SADAKATHULLAH APPA COLLEGE
(AUTONOMOUS)

(Reaccredited by NAAC with 'A' GRADE and ISO 9001: 2008 certified)

Rahmath Nagar, Tirunelveli – 627 011

DEPT. OF ZOOLOGY

B.SC. (ZOOLOGY)

UNITIZED SYLLABUS (CBCS)

FOR

(2011 - 2014)

(Applicable for students admitted in June 2011 and onwards)

(Updated as per the resolutions passed in the Academic Council Meeting held on 14-03-2013)

COURSE STRUCTURE (CBCS)
B.Sc. - ZOOLOGY (2011 - 2014)
ALLIED I - FOOD SCIENCE & NUTRITION : ALLIED II - PLANT BIOLOGY & PLANT BIOTECHNOLOGY

I SEMESTER				II SEMESTER			
P		**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 - 2	4	5
	Core Practical - I	2	--		Core Practical - I	2	3
	Allied I – 1	4	4		Allied I - 2	4	4
	Allied I Practical	2	--		Allied I Practical	2	2
IV	Skill Based Elective – 1	3	2	**IV**	Skill Based Elective - 2	3	2
	Social Value Education	3	2		Environmental Studies	3	2
	TOTAL	**30**	**19**		**TOTAL**	**30**	**24**
III SEMESTER				**IV SEMESTER**			
I	Tamil / Arabic	6	3	**I**	Tamil / Arabic	6	3
II	English	6	3	**II**	English	6	3
III	Core – 3	4	5	**III**	Core - 4	4	5
	Core Practical - II	2	--		Core Practical - II	2	3
	Allied II - 1	4	4		Allied II - 2	4	4
	Allied II Practical	2	--		Allied II Practical	2	2
IV	Skill Based Elective - 3	3	2	**IV**	Skill Based Elective - 4	3	2
	Non Major Elective - 1	3	2		Non Major Elective - 2	3	2
	TOTAL	**30**	**19**		**TOTAL**	**30**	**24**
V SEMESTER				**VI SEMESTER**			
III	Core - 5	5	5	**III**	Core - 8	5	5
	Core - 6	5	5		Core - 9	5	5
	Core - 7	5	5		Core Practical - III	3	4
	Core Practical - III	3	--		Core Practical - IV	3	5
	Core Practical - IV	3	--		Project	5	5
	Core Elective - 1	4	4		Core Elective - 2	4	4
	Core Elective Practical	2	--		Core Elective Practical	2	2
IV	Skill Based Elective - 5	3	2	**IV**	Skill Based Elective - 6	3	2
	TOTAL	**30**	**21**		**TOTAL**	**30**	**32**

B.Sc. - ZOOLOGY (2011 - 2014)					
DISTRIBUTION OF CREDITS, NO. OF PAPERS & MARKS					
PART	**COURSE**	**SEMESTER**	**CREDITS**	**NO.OF PAPERS**	**MARKS**
I	Tamil / Arabic	I to IV	12	4	400
II	English	I to IV	12	4	400
III	Core + Core Practical	I to VI	60	9 + 4	1300
	Core Elective + CE Pract + Project	V & VI	15	2 + 1 + 1	400
	Allied + Practical	I to IV	20	4 + 2	600
IV	Social Value Education	I	2	1	100
	Environmental Studies	II	2	1	100
	Skilled Based Elective	I to VI	12	6	600
	Non Major Elective	III & IV	4	2	200
V	Extension Activities	I to IV	1	-	100
		TOTAL	**140**	**41**	**4200**

SEMESTER WISE DISTRIBUTION OF HOURS

PART	**I**	**II**	**III**				**IV**			**TOT.**
SEM	**T/A**	**ENG**	**CORE**	**CE**	**PRO**	**AL**	**SBE**	**NME**	**SVE/ES**	
I	6	6	4+ 2	-	-	4+ 2	3	-	3	**30**
II	6	6	4+ 2	-	-	4+ 2	3	-	3	**30**
III	6	6	4+ 2	-	-	4+ 2	3	3	-	**30**
IV	6	6	4+ 2	-	-	4+ 2	3	3	-	**30**
V	-	-	15+ 6	4+ 2	-	-	3	-	-	**30**
VI	-	-	10+ 6	4+ 2	5	-	3	-	-	**30**
TOT	**24**	**24**	**61**	**12**	**5**	**24**	**18**	**6**	**6**	**180**

B.Sc. - ZOOLOGY (2011 - 2014)
TITLE OF THE PAPERS, CREDITS & MARKS

P	SUB	TITLE OF THE PAPER	S.CODE	H/W	C	MARKS		
						I	E	T
I SEMESTER								
I	TA 1	இக்காலத் தமிழ் **OR**	11ULTA11	6	3	25	75	100
	AR 1	Applied Grammar and Translation	11ULAR11					
II	EN 1	Prose, Poetry and functional Grammar - I	11ULEN11	6	3	25	75	100
III	C 1	Animal Diversity	11UCAZ11	4	5	25	75	100
	CP I	Core Practical - I	--	2	--	EXAM II SEM		
	AI - 1	Food Science	11UAFN11	4	4	25	75	100
	AI P	Allied I - Practical	--	2	--	EXAM II SEM		
IV	SBE 1	Herbal Botany	11SEAZ11	3	2	25	75	100
	SVE	Social Value Education	11USVE11	3	2	25	75	100
		TOTAL		**30**	**19**	**150**	**450**	**600**
II SEMESTER								
I	TA 2	சமயத் தமிழ்	11ULTA21	6	3	25	75	100
	AR 2	Functional Arabic and Translation	11ULAR21					
II	EN 2	Prose, Poetry and functional Grammar - II	11ULEN21	6	3	25	75	100
III	C 2	Developmental & Experimental Zoology	11UCAZ21	4	5	25	75	100
	CP I	Core Practical - I	11UCAZ2P	2	3	40	60	100
	AI - 2	Nutrition	11UAFN21	4	4	25	75	100
	AI P	Allied I - Practical	11UAFN2P	2	2	40	60	100
IV	SBE 2	Horticulture	11SEAZ21	3	2	25	75	100
	ES	Environmental Studies	11UENS21	3	2	25	75	100
		TOTAL		**30**	**24**	**230**	**570**	**800**
III SEMESTER								
I	TA 3	பயன்பாட்டுத் தமிழ்	11ULTA31	6	3	25	75	100
	AR 3	Conversational Arabic	11ULAR31					
II	EN 3	One Act Plays and Word Power	11ULEN31	6	3	25	75	100
III	C 3	Cell & Molecular Biology	11UCAZ31	4	5	25	75	100
	CP II	Core Practical - II	--	2	--	EXAM IV SEM		
	A II - 1	Plant Diversity and Anatomy	11UAPB31	4	4	25	75	100
	A II P	Allied II - Practical	--	2	--	EXAM IV SEM		
IV	SBE 3	Plant Resources and their Utilization	11SEAZ31	3	2	25	75	100
	NME 1	Choose any one from the list	--	3	2	25	75	100
		TOTAL		**30**	**19**	**150**	**450**	**600**

