction to Plant Pathology – Classification of plant diseases and its importance. Tikka disease of groundnut, Citrus Canker & Bunchy top of banana – Causal organism, Symptoms, Disease cycle and Control Measures.

REFERENCE 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. Parihar. N. S.2001. Bryophyta – Central Book Depot Publications in Botany, Allahabad
3. Vashista. B R .1997, The Algae, S .Chand & Co. Ltd... New Delhi
4. Pandey.B.P.1997 – Taxonomy of Angiosperms – S.Chand & Co., New Delhi.
5. Gangulee, Das & Datta, College Botany Vol I, 1986, new central book agency, Calcutta.
6. Sporne K.R. 1991. The Morphology of Pteridophytes. B.I Publishing Pvt. Ltd. Bombay.
7. Bhatnagar S.P and Moitra Alok 1996. Gymnosperms. New Age International Pvt. Ltd. Publishers, New Delhi.
8. Singh V. and D.K Jain, 1981 Taxonomy of Angiosperms. Rastogi Publication, Meerut.
9. Vashishta P.C., A.R. Sinha, Anil Kumar. 2006. Gymnosperms. S.Chand.
10. Vashishta P.C. 2006. Pteridophytes. S. Chand.
11. Sharma, O. P. (1986). Textbook of Algae. Tata McGraw Hill, New Delhi.
12. Smith, G. M. (1976). Cryptogamic Botany. Vol. I. Algae and Fungi. Tata McGraw Hill, New Delhi. •
13. Vashista, P. C. (2006). Taxonomy of Angiosperms. S. Chand and Co. Ltd., New Delhi.
14. Vashishta, B. R. et al. (2008). Botany for Degree Students – Algae. S. Chand and Co. Ltd., New Delhi.
15. Vashishta, B. R. and Sinha, A. K. (2007). Botany for Degree Students – Fungi. S. Chand and Co. Ltd., New Delhi.
16. Vashishta, B. R. et al. (2008). Botany for Degree Students: Bryophyta. S. Chand and Co. Ltd., New Delhi.
17. Singh, V. and Jain, K. K. (1989). Taxonomy of Angiosperms. Rastogi Publications, Meerut.
18. Davis, P. H. and Heywood, V. H. (1967). Principles of Angiosperm Taxonomy. Oliver and Boyd, London.
19. Gamble, J. S. (1933). Flora of the Presidency of Madras. Botanical Survey of India, Calcutta.

Allied II – Botany (Offered by the Department of Botany to B.Sc. Zoology Students)			
IV SEMESTER			
AII 2	PLANT PHYSIOLOGY & BIOCHEMISTRY		15UBTA41
Hrs/Week: 3	Hrs/Sem: 3x15=45	Hrs./UNIT: 9	Credit: 4

Objectives

To enable the students

- To understand the metabolic activities of plants.
- To know about the various concepts and mechanisms of functions of plant.
- To understand the basic concept of biochemical analysis.

UNIT I

Plant water relations: Absorption of water – Diffusion, Imbibition, Osmosis & Plasmolysis. Mechanism of water absorption – Active and Passive. Ascent of sap – Path and Mechanism. Cohesion and Transpiration pull theory only. Transpiration – Types – cuticular, stomatal, lenticular – guttation. Mechanism of Stomatal Transpiration. (Theories not needed). Antitranspirant, significance of transpiration.

UNIT II

Photosynthesis – Ultra Structure of Chloroplast. Pigment systems. 'Z' scheme of electron transport – Van Neil hypothesis – Calvin cycle, Factors affecting photosynthesis.

UNIT III

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

UNIT IV

Plant biochemistry – Introduction – biomolecules – Structure and Properties of Carbohydrate (Glucose, Maltose & Cellulose) and Proteins.

UNIT V

Techniques in Biochemistry – Colorimetry, PH metry and Paper Chromatography (Ascending).

REFERENCE BOOKS:

1. Jain V. K. 1996 – Fundamentals of Plant Physiology 5th edition – S. Chand &Co. New Delhi.
2. Taiz, L and Zeiger, E. 1991, Plant Physiology. The Bengamen Cummings Publishers, California.
3. Moore T.C. 1989. Biochemistry and Physiology of Plant Hormones. Springer – Verlag, New York, USA.
4. Salisbury F.B and Ross C.W 1992. Plant physiology (Fourth Edition) Wadsworth Publishing Company, California, USA.
5. Taiz L. and Zeiger E. 1998. Plant Physiology (Second Edition). Sinauer Associates, Inc. Publishes, Massachusetts, USA.
6. Verma S.K. and Verma Mohit 2007. A.T.B of Plant Physiology, Biochemistry and Biotechnology, S.Chand Publications.
7. Leninger A.C 1987. Principles of Biochemistry, CBS Publishers and Distributers (Indian Reprint)
8. Buchanan B.B, Gruissem W. and Jones R.L 2000. Biochemistry and Molecular Biology of Plants. American Society of Plant Physiologists Maryland, USA.
9. Dennis D.T., Turpin, D.H. Lefebvre D.D. and Layzell D.B. (Eds) 1997. Plant Metabolism (Second Edition) Longman, Essex, England.
10. Conn E.E.P.K. Stumpf, G. Brueming and R.H.Doi 1987, Outlines of Biochemistry, John Wiley & Co.New York.
11. William H, Elliot and Daphane C, Elliot 1997, Biochemistry and Molecular Biology, Oxford University Press.
12. Verma S. K. Textbook of Plant physiology and Biochemistry; 4th edition; S. Chand & Company Ltd, 2003.
13. Verma, V.; Textbook of plant physiology; New Delhi: Ane Books India, 2007.

III & IV SEMESTERS		
AII P	**ALLIED BOTANY PRACTICAL ***	**15UBTA4P**
Hrs/Week: 3	**Hrs/Sem: 3 x 15 = 45**	**Credit: 2**

*** Examination at the end of IV Semester**

Objectives

To enable the students

1. To study plant materials of anatomical & morphological interest for identification.
2. To identify various groups of flowering & non flowering plants.
3. To learn the Physiology & Biochemistry of plants.

DIVERSITY OF PLANT LIFE PRACTICAL

1. Micro preparation of specimens prescribed in the syllabus.
2. Identification of Permanent slides :
   Marchantia – Antheridiophore,Archegoniophore & Sporophyte.
   Marselia – Sporocarp(V.S).
   Pinus – L.S of male cone & female cone.
3. Botanical name, family, floral formula, floral diagram and Technical description of the plants from the families prescribed in the theory syllabus.
4. Identification of plant diseases.

PLANT PHYSIOLOGY & BIOCHEMISTRY PRACTICAL

Plant Physiology

To demonstrate simple set up in Plant Physiology.

1. Osmosis – Potato Osmoscope.
2. To demonstrate Plasmolysis by using Tradescantia leaf.
3. Transpiration Ganong's Potometer Experiment.
4. Demonstration of Suction Pressure due to Transpiration.
5. Ganong's light screen.
6. Evolution of oxygen during photosynthesis – Test tube & Funnel experiment.
7. Ganong's respiroscope – Respiration.
8. Anaerobic respiration – Kuhne's Vessel.
9. Separation of plant pigments – paper chromatography.
10. Demonstration and usage of PH meter & Colorimeter.
11. Field trip and Industrial visit is necessary.

REFERENCES:

1. Pandey, B.P. 2010, Modern Practical Botany Vol II. S.Chand & Company Ltd. New Delhi.
2. Santra. S.C. et al., 2005, College Botany Practical Vol. I. New Central book agency (P) Ltd, Kolkatta, India.
3. Pandey, B.P. 2009,Plant Pathology ,Pathogen and Plant disease, S.Chand & Company Ltd, New Delhi.
4. Pandey, B.P. 2010, Modern Practical Botany Vol III. S.Chand & Company Ltd. New Delhi

III SEMESTERS		
SBE 1	**DIET THERAPY**	**15UZOS31**
Hrs/Week: 3	**Hrs/Sem: 3 x 15 = 45 Hrs./Unit:9**	**Credit: 2**

Objectives:

To enable students to

- To learn the responsibilities of a Dietitian in a hospital
- To plan and prepare therapeutic diets for various disease conditions.
- To acquire skills on diet counseling for various disease conditions

UNIT I

Definition of dietetics – purpose of diet therapy – factors considered in planning therapeutic diets – Types and role of dietitian.