IV SEMESTER								
P	**SUB**	**TITLE OF THE PAPER**	**S.CODE**	**H/W**	**C**	**MARKS**		
						I	**E**	**T**
I	TA 4	அறிவியல் தமிழ்	11ULTA41	6	3	25	75	100
	AR 4	Quran , Hadeeth and Grammar	11ULAR41					
II	EN 4	A Course in Spoken English	11ULEN41	6	3	40	60	100
III	C 4	Biochemistry & Instrumentation	11UCAZ41	4	5	25	75	100
	CP II	Core Practical - II	11UCAZ4P	2	3	40	60	100
	A II - 2	Plant Functions & Plant Biotechnology	11UAPB41	4	4	25	75	100
	A II P	Allied II - Practical	11UAPB4P	2	2	40	60	100
IV	SBE 4	Public Health	11SEAZ41	3	2	25	75	100
	NME 2	Choose any one from the list	--	3	2	25	75	100
		TOTAL		**30**	**24**	**245**	**555**	**800**
V SEMESTER								
III	C 5	Animal Physiology	11UCAZ51	5	5	25	75	100
	C 6	Genetics and Evolution	11UCAZ52	5	5	25	75	100
	C 7	Fundamentals of Biotechnology	11UCAZ53	5	5	25	75	100
	CE 1	A) Aquaculture **OR**	11UEAZ5A	4	4	25	75	100
		B) Apiculture	11UEAZ5B					
	CP III	Core Practical - III	--	3	--	EXAM VI SEM		
	CP IV	Core Practical - IV	--	3	--	EXAM VI SEM		
	CE P	Core Elective Practical	--	2	--	EXAM VI SEM		
IV	SBE 5	Dietetics	11SEAZ51	3	2	25	75	100
		TOTAL		**30**	**21**	**125**	**375**	**500**
VI SEMESTER								
III	C 8	Immunology & Microbiology	11UCAZ61	5	5	25	75	100
	C 9	Applied Biotechnology	11UCAZ62	5	5	25	75	100
	CE 2	A Biostatistics & Computer Applications **OR**	11UEAZ6A	4	4	25	75	100
		B) Poultry Science	11UEAZ6B					
	P	Project	11UPAZ61	5	5	--	100	100
	CP III	Core Practical - III	11UCAZ6P1	3	4	40	60	100
	CP IV	Core Practical - IV	11UCAZ6P2	3	5	40	60	100
	CE P	Core Elective Practical	11UEAZ6P	2	2	40	60	100
IV	SBE 6	Medical Nutrition Therapy	11SEAZ61	3	2	25	75	100
		TOTAL		**30**	**32**	**220**	**580**	**800**

PART I & II (2011 - 2014)

TITLE OF THE PAPERS, CREDITS & MARKS

TITLE OF THE PAPERS, CREDITS & MARKS

TWO YEARS LANGUAGE COURSES (B.A. - HIS., ENG.LIT., B.Sc. - MATHEMATICS, PHYSICS, CHEMISTRY, ZOOLOGY & MICROBIOLOGY)							
PART I - TAMIL							
I	இக்காலத் தமிழ்	11ULTA11	6	3	25	75	100
II	சமயத் தமிழ்	11ULTA21	6	3	25	75	100
III	பயன்பாட்டுத் தமிழ்	11ULTA31	6	3	25	75	100
IV	அறிவியல் தமிழ்	11ULTA41	6	3	25	75	100
		TOTAL	**24**	**12**	**100**	**300**	**400**
PART I - ARABIC							
I	Applied Grammar and Translation	11ULAR11	6	3	25	75	100
II	Functional Arabic and Translation	11ULAR21	6	3	25	75	100
III	Conversational Arabic	11ULAR31	6	3	25	75	100
IV	Quran , Hadeeth and Grammar	11ULAR41	6	3	25	75	100
		TOTAL	**24**	**12**	**100**	**300**	**400**
PART II - ENGLISH							
I	Prose, Poetry and Functional Grammar I	11ULEN11	6	3	25	75	100
II	Prose, Poetry and Functional Grammar II	11ULEN21	6	3	25	75	100
III	One act plays and word power	11ULEN31	6	3	25	75	100
IV	A Course in Spoken English	11ULEN41	6	3	40	60	100
		TOTAL	**24**	**12**	**115**	**285**	**400**

DEPT. OF ZOOLOGY CBCS SYLLABUS (2011 - 2014)								
PART III CORE , CORE ELECTIVE & PROJECT (FOR B.Sc. - ZOOLOGY)								
SEM	**P**	**TITLE OF THE PAPER**	**S.CODE**	**H/ W**	**C**	**MARKS**		
						I	**E**	**T**
I	C1	Animal Diversity	11UCAZ11	4	5	25	75	100
	CP	Core Practical - I	--	2	--	EXAM II SEM		
II	C2	Developmental & Experimental Zoology	11UCAZ21	4	5	25	75	100
	CP	Core Practical - I	11UCAZ2P	2	3	40	60	100
III	C3	Cell & Molecular Biology	11UCAZ31	4	5	25	75	100
	CP	Core Practical - II	--	2	--	EXAM IV SEM		
IV	C4	Biochemistry & Instrumentation	11UCAZ41	4	5	25	75	100
	CP	Core Practical - II	11UCAZ4P	2	3	40	60	100
V	C5	Animal Physiology	11UCAZ51	5	5	25	75	100
	C6	Genetics and Evolution	11UCAZ52	5	5	25	75	100
	C7	Fundamentals of Biotechnology	11UCAZ53	5	5	25	75	100
	CE1	A) Fisheries and Aquaculture **OR**	11UEAZ5A	4	4	25	75	100
		B) Apiculture	11UEAZ5B					
	CP	Core Practical - III	--	3	--	EXAM VI SEM		
		Core Practical - IV	--	3	--	EXAM VI SEM		
	CEP	Core Elective Practical	--	2	--	EXAM VI SEM		
VI	C8	Immunology & Microbiology	11UCAZ61	5	5	25	75	100
	C9	Applied Biotechnology	11UCAZ62	5	5	25	75	100
	CE2	A) Biostatistics & Computer Applications **OR**	11UEAZ6A	4	4	25	75	100
		B) Poultry Science	11UEAZ6B					
	P	Project	11UPAZ61	5	5	--	100	100
	CP	Core Practical - III	11UCAZ6P1	3	4	40	60	100
		Core Practical - IV	11UCAZ6P2	3	5	40	60	100
	CEP	Core Elective Practical	11UEAZ6P	2	2	40	60	100
			TOTAL	**78**	**75**	**475**	**1225**	**1700**