UNIT II

A) Routine hospital diets – clear fluid diet, full fluid diet – soft diet, regular normal diet - preoperative diet, postoperative diet.

B) Special feeding methods – Entral & Parental feeding- advantages and disadvantages.

UNIT III

Diet in fevers - causes, types, general dietary consideration in fever, Principles of dietary management, recommended Dietary Allowance.

UNIT IV

a) Obesity etiology, assessment and classification of obesity and nutritional modification, RDA
b) Under nutrition
c) Importance of fiber.

UNIT V

Peptic ulcer, diarrhoea, constipation Principles of planning diet, etiology, and nutritional modification, RDA.

PRACTICAL EXPERIENCES:

1. Preparation of clear fluid diet
2. Preparation of full fluid diet
3. Preparation of soft diet
4. Planning and preparing the following diets
   * Weight reduction diets
   * Ulcer
   * High calorie and High protein diets.

Visits: Hospitals for live demonstration of tube feeding and Visit to dietary department in a multi specialty hospital to observe the serving of hospital diets.

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. Guthrie and Boston, Introductory Nutrition, 1989, VIII Edition.
4. Robinson C.H. and Lawery M. Normal and therapeutic nutrition, Macmillan Publishing Co., NewYork, 1990.
5. Sri Lakshmi, B., Dietetics, Wiley eastern limited, 1993.

IV SEMESTERS		
SBE 2	**MEDICINAL BOTANY AND HORTICULTURE**	**15UZOS41**
Hrs/Week: 3	**Hrs/Sem: 3 x 15 = 45 Hrs./Unit:9**	**Credit: 2**

OBJECTIVES:

- To know about the values of ethnomedicine.
- To identify and classify the common medicinal plants.
- To enable the students to know about the latest Horticultural Techniques and to enrich themselves on the modern developments in ornamental garden.

UNIT I

Introduction to Herbal Medicine. Traditional systems of medicines: Ayurvedic, Homeopathy, Siddha and Unani. Traditional knowledge on medicinal plans and conservation of medicinal plants.

UNIT II

Classification of medicinal plants – Based on Morphology of plant parts used, Active Principles and Therapeutic Values.

UNIT III

Study of the following medicinal plants with reference to morphology of the plants – Botanical name, Common name, Active Principle and its Therapeutic value - Ginger, Fenugreek, Coleus, Vetiver, Phyllantus and Asafoetida.

UNIT IV

Introduction to horticulture – Importance and Division. Propagation of horticultural crops – cutting, Grafting, Budding and layering.

UNIT V

Importance, Principles, and designs of ornamental garden – layout and components of ornamental garden – Lawn, Indoor gardening and rockeries, Bonsai and Hanging pots, Flower arrangement.

REFERENCE BOOKS

1. Craker, Lyle. E, 1988, Herbs, Spices & Medicinal plants: Racent advances in Botany, Oryx Press, Phoenix, Arizonal.
2. Vijay Verma 2008, Dictionary of medicinal plants, Anmol publication, New Delhi
3. M.I.H.Farooqi, 2004. Medicinal plants in the traditions of prophet Mohamed: Scientific study of prophetic medicine, Vedoms Books (P) Ltd. Sidrab Pub. Lucknow.
4. Walter H. Lewis et al. 2003, Medical Botany plants affecting human health 2nd Edition, Wiley publishers, New York.
5. Kokate, C.K., Purohitt, A.P. Gokhale, S.B. 2007, Pharmacognsy, Nirali Prakashan Publishers, Pune.
6. Jyothiprakash E.J, 2006, Medicinal botany and pharmacognosy, Emkay publishers, New Delhi.
7. Edmud Senn, Andrew, Halfacre, 1977, Fundamentals of horticulture, Tata McGraw-Hill, New Delhi.
8. Manibhusan Rao, K,1991, Text Book of Horticulture, McMillan India, New Delhi.
9. Kmar, 1987, Introduction to Horticulture, Rohini Agencies, New Delhi.

III SEMESTERS			
NME 1	**ORNAMENTAL FISH CULTURE**		**15UZON31**
Hrs/Week: 3	**Hrs/Sem: 3 x 15 = 45**	**Hrs./Unit:9**	**Credit: 2**

OBJECTIVES:

To create interest in self employment and to earn income by developing the skills.

To understand the techniques in culture.

UNIT I:

Introduction – Entrepreneurship - Scope of Ornamental fish culture - Types of Aquaria - setting up of tanks - accessories for fish tanks - Ornamental plants.

UNIT II:

Popular ornamental fishes: selecting a healthy fish - Egg laying fishes (Siamese fighting fish, Gowrami, Goldfish, Zebra and Angel fish) and Live bearing fishes (Molly, Guppy and Sword tail).

UNIT III:

Food and feeding: Natural feed - Artificial feed - Balanced diet. Aquarium management: water capacity and number of fishes in an aquarium (tank fish ratio).

UNIT IV:

Common Ornamental fish diseases and their treatment: Bacterial, Viral, Fungal, Protozoan and Parasitic diseases (any three diseases in each category).

UNIT V:

Transport of fishes - Economics of commercial farming - Tips for maintaining a healthy aquarium.

Text book

1. C.S. Tharadevi K.V. Jayashree. Home Aquarium. Saras Publications, Nagercoil.

BOOKS FOR REFERENCE:

1. Jameson J. D and Santhanam R., (1996). Manual of Ornamental Fishes and Farming Technologies. Fisheries College and Research Institute, Tamil Nadu Veterinary and Animal Sciences University, Tuticorin.
2. Dolakia, A. D., (2009). Ornamental fish culture and aquarium management. Daya Publishing House, Delhi - 52.
3. Meenakshi Jindal., Yadava N. K and Gupta R.K., (2010). Fresh water ornamental fishes. Mangalam Publications, Delhi- 53.

IV SEMESTER			
NME 2	**APICULTURE**		**15UZON41**
Hrs / Week : 3	**Hrs / Sem : 3 X 15 = 60**	**Hrs./Unit:9**	**Credits : 2**

Objectives:

- To create an interest in the learner to understand the elaborate details about maintaining bee hives for profit and pleasure
- To provide in-depth applied knowledge in apiculture to enable the student takes up apiculture as a career.

UNIT I - Introduction

Definition, scope, honey bee- classification of bees- rock bee, Indian bee, little bee and dammer bee – their identification and habits – choice of species in apiculture. Bee colony – distinctive features and identification of queen, drones and workers, functions of the members. - Anatomy and organ system of honey bee. - Development of honey bee – egg, larva and pupa – time taken for the development of queen, drone and worker, life history of *Apis indica*.

UNIT II – Rearing

Apiculture techniques, arranging an apiary position – space, acquiring bees – care of newly captured colonies – handling the bees. - Bee keeping – primitive methods – modern methods. The bee hive and its architecture – different kinds of cells – burr comb. - Different types of hives – their identification, artificial hives their advantages – parts of artificial hive – other appliances used in apiaries.

UNIT III – Economic Importance

Honey bee products. - Honey – extraction of honey – preservation and storage of honey – properties, chemical composition, nutritive value, medicinal values – honey as daily food. - Bee wax – production – method of extraction – characteristics and uses. - Bee venom – methods of extraction of venom – composition of venom – curative value

UNIT IV – Enemies and Diseases

Enemies of bees – greater wax moth, lesser wax moth, ants wasps, lice, beetles and birds and their control.

Diseases of bees – adult and brood diseases – prevention and control measures.

UNIT V - Management

Swarming – prevention and control. - Robbing and fighting – prevention and control. - Uniting stocks – different methods - Queen

rearing and introduction - Supersedure - Foraging - Inter- relationship of plants and bees.

TEXT BOOK

Johnson, J. and I. Jeyachandra - Apiculture –Dept. of Zoology, N.M. Christian College, Marthandam.- 629 165.

REFERENCE BOOKS

1. Abrol, D.P.-Bees and Bee keeping in India. Kalyani Publishers, B.1/1292, Rajinder Nagar , Ludhiana- 141 008. .
2. Abrol, D.P.Honey bee Diseases and their Management, Kalyani Publishers, B.1/1292, Rajinder nagar , Ludhiana- 141 008. .
3. Bee keeping in South India – Cherian MC and Ramachandran
4. Bee keeping in South India – Superintendent, Govt. press, Chennai
5. Sharma P.L.& SinghS.-Hand book of Bee Keeping, Printing and stationary, Chandigarh.