DEPT. OF ZOOLOGY CBCS SYLLABUS (2011 - 2014)								
PART III - ALLIED I - FOOD SCIENCE & NUTRITION (FOR ZOOLOGY MAJOR)								
SEM	**P**	**TITLE OF THE PAPER**	**S.CODE**	**H/W**	**C**	**MARKS**		
						I	**E**	**T**
I	1	Food Science	11UAFN11	4	4	25	75	100
		Allied I - Practical	--	2	--	EXAM II SEM		
II	2	Nutrition	11UAFN21	4	4	25	75	100
		Allied I - Practical	11UAFN2P	2	2	40	60	100
			TOTAL	**12**	**10**	**90**	**210**	**300**
PART III - ALLIED II - PLANT BIOLOGY & PLANT BIOTECHNOLOGY (FOR ZOOLOGY MAJOR)								
III	1	Plant Diversity and Anatomy	11UAPB31	4	4	25	75	100
		Allied II - Practical	--	2	--	EXAM IV SEM		
IV	2	Plant Functions & Plant Biotechnology	11UAPB41	4	4	25	75	100
		Allied II - Practical	11UAPB4P	2	2	40	60	100
			TOTAL	**12**	**10**	**90**	**210**	**300**
PART IV - SKILL BASED ELECTIVE (FOR AD. ZOOLOGY MAJOR)								
I	1	Herbal Botany	11SEAZ11	3	2	25	75	100
II	2	Horticulture	11SEAZ21	3	2	25	75	100
III	3	Plant Resources and their utilization	11SEAZ31	3	2	25	75	100
IV	4	Public Health	11SEAZ41	3	2	25	75	100
V	5	Dietetics	11SEAZ51	3	2	25	75	100
VI	6	Medical Nutrition Therapy	11SEAZ61	3	2	25	75	100
			TOTAL	**18**	**12**	**150**	**450**	**600**
PART IV - NON MAJOR ELECTIVE (FOR OTHER MAJORS)								
III	1	Food Preservation	11NEAZ31	3	2	25	75	100
IV	2	Mushroom Culture & Forestry	11NEAZ41	3	2	25	75	100
			TOTAL	**6**	**4**	**50**	**150**	**200**
PART IV - SVE & ES (FOR ALL MAJORS)								
I	1	Social Value Education	11USVE11	3	2	25	75	100
II	2	Environmental Studies	11UENS21	3	2	25	75	100
			TOTAL	**6**	**4**	**50**	**150**	**200**
PART - V								
I to IV		Extension activities		**-**	**1**	**100**	**-**	**100**

B.Sc. (ZOOLOGY) - CBCS SYLLABUS (2011 – 2014)
PART III – CORE ,CORE ELECTIVE & PROJECT

I SEMESTER		
Core 1	**ANIMAL DIVERSITY**	**11UCAZ11**
Hrs / Week : 4	**Hrs / Sem :4 x 15 = 60**	**Credits : 5**

Objectives:

- To bring into the light oneself with the invertebrate and chordata classification giving special attention to the general characters of various classes along with in-depth type studies of various phylum.

UNIT I **12 hrs**

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*.
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.
Platyhelminthes: General characters and classification upto classes with example. Type study**:** Fasciola hepatica – External morphology, life cycle, pathogeny and control measures.

UNIT II **12 hrs**

Nematoda: External morphology, life cycle, pathogeny and control measures of Ascaris lumbricoides.
Annelida : General characters and classification upto classes with examples.
Type study: Earthworm – external morphology and reproduction.
Arthropoda :General characters and classification upto classes with anexample.

UNIT III **12 hrs**

Mollusca: General characters and classification upto classes with examples.
Echinodermata : General characters and classification upto classes with examples.
Type study : Star fish - External characters and water vascular system only.
Chordata: General characters and classification upto classes with example.
Prochordata: Amphioxus - External morphology.

UNIT IV **12 hrs**

Pisces: General characters and classification upto classes with examples. (extinct excluded).
Type study **:** Scoliodon - External Morphology .
General Topic **:** Migration in Fishes .
Amphibia : General characters and classification upto classes with examples. .(extinct excluded). General Topics **:** Parental care in Amphibia.

Reptilia : General characters and classification upto classes with examples.
General Topics **:** Identification of poisonous and non – poisonous snakes of South India. Poisonous apparatus - Biting mechanism, Venom and anti venom - first aid for snake bite.

UNIT V **12 hrs**

Aves : General characters and classification upto classes with examples.
General topics **:** 1. Migration in birds
2. Flight adaptation in birds.
Mammalia : General characters and classification up to classes with examples.
Type study **:** Rabbit - External Morphology.
General Topic **:** Adaptations of aquatic mammals.
Dentition in mammals.

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. Jordon. E. L. and Verma . P. S. – Chordate Zoology - S. Chand & Co. Limited, 7361, Ram Nagar, Qutub Road, New Delhi – 110 055.

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 .

REFERENCE BOOKS – CHORDATA

1. Bhamrah, H. S. et al. A text Book of Chordates – Anmol Publications Private Ltd. 4374 / 4B, Ansari Road, Daryaganj, New Delhi – 110 002 .
2. Ekambaranatha Iyer .M.A., Manual of Zoology – Part II – Chordata - S.Viswanathan Printers and Publishers Pvt. Ltd. Chennai.
3. Ekambaranatha Iyer . M. and Anathakrishnan T. N. - A Manual of Zoology - Vol . II – Chordata - S. Viswanathan Printers and Publishers Pvt. Ltd. Chennai.
4. Kotpal, R. L. - Modern Text Book of Zoology – Vertebrates, Rastogi Publications, Gangotri, Shivaji Road, Meerut .- 250 002.

II SEMESTER		
Core 2 DEVELOPMENTAL & EXPERIMENTAL ZOOLOGY		**11UCAZ21**
Hrs / Week : 4	**Hrs / Sem : 4 x 15 = 60**	**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 **12 hrs**

Gametogenesis - Spermatogenesis – Oogenesis. Structure of sperm and egg of Chick and Human.

Fertilization - sperm and egg interaction – pre and post fertilization, theories and biochemical events-Parthenogenesis.

UNIT II **12 hrs**

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 **12 hrs**

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 **12 hrs**

Reproduction in Human - Infertility (male and female) Artificial insemination - Invitro fertilization and embryo transfer -Test tube babies - Amniocentesis. Birth control - contraceptive devices - surgical method - hormonal method – IUCD- Cryopreservation.

UNIT V **12 hrs**

Nuclear transplantation in Acetabularia. Regeneration- definition, types, Regeneration in Planaria-Regeneration in Amphibians. Tissue interaction - morphogenetic field and gradient hypothesis.

TEXT BOOKS:

1. 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.

I & II SEMESTERS		
CORE PRACTICAL I (Core 1 & 2) (Exam end of II Sem)		**11UCAZ2P**
Hrs / Week : 2	**Hrs / Sem : 2 X15 = 30**	**Credit : 3**

ANIMAL DIVERSITY PRACTICAL

Models/Charts:

1. Earth worm - Body setae mounting.
2. Cockroach - Nervous system and Digestive system -Dissection
3. Shark - Placoid scales,
4.Frog brain –chart.

5. **Museum specimens, slides, models and charts :**

Paramecium, Obelia colony, Fasciola, Ascaris - male and female, Chatoepterus, Mysis larva, Octopus, Star fish, Amphioxus, Tornaria larva, Petromyzon, Narcine, Hippocampus, Rhacoporus, Chamaeleon, Enhydrina, Cobra, King fisher , bat .

DEVELOPMENTAL & EXPERIMENTAL ZOOLOGY PRACTICAL

1. Frog – Egg/sperm - Demonstration only – Model/ chart/ CD
   Students have to draw the diagram and write detailed account of the Egg/sperm in the observation note book.

2. Temporary mounting and observation of Chick embryo - 24, 48, 72 and 96 Hours.

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 .

III SEMESTER		
Core 3	**CELL & MOLECULAR BIOLOGY**	**11UCAZ31**
Hrs / Week : 4	**Hrs / Sem : 4 x 15 = 60**	**Credits : 5**

Objectives:

- To gain knowledge of the types of cells and cell organelles and to understand the furtive of the genetic code that forms the foundation for the formation of the next generation.
- To study about the importance of DNA and protein synthesis with the help of the genetic code and RNA.