PART IV – NON-MAJOR ELECTIVE (AIDED COURSES) (2015 – 2018)							
SEM	**TITLE OF THE PAPER**	**S.CODE**	**H/W**	**C**	**MARKS**		
					I	**E**	**T**
DEPT. OF ENGLISH							
III	*Computer Assisted Language Learning: Reading & Writing*	*15UENN31*	**3**	**2**	**25**	**75**	**100**
IV	*Computer Assisted Language Learning: Listening & Speaking*	*15UENN41*	**3**	**2**	**25**	**75**	**100**
DEPT. OF HISTORY							
III	*Modern Constitution – I*	*15UHSN31*	**3**	**2**	**25**	**75**	**100**
IV	*Modern Constitution – II*	*15UHSN41*	**3**	**2**	**25**	**75**	**100**
DEPT. OF MATHEMATICS							
III	*Mathematics for Competitive Examinations – I*	*15UMAN31*	**3**	**2**	**25**	**75**	**100**
IV	*Mathematics for Competitive Examinations – II*	*15UMAN41*	**3**	**2**	**25**	**75**	**100**
DEPT. OF PHYSICS							
III	*Basic Physics – I*	*15UPHN31*	**3**	**2**	**25**	**75**	**100**
IV	*Basic Physics - II*	*15UPHN41*	**3**	**2**	**25**	**75**	**100**
DEPT. OF CHEMISTRY							
III	*Water Management*	*15UCHN31*	**3**	**2**	**25**	**75**	**100**
IV	*Applied Chemistry*	*15UCHN41*	**3**	**2**	**25**	**75**	**100**
DEPT. OF ZOOLOGY							
III	*Ornamental Fish culture*	*15UZON31*	**3**	**2**	**25**	**75**	**100**
IV	*Apiculture*	*15UZON41*	**3**	**2**	**25**	**75**	**100**
DEPT. OF COMPUTER SCIENCE							
III	*Office Automation*	*15UCSN31*	**3**	**2**	**25**	**75**	**100**
IV	*Desktop Publishing*	*15UCSN41*	**3**	**2**	**25**	**75**	**100**
DEPT. OF COMMERCE							
III	*Principles of Commerce*	*15UCON31*	**3**	**2**	**25**	**75**	**100**
IV	*Basics in Accounting**	*15UCON41*	**3**	**2**	**25**	**75**	**100**

* Common to Department of Commerce and Department of Commerce (CA)

I SEMESTER			
EVS	**ENVIRONMENTAL STUDIES**		**15UEVS11**
Hrs/ Week: 2	**Hrs/ Sem: 30**	**Hrs/ UNIT: 6**	**Credits: 1**

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, Fukishma – Stone leprosy in Taj Mahal

UNIT - II: Natural Resources

Renewable and Non Renewable resources - classification.

- Forest resources: Use and over - exploitation, Aforrestation 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. Types, structure & Functions of the following:
  a) Aquatic ecosystem
  b) Grassland ecosystem
  c) Forest ecosystem
  d) Desert ecosystem
  e) Living conditions on other planets (Briefly)

UNIT - IV: Biodiversity & Its Conservation

Introduction - Definition: eco system diversity, species and Genetic Hot spots of biodiversity - Western Ghats, Eastern Himalayas and Gulf of Mannar. Threats to biodiversity - Habitual Loss, Poaching of wild life and Man - wild life conflicts.

Conversation of biodiversity: Insitu and ex-insitu.

UNIT - V: Environmental Pollution

Sources, effects, prevention and control measures of the following.

a) Air pollution: Composition of clean air, Global warming, Ozone layer depletion.
b) Water Pollution: Fresh and Marine water pollution
c) Noise Pollution
d) Soil pollution
e) Bio degradable and Non Bio degradable wastes
   - Air (prevention & Control of Pollution) Act.
   - Environmental Protection Act
   - Water (Prevention & Control of pollution) Act
   - Environmental movements - Green peace and Chipco,
   - Role of State & Central pollution Control Boards.