UNIT I **12 hrs**

Cell biology – introduction - cell types - prokaryotic & eukaryotic - microscopy - detailed study of compound, phase contrast, electron microscopes – SEM, TEM.

UNIT II **12 hrs**

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 **12 hrs**

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

Cell division - cell cycle – mitosis - mitotic apparatus - significance of mitosis, meiosis - significance of meiosis & synaptonemal complex.

UNIT IV **12 hrs**

Molecular Biology: DNA - types, structure, replication - DNA as genetic material. Cancer biology – cancer cells – carcinogenesis – definition – types – causes – properties, theories, diagnosis, treatment - oncogenes

UNIT V **12 hrs**

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

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

REFERENCE BOOKS - CELL BIOLOGY & MOLECULAR BIOLOGY

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. Berry, A. K - Cell Biology, EMKEY Publications, Post Box No. 9410, B - 19 Eas
4. Arora, M. P. Molecular Biology. Himalaya Publishing House, Ramdoot, Dr. Bhalero Marg, Giraon, Mumbai 400 004.
5. Kumar, M. D. Molecular Biology, Vikas Publishing House Private Ltd . 576, Maszid Road, Jangpura, New Delhi – 100 014 .
6. De Robertis , E.D,P., W. N. Nowinki and F. A. Saez. Cell Biology. – W. B. Saunders & Co. Philadelphia.
7. Powar, C.B., Cell Biology, Himalaya Publishing House, Mumbai.
8. Gupta, M.L. and Jangir, M.L., Student Edition, Jodhpur.
9. Jeyaraj and Rastogi, Cell Biology, Wiley Eastern Limited, New Delhi.

IV SEMESTER		
Core 4	**BIOCHEMISTRY & INSTRUMENTATION**	**11UCAZ41**
Hrs / Week : 4	**Hrs / Sem : 4 x 15 = 60**	**Credits : 5**

Objectives:

- To gain knowledge about the basics of biochemistry in life along with the principles and techniques applied.
- To learn about the carbohydrates, proteins and fats classification, structure and metabolism.

UNIT I **12 hrs**

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 **12 hrs**

Oxidation – reduction reactions, Redox potential, Properties, Chemical nature & biological significance of water.Carbohydrates-classification, structure and biological significance of Monosaccharides (Glucose and Fructose), Disaccharides (Lactose and Sucrose) and Polysaccharides (Starch and Glycogen).

UNIT III **12 hrs**

Amino acid – classification and structure. Proteins – classification, structure and biological significance. Protein misfolding diseases – madcow disease, Thalassemia, Alzhimer's disease and Parkinson's disease. Brief account on proteomes.

UNIT IV **12 hrs**

Lipids – classification, structure , properties and biological significance of lipids. Enzymes – classification, nomenclature, properties, mechanism of enzyme action, factors affecting enzyme activity, coenzymes & isoenzymes.

UNIT V **12 hrs**

Principle and applications of pH meter, Colorimeter, Spectrophotometer. Electrophoresis - (AGE & PAGE) - Centrifuge and paper Chromatography - X ray crystallography and NMRS.

TEXT BOOK

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

REFERENCE BOOKS - BIOCHEMISTRY & INSTRUMENTATION

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. Annie & Arumugam . N. – Biochemistry , Saras Publications,114 / 35 g, A. R. P.Camp Road, Periavilai , Kottat Post. , Nagercoil **.**
4. 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.
5. 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 .
6. Jeyaraman , J. – Laboratory Manual in Biochemistry. New Age International Publishers , 4835/24 , Ansari Road , Darya Ganj, New Delhi. – 110 002.

III & IV SEMESTERS		
CORE PRACTICAL II (Core 3 & 4) (Exam end of IV Sem)		**11UCAZ4P**
Hrs / Week : 2	**Hrs / Sem : 2 x 15 = 30**	**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. Preparation of the following:
   a) Human Squamous epithelium
   b) Frog's blood smear (Demonstration)
   c) Human blood smear
4. Models & charts :
   a) DNA
   b) tRNA
   c) Ribosome
   d) Protein synthesis
   e) Mitochondria
   f) Golgi apparatus
   g) Nucleus
   h) Endoplasmic reticulum
   i) Lysosomes
   j) Rocking Microtome.

BIOCHEMISTRY & INSTRUMENTATION PRACTICAL

1. Beer's law verification using Colorimeter.
2. Separation of Amonoacid using paper Chromatography.
3. Qualitative tests for Carbohydrates, Proteins & Lipid.
4. pH measurement of any two samples with the help of pH meter.
5. Demonstration of Electrophoresis.
6. Titration curves – Acids & Bases-Demonstration.
7. **Charts/Models:**
   Glucose, Aminoacid, Steroid, Electrophoresis, Colorimeter, pHmeter, Chromatogram.

V SEMESTER			
Core 5	**ANIMAL PHYSIOLOGY**		**11UCAZ51**
Hrs / Week : 5	**Hrs / Sem: 5 x 15 = 75**	**Hrs / Unit : 15**	**Credits : 5**

Objectives :

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

UNIT I 15 hrs

Digestion - Intracellular and intercellular - Role of enzymes in carbohydrate, protein and fat digestion - absorption of digested food materials. Metabolism - concept – metabolism of carbohydrate (Glycolysis& TCA cycle, Glycogenolysis, Glycogenesis)

UNIT II **15 hrs**

Types of respiratory organs, respiratory pigments, transport and exchange of gases – control of respiration-biological oxidation - anaerobiosis – respiratory quotient Blood - composition, function and coagulation. - Structure and function of human heart - ECG.

UNIT III **15 hrs**

Types of nitrogenous wastes – Ammonotelism, Ureotelism, Uricotelism – Structure and function of human Kidney – Physiology of Urine formation - Homeostasis - Osmoregulation in crustaceans (Maia, Caracinus and Astacus) and fishes (Marine and freshwater teleosts), .Mechanism of thermoregulation in ectotherms and endotherms.

UNIT IV **15 hrs**

Ultra structure of skeletal muscle ; physico - chemical properties – mechanism of muscle contraction - - Structure and types of neurons - nerve impulse - conduction of impulse through nerve – synapse – myoneural junction - reflex action.

UNIT V **15 hrs**

Endocrine systems: Endocrine glands – pituitary, thyroid, parathyroid, adrenal - Menstrual cycle and oestrous cycle – the role of hormones – menopause, pregnancy and parturition.

Chronobiology : Biological rhythms – exogenous and endogenous rhythms – concept of biological clocks - survey of biological rhythms in animals and human.

TEXT BOOKS

Goel ,K.A.,Sastri , K. V. –A Text Book of Animal Physiology ,Rastogi Publications, Shivaji Road , Meerut. – 250 002.

REFERENCE BOOKS - ANIMAL PHYSIOLOGY

1. Agarwal , R. A. A. K. – Srivastava and Kaushal Kumar, Animal Physiology and Biochemistry, S. Chand & Company Limited, 7361 Ram Nagar, New Delhi.
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 – 600 017 .