REFERENCE BOOKS:

1. Basic of Environmental Science. Viyajalakhmi, 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.
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. Environmental Studies. V.M. Selvaraj, Bavani Publications, Tirunelveli.

II SEMESTER			
VE1	**VALUE EDUCATION – I**		**15USVE2A**
Hrs/ Week: 2	**Hrs/ Sem: 30**	**Hrs/ Unit: 6**	**Credits: 1**

Objectives:

1. To inculcate moral values in the minds of students.
2. To teach ethical practices to be adopted by students in their life.
3. To make students honest and upright 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– Sura Fathiha , 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) – Aiamul Jahiliya – 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 – Masnoon Duas.

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. Manzoor Nomani – Islamic Faith & Practice.
4. Abdul Hasan Ali Nadvi – Muhammad Rasulullah.
5. K. Ali – A Study of Islamic History.
6. Abdul Rahuman Abdullah – Islamic Dress code for Women.
7. Dr. Munir Ahamed Mughal – Code For Believers.
8. Abdul Malik Mujahid – Gems and Jewels.

II SEMESTER			
VE2	**VALUE EDUCATION – II**		**15USVE2B**
Hrs/ Week: 2	**Hrs/ Sem: 30**	**Hrs/ Unit: 6**	**Credits: 1**

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.

TEXTBOOK:

Publication of Sadakathullah Appa College.

SCHEME OF EXAMINATIONS UNDER CBCS (2015 - 2018)

The medium of instruction in all UG and PG courses is English and students shall write the CIA Tests and Semester Examinations in English. However, if the examinations were written in Tamil, the answer papers will be valued.

DISTRIBUTION OF MARKS FOR CIA AND SEMESTER EXAMINATIONS

UNDERGRADUATE, CERTIFICATE & DIPLOMA COURSES

SUBJECT	TOTAL MARKS	CIA TEST	SEMESTER EXAMINATION	PASSING MINIMUM		
				CIA TEST	SEM. EXAM.	OVER ALL
Theory	100	25	75	Nil	30	40
Practical	100	40	60	Nil	24	40
Project	100	Nil	Report - 60 marks Viva Voce - 40 marks	Nil	40	40

POSTGRADUATE COURSES

SUBJECT	TOTAL MARKS	CIA TEST	SEMESTER EXAMINATION	PASSING MINIMUM		
				CIA EXAM.	SEM. EXAM.	OVER ALL
Theory	100	25	75	nil	38	50
Practical	100	40	60	nil	30	50
Project	100	nil	Report - 60 marks Viva Voce - 40 marks	nil	50	50

DIVISION OF MARKS FOR CIA TEST

SUBJECT	MARKS	ASSIGNMENT FOR UG / ASSIGNMENT OR SEMINAR FOR PG	REGULARITY	RECORD NOTE	TOTAL MARKS
Theory	20	5	--	--	**25**
Practical	30	--	5	5	**40**

1. The duration of each CIA Test is ONE hour and the Semester Examination is THREE hours.
2. Three CIA tests of 20 marks each will be conducted and the average marks of the best two tests out of the three tests will be taken.
3. The I test will be based on the first 1.5 units of the syllabus, the II test will be based on the next 1.5 units of the syllabus and the III test will be based on the next 1.5 units of the syllabus.
4. Two assignments for Undergraduate, Certificate, Diploma and Advanced Diploma Courses and two assignments OR two seminars for Postgraduate Courses.
5. The duration and the pattern of question paper for practical examination may be decided by the respective Boards of Studies. However, out of 60 marks in the semester practical examination, 10 marks may be allotted for record and 50 marks for practical.
6. Three internal practical tests of 25 marks each will be conducted for science students in the even semester and the best two out of the three will be taken. The total 50 marks of the best two tests will be converted to 30 by using the following formula:

$$\left(\begin{array}{c}\text{Marks secured in the first best Practical Test (Out of 25)}\\ +\\ \text{Marks secured in the next best Practical Test (out of 25)}\end{array}\right) \text{X } 0.6$$

7. The Heads of Science Departments are requested to keep a record of attendance of practicals for students to assign marks for regularity.