V SEMESTER			
Core - 6	**GENETICS & EVOLUTION**		**11UCAZ52**
Hrs / Week : 5	**Hrs / Sem : 5 x 15 = 75**	**Hrs / Unit : 15**	**Credits : 5**

Objectives:

- To facilitate the student to understand the genetic basis of inheritance and the basic concepts of evolution

UNIT I

Mendelian Inheritance and laws of heredity. 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 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)

UNIT III

Human chromosomes – Karyotype, ideogram, Simple Mendelian traits in man, Inborn errors of metabolism – Phenyl ketonuria, and sickle cell anaemia. Eugenics, Euthenics, Genetic Counselling

UNIT IV

Evolution- Origin of Life - Chemical and molecular evolution – 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. Power, C .B. Genetics - I, Himalaya Publishing House, Ramdoot, Dr. Bhalero Marg, Giraon, Mumbai 400 004.
2. Rastogi V. B. Kedarnath & Ram Nath, Meerut, Organic Evolution, Wiley Eastern Limited, New Delhi.

REFERENCE BOOKS - GENETICS AND EVOLUTION

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 PublicationsPrivateLimited, 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 Meyyan , R. P. - Genetics, Saras Publications, 114 / 35 G, A. R. P. Camp road, Periavilai , Kottar Post. , Nagercoil .
5 Parihar, P. A. - A Text Book of Basic and Molecular Genetics. Student Edition, Agrobios (India), Behind Nasrani Cinema, Chopasani Road, Jodpur – 342 002.
6 Sanjay Mandal, -Fundamentals of Human Genetics. New Central Book Agency, (P) Ltd. 8 / 1 Chintamoni Das Street, Kolkata – 700 009.
7 Verma, P.S., Agarwal, V.K. Genetics. 9th revised edition S,Chand & Co Limited, New Delhi
8 Arora, M. P. Evolutionary Biology, Himalaya Publishing House, Mumbai. Futuyma, A. Evolution, ANE book, India.

V SEMESTER			
Core 7	**FUNDAMENTALS OF BIOTECHNOLOGY**		**11UCAZ53**
Hrs / Week : 5	**Hrs / Sem : 5 x 15 = 75**	**Hrs / Unit : 15**	**Credits : 5**

Objectives :

- To learn the basic concepts of various aspects of biotechnology

UNIT I

History, scope and importance of Biotechnology - Basic concept 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.

UNIT II

Gene cloning: Integration of DNA fragments into the vector – transformation and gene transfer methods - Screening and Selection of recombinants.

UNIT III

Animal cells 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

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

UNIT V

Technique of transgenic animal production, applications of transgenic animals. Bioethics: Bio safety and Patenting of Biotech product and IPR.

TEXT BOOK

1. R.C. Dubey – Biotechnology, S.Chand Publication limited, New Delhi
2. Sathyanarayan, Biotechnology,

REFERENCE BOOKS - FUNDAMENTALS OF BIOTECHNOLOGY

1. Arora M.Biotechnology (2nd Edition) Himalaya Publishing House,Ramdoot,Dr Bhalero Marg, Giraon, Mumbai. – 400 004.
2. Dubey, R. C. A - Text Book of Biotechnology (4 th Edition) S.Chand & Company Limited, 7361 Ram Nagar, New Delhi - 110 055
3. Gupta ,P.K.Elements of Biotechnology. Rastogi Publications, Gangotri, Shivaji Road, Meerut - 250 002.
4. Jogdand, S. N .- Gene Biotechnology (5 th Edition) Himalaya Publishing House, Ramdoot, Dr. BhaleroMarg, Giraon, Mumbai. – 400 004.
5. Joshi, P.- Genetic Engineering Student Edition., Agrobios (India), Behind Nasrani, Cinema, Chopasani Road, Jodpur – 342 002.
6. Kumar, H. D. Modern Concept of Biotechnology Vikas Publishing House Private Ltd . 576, Maszid Road , Jangpura, New Delhi – 100 014
7. Sambamurty, A.V.S.S. Molecular Biology, Narosa Publishing Home, India

V SEMESTER		
CE 1 A	**FISHERIES AND AQUACULTURE**	**11UEAZ5A**
Hrs / Week : 4	**Hrs / Sem : 4 X 15 = 60**	**Credits : 4**

Objectives:

To enumerate the fishery and aquaculture potential and practices in India and augment food production form aquatic resources. The syllabus will be helpful for an UG student is attending ICAR and other competitive examinations.

UNIT – I - Capture fisheries **12 hrs**

Capture fisheries - present status and scope – Inland and marine fisheries – Outlook of marine fisheries of India – Indian EEZ and its yield – pelagic fish resources – demersal fish resources – Exploitation of Oil sardine – seer fishes – mackerel – prawn and lobster.

UNIT – II - Culture fisheries **12 hrs**

Biology of Indian major carps – marine prawn (Paeneus)- Fin fish culture: collection of seeds – natural breeding, induced breeding, transportation of seeds. Culture practices:: collection of seeds – induced breeding culture practices. Pearl oyster culture: collection of seeds – induced breeding, culture practices

UNIT – III - Aquaculture **12 hrs**

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 - pig cum fish culture - sewage fed fish culture.

UNIT- IV - Fish Feed and Diseases of Aquaculture Organisms **12 hrs**

Fish feed: artificial feed – feed formulation – need - ingredients ratio - pellets. Live feeds and their culture: *Artemia* - microalgae. Diseases of aquaculture organisms: bacterial, viral, fungal, ecto and endo-parasitic diseases and nutritional deficiency diseases.

UNIT – V - Harvesting and Post-harvest technology **12 hrs**

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

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		
CE 1B	**APICULTURE**	**11UEAZ5B**
Hrs / Week : 4	**Hrs / Sem : 4 X 15 = 60**	**Credits : 4**

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 **12 hrs**

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 **12 hrs**

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 **12 hrs**

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 **12 hrs**

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 **12 hrs**

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.

REFERENCE BOOKS - APICUTURE

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. Johnson, J. and I. Jeyachandra - Apiculture –Dept. of Zoology, N.M. Christian College, Marthandam.- 629 165.
4. Bee keeping in South India – Cherian MC and Ramachandran
6. Bee keeping in South India – Superintendent, Govt. press, Chennai
7. Sharma P.L.& SinghS.-Hand book of Bee Keeping, Printing and stationary, Chandigarh.

VI SEMESTER			
Core 8	**IMMUNOLOGY & MICROBIOLOGY**		**11UCAZ61**
Hrs / week : 5	**Hrs / Sem :5 x 15 = 75**	**Hrs / unit : 15**	**Credits : 5**

Objective:

- To understand and perceive the importance of the immune system, the importance of lymphoid organs and cells and immunoglobulin.
- To learn about the nature of the microbes and to realize their harmful effects.

UNIT I **15 hrs**

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 **15 hrs**

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 **15 hrs**

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 **15 hrs**

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 **15 hrs**

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 (20^{th} Edition) Himalaya
Publishing House, Ramdoot, Dr. BhaleraoMarg, Girgaon, Mumbai .

VI SEMESTER		
Core 9	**APPLIED BIOTECHNOLOGY**	**11UCAZ62**
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 15 hrs

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 12 hrs

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 15 hrs

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 18hrs

Human Genome Project –Vaccines - Recombinant Vaccines, DNA Vaccines. gene therapy- types – vectors used in gene therapy.

DNA sequencing, molecular markers and applications – DNA finger printing technique and applications. Bio sensors – Types – Applications.

UNIT V – Bioinformatics and Nanotechnology 15hrs

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- definition – classification- methods of synthesis – solgel method – application in biology.

TEXT BOOK

1. Sathyanarayanan, - Biotechnology . S.Chand Publication limited,. NewDelhi
2. Dubey - Biotechnology S.Chand Publication limited,. NewDelhi .

REFERENCE BOOKS - APPLIED BIOTECHNOLOGY

1. Arora M.P.- Biotechnology (II nd Edition) Himalaya Publishing House, Ramdoot. Dr. Bhalerao Mar g, Girgaon Mumbai – 400004.
2. Dubey R.C. - A Text book of Biotechnology (4th Edition). S.Chand & Co Ltd . 7361, Ramnagr, New Delhi – 110055.
3. Gupta P.K - Elements of Biotechnology. Rastogi Publications, Gangotri, Shivaji Road, Mererut – 2500002
4. Herren, R.V. - Introduction to Biotechnology, Thomson Learning, Alps Buildings, Ist Floor, 56 Janpath , New Delhi – 110001.
5. Joshi.P - Genetic Engineering. Student Edition, Agrobios (India) Behind Nasrani Cinema, Chopasani Road, Jodhpur – 342002.
6. Prakash S. Lohar - Biotechnology , M.J.P. Publishers , Tamilnadu Book house 47, Nallathambi Street Triplicane – 600005.
7. Trivedi P.C - Advances in Bio-technology, Agrobios (India) Behind Nasrani Cinema, Choprasani Road Jodhpur – 342002.
8. Vikas pruthi - Basic Biotechnology,ANE Books India,Avantika Nivas,19, Doraisamy Road T.Nagar Chennai – 600017.
9. Yount. L – Genetics & Genetic Engineering , Orient Longman Limited Post Box No : 310, 160 Anna Salai, Chennai – 600002.
10. Shanmugam - Naobiotechnology – MJP publication, Chennai

VI SEMESTER		
CE 2A	**BIOSTATISTICS & COMPUTER APPLICATIONS**	**11UEAZ6A**
Hrs / Week : 4	**Hrs / Sem : 4 x 15 = 60**	**Credits : 4**

Objectives:

- To understand and perceive the learner about the applied areas of advanced bioscience like biostatistics and computer applications

UNIT I **12 hrs**

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 polycurve.

UNIT II **12 hrs**

Measures of central tendency –mean , median, mode, standard deviation and standard error and Coefficient of variation.. Test of Independence- Goodness of Fit- Chi – square test.

UNIT III **12 hrs**

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 **10 hrs**

Introduction to Computer, types of computer, generation of computer, components of computer – input devices, output devices, CPU and memory.

UNIT V **14 hrs**

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

Palanichamy and Manoharan. Bioststistics for Biology. Palani Paramout Publications.

REFERENCE BOOKS - BIOSTATISTICS

1. Arora and Mathan, Biostatistics (5th Edition) . Himalaya Publishing House, Ramdoot, Dr . Bhalerao Marg, Girgaon Mumbai – 400004.
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 . - Evolution , Biostatistics and Computer Application , Saras publications , 114 / 35G , A.R. P. Camp Road , Periavilai , Kottar Post. , Nagercoil.
4. Parihar and Parihar - Biostatistics and Biometry, Student Edition, Agrobios (India) Behind Nasrani Cinema, Chopasani Road, Jodhpur – 342002.
5. Pranab Kumar Banergee, - Introduction to Biostatistics (2nd Edition) S.Chand & Co Ltd . 7361, Ramnagr , New Delhi – 110055.
6. 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
4. Arumugam, - Introduction to computer, Saras Publications

VI SEMESTER		
CE 2B	**POULTRY SCIENCE**	**11UEAZ6B**
Hrs / Week : 4	**Hrs / Sem : 4 x 15 = 60**	**Credits : 4**

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

VI SEMESTER		
	PROJECT	**11CPAZ61**
Hrs / Week : 5	**Hrs / Sem : 5 x 15 = 75**	**Credits : 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 or experiments, analyse 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 pages of the project should be 30 pages in A4 size.
3 It may be of survey method or experimental oriented.
4 Project should be cheap within the expense of students limit.
5 Marks for the project report will be 100 divided as **80% for the presentation of**
project and 20% for viva-voce.

V & VI SEMESTERS		
CORE PRACTICAL III (Exam end of VI Sem)		**11UCAZ6P1**
Hrs / Week : 6	**Hrs / Sem : 6 x 15 = 90**	**Credits : 4**

(ANIIMAL PHYSIOLOGY, GENETICS, EVOLUTION & FUNDAMENTALS OF BIOTECHNOLOGY)

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 & EVOLUTION 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
   6 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. e) Mutant forms of Drosophila f) Phylluim
   g) Stick insect Lircoden h) Ancon sheep i) Dinosaur

FUNDAMENTAL OF BIOTECHNOLOGY PRACTICAL

1. Isolation 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		
CORE PRACTICAL IV	**(Exam end of VI Sem)**	**11UCAZ6P2**
Hrs / Week : 6	**Hrs / Sem : 6 x 15 = 90**	**Credits : 5**

(IMMUNOLOGY & MICROBIOLOGY AND APPLIED BIOTECHNOLOGY)

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 different 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) – Azolla.
6. Visit to Biotechnology lab

V & VI SEMESTERS		
CORE ELECTIVE PRACTICAL (Exam End of VI Sem)		**11UEAZ6P**
Hrs / Week : 2	**Hrs / Sem : 2x 15 = 30**	**Credits : 2**

(AQUACULTURE OR APICULTURE & BIOSTATISTICS & COMPUTER APPLICATIONS OR POULTRY SCIENCE)

AQUACULTURE PRACTICAL

1. Estimation of salinity, dissolved oxygen and alkalinity in two water samples.
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/visit (2 days)

APICUTURE PRACTICAL

1. Identification of workers, queen and drone.
2. Mounting of legs, mouth parts and sting.
3. Artificial hives and its parts.
4. Apiary – appliances used.
5. Report on field visit to Apiary

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. Bar diagram, Pie diagram, Histogram.

spotters: 1) Input – Key board, Mouse 2) output – Monitor, printer 3) CPU

POULTRY SCIENCE PRACTICAL

1. Identification of ectoparasites of poultry studied in the theory.
2. Feeders – different types.
3. Waterers – different types.
4. Cage house – model.
5. New castle disease, Fowl pox , Coryza , Coccidiosis (diagrams or models)
6. Polyneuritis, Curled toe papalysis, Perosis (diagram).
7. Debeaking
8. Visit to poultry farms

PART III - ALLIED I - FOOD SCIENCE AND NUTRITION (2010 – 2011 ONWARDS)			
I SEMESTER			
AI P 1	**FOOD SCIENCE**		**11UAFN11**
Hrs / Week : 4	**Hrs / Sem : 4 x 15 =60**	**Hrs / Unit : 12**	**Credits : 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
- To gain knowledge and skill in planning diet for normal and various therapeutic conditions.

UNIT I

a. Definition of health, food and nutrition- Classification of food according to functions- Food groups: Basic V.
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. Toxin in pulses-Lathyrism, heamaggulatanin, Favism, Saponins, Trypsin inhibitors .Fortification and enrichment of cereals and pulses.