QUESTION PAPER PATTERN FOR CIA TEST (THEORY)

Duration: 1 Hr **Maximum Marks: 20**

Section	Question Type	No. of Questions & Marks	Marks
A	No Choice Answer should not exceed 75 words	2 Questions 2 marks each	2 x 2 = 4
B	Internal choice (Either or type) Answer should not exceed 200 words	2 Questions 4 marks each	2 x 4 = 8
C	Open Choice (Answer ANY ONE out of Two) Answer should not exceed 400 words	1 Question 8 marks	1 x 8 = 8
		TOTAL	**20 MARKS**

QUESTION PAPER PATTERN FOR SEMESTER EXAMINATION (THEORY)

Duration: 3 Hrs **Maximum Marks: 75**

Section	Question Type	No. of Questions & Marks	Marks
A	No Choice Answer should not exceed 75 words	10 Questions - 2 marks each (2 Questions from each unit)	10 x 2 = 20
B	Internal choice (Either or type) Answer should not exceed 200 words	5 Questions with internal choice. Each carries 5 marks (Two questions from each unit)	5 x 5 = 25
C	Open Choice (Answer ANY THREE out of FIVE) Answer should not exceed 400 words	3 Questions out of 5 - 10 marks each (1 Question from each unit)	3 x 10 = 30
		TOTAL	**75 MARKS**

2015-2018

Allied I – Nutrition and Dietetics (Offered by the Department of Nutrition and Dietetics to B.Sc. Zoology Students)		
I SEMESTER		
AI 1	FOOD SCIENCE	15UFNA11
Hrs/Week: 3 Hrs/Sem: 3x15 = 45	Hrs./UNIT: 9	Credit: 4

Objectives:

To enable students

- To understand the vital link between nutrition and health.
- To gain knowledge of nutrition and their role in body's smooth functioning.
- To gain practical experience in different methods of cooking.
- To get insights on food adulterants

UNIT I

a. Definition of health, food and nutrition – Classification of food according to functions – Food groups: Basic V, IV, VII – Food pyramid.

b. Preparation techniques – Different methods of cooking and their influence on nutrient retention.

UNIT II

a. Cereals and millets – Structure of a cereal and nutritive value of rice, wheat, maize, jowar, bajra and ragi – Par boiling and its advantages.

b. Flour – its application, Bread and Cake preparation.

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

Unit III

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

b. Kinds of fats and oils – Mustard oil, sunflower oil, Safflower oil, Factors affecting oil absorption.

c. Stages of sugar cookery.

UNIT IV

a. Vegetables – Classification according to structure – Nutritive value, principles of cooking vegetables – pigments in vegetables and changes during cooking.

b. Fruits – Nutritive value, Classification – Browning reaction

c. Commonly used Condiments and spices – uses and abuses.
d. Beverages – hot and cold beverages.

UNIT V

a. Milk – Nutritive value – different types of milk and milk products.
b. Egg – Structure and nutritive value – uses of egg in cookery.
c. Flesh foods – Nutritive value – methods of selection of fish, poultry, and meat.
d. Food Adulteration – common food adulterants and its Harmful effects.

REFERENCE BOOKS:

1. Food Facts and Principles – Manay, S.N. and Shadakshalaswamy, New Age International Publications, 1996.
2. Food Science, Potter, AVI publishing Company, New York, USA – 1992.
3. Foundation of Food Preparation, peck am, McMillan Company, London 1994.
4. Food Science, Sri Lakshmi, Wiley Eastern Ltd. – 2005
5. Food Science, Usha Chandra Shekar – 2003
6. Food Science, Marion Bennion
7. Food Chemistry, Mayer
8. Practical Manuel – Mohini Sethi
9. Practical Manuel – Sri lakshmi
10. Nutritive value of Indian foods – G. Gopalan

II SEMESTER			
AI 2	APPLIED NUTRITION		15UFNA21
Hrs/Week: 3	Hrs/Sem: 3x15=45	Hrs./UNIT: 9	Credit: 4

OBJECTIVES:

To enable students

- To gain knowledge about the methods of assessment of nutritional status
- To gain knowledge and skill on various methods of different food groups and their nutritive value
- To gain knowledge and skill on various methods of nutritional assessment for different age groups.

UNIT I

a. Menu planning - Factors affecting menu planning.
b. Assessment of Nutritional status – Methods – Clinical examination, Anthropometric measurements, Diet surveys, vital statistics. Biochemical examination.

UNIT II

Energy – Unit of energy – Bomb calorimeter, Physiologic energy value of food – BMR – definition, Determination, Factors affecting BMR, Determination of energy during activity, SDA – Specific Dynamic Action.

UNIT III

A. Carbohydrates – Classification, functions, sources and requirements.
B. Lipids – Classification, functions, sources and requirements.
C. proteins – Classification, functions, sources and requirements.
D. Protein energy mal nutrition and Kwashiorkor – causes, symptoms and diet therapy.

UNIT IV

a. Fat soluble Vitamins A,D,E,K – Functions, Sources Requirements and deficiency
b. Water soluble Vitamins C and B group vitamins.

UNIT V

a. Minerals – Functions, Sources requirements and deficiency of Ca, P, Na, K, Fe, Zn, Selenium, Fluorine, Iodine.

REFERENCE BOOKS:

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

I & II SEMESTERS		
AI P	ALLIED NUTRITION AND DIETETICS PRACTICAL *	15UFNA2P
Hrs/Week: 3	Hrs/Sem: 3 x 15 = 45	Credit: 2

*** Examination at the end of II Semester**

1. Group experience different methods of cooking with common recipes.
   a. Cereals
   b. Pulses
   c. Vegetables
   d. Fruits
   e. Milk
2. Planning menu for the following age groups
   a. Preschool children
   b. Adolescent boys and girls
   c. Adult men and women
   d. Pregnant mothers
   e. Nursing mothers
   f. School going children with packed lunch.
   g. College going girl – diet for Anemia
3. Tests for detecting food adulteration.
4. Identification of food groups.
5. Identification of different stages of sugar cooking.
6. Demonstration of bread and cake making.
7. Spotter – Deficiency diseases of vitamins and minerals
8. Report of Nutrition assessment
   a. Clinical and anthropometric assessment among rural school children
   b. Conducting 24 Hrs recall method in a community.
9. Visit to Food industry, bakery unit, CFTRI, observing school lunch program and ICDS programme.

Record and the report of the nutritional assessment to be submitted at the time of practical examination.

III SEMESTER		
SBE 1	DIET THERAPY	15UZOS31
Hrs/Week: 3	Hrs/Sem: 3x15=45 Hrs./UNIT: 9	Credit: 2

Objectives:

- To learn the responsibilities of a Dietitian in a hospital.
- To plan and prepare therapeutic diets for various disease condition.
- To acquire skills on diet counseling for various disease conditions.

UNIT I

Definition of dietetics – purpose of diet therapy – factors considered in planning therapeutic diet – Types and role of dietitian.

UNIT II

A. Routine hospital diets – clear fluid diet, full fluid diet – soft diet, regular normal diet – preoperative diet, postoperative diet.
B. Special feeding methods – Entral and parental feeding – advantages and disadvantages.

UNIT III

Diet in fevers – causes, types, general dietary consideration in fever, principles of dietary management, recommended Dietary Allowances.

UNIT IV

a) Obesity – etiology, assessment and classification of obesity and nutritional modification, RDA.
b) Under nutrition.
c) Importance of fiber.

UNIT V

Peptic Ulcer, diarrhea, constipation, principles of planning diet, etiology and nutritional modification, RDA.

PRACTICAL EXPERIENCES:

1. Preparation of clear fluid diet
2. Preparation of full fluid diet
3. Preparation of soft diet
4. Planning and preparing the following diets
   - Weight reduction diets
   - Ulcer
   - High calorie and High protein diets.

Visits: Hospitals for live demonstration of tube feeding and
Visit to dietary department in a multi specialty hospital to observe the serving of hospital diets.

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. Guthrie and Boston, Introductory Nutrition, 1989, VIII Edition.
4. Robinson C.H. and Lawery M. Normal and therapeutic nutrition, Macmillan Publishing Co., NewYork, 1990.
5. Sri Lakshmi, B., Dietetics, Wiley eastern limited, 1993.