UNIT III

a. Nuts and oil seeds – Nutritive value of groundnuts, soybeans, sesame, coconut.
b. Kinds of fats and oils,
c. Sugars: Stages of sugar cookery, application in Indian cooking

UNIT IV

a. Vegetables –Classification according to structure and pigment - Nutritive value, principles of cooking vegetables and its effect on pigments
b. Fruits – Nutritive value, Classification- Browning reaction
c. Condiments and spices- uses and abuses
d. Definition of beverages and its functions.

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 - characteristics of good fish, poultry, and meat.
d. Food Adulteration – 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 P2	**NUTRITION**		**11UAFN21**
Hrs / Week : 4	**Hrs / Sem :4 x 15 =60**	**Hrs / Unit :12**	**Credits : 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

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,

UNIT III

a. Carbohydrates, lipids, proteins – Classification, functions, sources and requirements, Protein energy mal nutrition- factors contributing and strategies to combat mal nutrition
b. Role of fiber in health

UNIT IV

a. Vitamins – Functions, Sources Requirements and deficiency of Vitamin A, D, E, K, C, and B group vitamins.
b. Minerals– Functions, Sources requirements and deficiency of Ca, P, Na, K, Fe, Zn, Selenium, Fluorine, Iodine.
c. Water- Composition of water in the body and functions

UNIT V

a. Factors influencing menu planning

b. Nutritional Requirements of - Infancy, pre-school, school going, adolescence, adult, Pregnancy and lactation & old age.

c. National special nutritional Programmes in nutrition – ICDS, school lunch programme

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., NewYork, 1990, Revised Edition.
4. Introductory Nutrition, Guthrie & Boston, 8th Edition. 1989.

I & II SEMESTERS			
	ALLIED I PRACTICAL (Exam. End of II Sem.)		**11UAFN2P**
Hrs / Week : 4	**Hrs / Sem :4 x 15 =60**	**Hrs / Unit :12**	**Credits : 4**

1. Group experience different methods of cooking.
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. Vitamin A deficient school child
    g. PEM diet for preschool child
    h. College going girl – diet for Anaemia

3. Tests for detecting food adulteration
4. Report of Nutrition assessment
    a. Clinical and anthropometric assessment among rural school children
    b. Conducting diet survey among tribal people.

5. Visit to milk factory, food analysis institute, 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

PART III- ALLIED II - PLANT BIOLOGY & PLANT BIOTECHNOLOGY(2011 – 2014)		
III SEMESTER		
AII P1	**PLANT DIVERSITY & ANATOMY**	**11UAPB31**
Hrs / Week : 4	**Hrs / Sem : 60**	**Credits :4**

OBJECTIVES

To enable the students

1. To have a general understanding about the non flowering plants and observes the variations among the plants.
2. To identify the different non flowering plants using morphological and anatomical features of non – flowering plants.

UNIT I - Algae & Fungi **Hrs: 12hrs**

Algae – General characters of algae: Distribution, structure, reproduction & life cycle of *Sargassum*. Economic importance of algae (Agriculture, Industry & Medicine. Fungi - General characters of fungi: Distribution, structure, reproduction & life cycle of Albugo. Economic importance of fungi.

UNIT II - Lichens & Bryophytes **Hrs: 12hrs**

General characters of lichen – Economic importance of lichen. Bryophytes- General characters of Bryophyte. Distribution, structure reproduction & life history of *Riccia* - Economic importance of bryophytes.

UNIT III – Pteridophytes & Gymnosperms **Hrs: 14hrs**

Pteridophytes- General characters, Structure, reproduction & life cycle of *Selaginella.* Gymnosperms – General characters, Structure, reproduction & life cycle of Pinus. Economic importance of gymnosperms.

UNIT IV – Tamonomy **Hrs: 10hrs**

Brief account on Natural, Phylogenetic. Classification – Study of the following families – Annonaceae - *Annona squamosa*, Apocyanaceae - *Vinca rosea*, Euphorbiaceae - *Ricinus communis*, Poaceae - *Oryza sativa*.

UNIT V – Anatomy

Tissues: Meristematic and permanent - Study of internal (Theories not needed) Structures of Dicot stem and root – *Tridax* (Primary), Moncot stem and root - *Cyanodon*, dicot leaf (Mango), Monocot leaf (Maize).

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. Power, D. General Microbiology, 1986, Himalaya Publishing House, Bombay.
6. Gangulee, Das & Datta, Collge Botany Vol I, 1986, new central book agency, Calcutta.

IV SEMESTER		
A II P2	**PLANT FUNCTIONS & PLANT BIOTECHNOLOGY**	**11UAPB41**
Hrs / Week : 4	**Hrs / Sem : 60**	**Credits :4**

OBJECTIVES

To enable the students

1. To understand the metabolic activities of plants.
2. To know about the various concepts mechanisms and functions of plant.
3. To understand the basic principles of tissue culture.

UNIT I (14hrs)

Water relations – Diffusion & Imbibition, Osmosis. Absorption of water – Mechanism of water absorption – active and passive. Ascent of sap – Path and Mechanism. Transpiration – Types – cellular, stomatal, lenticular & guttation. Mechanism of Stomatal Transpiration. (Theories not needed). Antitranspirant, significance of transpiration.

UNIT II (12hrs)

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

UNIT III (10hrs)

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

UNIT IV (12hrs)

Plant tissue culture: Definition, Organization of plant tissue culture lab. Totipotency, callus induction. Organogenesis –Application of tissue culture.

UNIT V (12hrs)

Biofertilizer – Mass production of Rhizobium, , BGA and VAM fungi. Transgenic plants and GM crops – merits & demerits. (Herbicide Tolerant)

REFERENCE BOOKS:

1. Dubey R.C. 2001 A Text Book of Biotechnology, S. Chand & Co., New Delhi.
2. Jain V. K. 1996 - Fundamentals of Plant Physiology 5th edition - S Chand &Co., New Delhi.
3. Kumar H. D. 1998 - Modern Concept of Biotechnology, Vikas Publishing House Ltd., New Delhi.
4. Taiz, L and Zeiger, E. 1991, Plant Physiology. The Bengamen Cummings Publishers, California.

III & IV SEMESTERS		
ALLIED II PRACTICAL (Exam. End of IV Sem.)		**11UAPB4P**
Hrs / Week : 2	**Hrs / Sem : 30**	**Credits :2**

OBJECTIVES

To enable the students

1. To take better sections of plant materials of anatomical & morphological interest for identification.
2. To identify various groups of non flowering plants.
3. To develop skill in identify the flowering plants up to species level.

DIVERSITY OF PLANT LIFE PRACTICAL

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1. Micropreparation & Identification of sargassum – thallus.
2. Permanent slide of Albugo& Riccia sporophyte.
3. Micropreparation of Riccia thallus.
4. Micropreparation & Identification of T.S. of Lycopodium/Selaginella stem & T.S of Pinus needle.
5. T. S. of stem/root/leaf Dicot and Monocot.
6. Identification, botanical name, family, floral formula, floral diagram and description of the plants from the families prescribed in the theory syllabus.

PLANT FUNCTIONS & PLANT BIOTECHNOLOGY PRACTICAL

Plant Funtions:

To demonstrate simple set up in Plant Physiology.

1. Osmosis – Potato Osmoscope.
2. Study the imbibition Pressure - by using Dialatometer.
3. Transpiration Pull.
4. To demonstrate plasmolysis by using Tradescantia leaf.
5. Ganong's light screen
6. Evolution of oxygen during photosynthesis – Wilmott's bubbler.
7. Ganong's respiroscope – Respiration.

Plant Biotechnology:

Photograph / model in Biotechnology.

1. Biofertilizer – Rhizobium/ / B.G.A.
2. Tissue culture - photograph (Callus culture) or any one type.
3. Field trip and Industrial visit is necessary.

REFERENCES:

1. Gunasekaran, P., 1996. Lab Manual in Microbiology. New Age International (P), Ltd., Publishers, New Delhi.
2. Parihar, N.S. 19985, the Biology and Morphology of Pteridophytes, Central Book Department, Allahabad.
3. Sporne, K.R. 1971, The Morphology of Gymnosperms, Hutchinson University library London.

PART IV - SKILL BASED ELECTIVE			
I SEMESTER			
SBE 1	**HERBAL BOTANY**		**11SEAZ11**
Hrs / Week : 3	**Hrs / Sem : 3 x 15 = 45**	**Hrs / Unit: 9**	**Credits : 2**

OBJECTIVES

To enable the students

1. To know about the herbal drugs.
2. To give some idea about Tribal pharmacology including forms of medicines.
3. To know about the uses of important herbal plants.
4. To get a broad knowledge of Medicinal Herbs and its drugs administration.

UNIT I

Brief history & scope of herbal botany. Raw drug of plant origin – Definition of herbal drug – sources of drugs. Routes of drug administration – oral, enteric, enemata and parenteral.

UNIT II

Local systems of medicines: Ayurvedic, Homeopathy & Siddha medicines – Tribal knowledge on medicinal plants and plant conservation.

UNIT III

Study of the morphologically useful parts, its medicinal values of the following plants – Rhizome - Ginger, Fruit – Pepper, Seed - Fenugreek, Bulb - Onion, Leaves – Plectanthrus, Root – Asparagus.

UNIT IV

Study of the following plants with reference to their habit, description of the plant, useful part and their uses – *Phyllanthus amarus, Centella asiatica,Justicia adhatoda, Azadirachta indica, Murraya koenigii.*

UNIT V

Extraction methods and medicinal uses of oils in the following plants: Eucalyptus, Neem and Rose oil.

REFERENCE BOOKS:

1. Herbs, Spices & Medicinal plants: Recent advances in Botany by Craker, Lyle.E. 1988, Oryx Press, Phoenix, Arizonal.
2. Dictionary of medicinal plants by Vijay Verma 2008, Anmol publication. New Delhi.
3. Medicinal plants in the traditions of prophet Mohamed: Scientific study of prophetic medicine by M.I.H. Farooqi. Vedoms Books (P) Ltd.Sidrab Pub. Lucknow.2004.
4. Medical botany plants affecting human health 2nd edition by Walter H. Lewis et al. 2003. Wiley publishers, New York.
5. Medicinal plants of India. (Medicinal plants of the world vol5. by Sudhanshu Kumar jain. 1985- 1989.
6. Poisonous and medicinal plants by will H. Blackwell. 2001. Prentice Hall.
7. Albert F.Hill, 1988, economic Botany – a Text of useful plants & plant products,TATA McGraw – Hill publishing company Ltd.New Delhi.
8. Kokate.C.K, Purohit, A.P. Gokhale,S.B, 2007. Pharmacognosy, Nirali Prakashan Publishers, Pune.
9. Jyothiprakash e J 2006. Medicinal botany and pharmacognosy. Emkay publishers New Delhi.
10. Verma V 2009. Text book of Economic Botany. Ane Book.

II SEMESTER			
SBE 2	**HORTICULTURE**		**11SEAZ21**
Hrs / Week : 3	**Hrs / Sem : 3 x 15 = 45**	**Hrs / Unit: 9**	**Credits : 2**

OBJECTIVES

To enable the students

1. To understand the plant propagation methods.
2. To know about the latest Horticultural Techniques.
3. To promote the knowledge in the horticulture career area.
4. To enrich themselves on the modern developments in ornamental gardening & olericulture.

UNIT I

Introduction – division of horticulture – propagation of horticultural crops – asexual propagation, advantages & disadvantages – Methods – a) cuttage b) layering c) graftage – propagation by specialized plant parts.

UNIT II

Olericulture – classification of vegetables – types of vegetable growing – kitchen gardening – selection of site, layout. Model kitchen garden.

UNIT III

Training – Details of training Methods of traning. Prunning – Special Prunning techniques. Irrigation methods.

UNIT IV

Establishment of orchard, location & site – planning – layout – planting methods – orchard cultivation- Clean culture, Clean culture with cover crops, Mulching, Sod, Sod mulch.

UNIT V

Importance, principles & designs of ornamental garden – layout & components of ornamental garden – Lawn. Indoor gardening & care of indoor plants, rockeries, Bonsai – commercial floriculture with reference to Jasmine.

REFERENCE BOOKS:

1. Edmund senn – Andrew – Halfacre, 1977, Fundamentals of Horticulture,Tata Mc Graw – Hill, New Delhi.
2. Kumar,N. 1987, Introduction to Horticulture, Rohini Agencies.
3. Manibhusan Rao, K. 1991. Text book of Horticulture, Mac. Millan India, New Delhi.
4. Muthusamy, S. et al.,1970. A Guide on Horticulture, Valan Pathipagam.

III SEMESTER			
SBE 3	**PLANT RESOURCES AND THEIR UTILIZATION**		**11SEAZ31**
Hrs / Week : 3	**Hrs / Sem : 3 x 15 = 45**	**Hrs / Unit: 9**	**Credits : 2**

OBJECTIVES

To enable the students

1. To know about the common names and useful parts of plant species around us
2. To know about the commercial usage of medicinal plants.
3. To exploit the uses of plants in small scale like industries like canning, beverage, Pharmaceuticals, Nursery gardens, Floriculture, horticulture etc.

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

UNIT I

Plant resources as food: Cereals – Rice, Wheat; Pulses – Pea, Black gram Vegetables - Sweet potato, Cabbage; Fruits – Mango, Banana.

UNIT II

Plant resources as fibers – Classification – Surface fibers – Cotton; Soft fibers - Jute,

UNIT III

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

UNIT IV

Plant resources as beverages – Coffee, Tea – methods of processing of tea.

UNIT V

Plant resources as spices and condiments – Seed – Cardamom; Bark – Cinnamon; Fruit - Coriander.

REFERENCE BOOKS:

1. Herbs, spices & Medicinal plants, Recent advanced botany by Craker, Lyle E. 1988. Oryx press, phoenix. Arizona.
2. Medicinal plants of India (Medicinal plants of the world vol.5. by Sudhanshu Kumar.Jain.1985-1989.
3. Trease, G.E. & Eram,N.C. 1983, Pharmocognosy Baullinie, Trendall, Enaullourne
4. Pulok K. Mukherjee, 1988Quality control herbal drugs. New Delhi.
5. VinodL.D. and Rengaw. 1976. Pharmacogonosy & Phytochemical Ist edition Vol I & II. Delhi.
6. Chowdery.R. D., 1996.Herbal Drug Industry.Delhi.
7. Pandey,B.P. 1997. Economic Botany–S. Chand & company Ltd.New Delhi.
8. Verma, V. 198. Economic Botany – Emkay publication, New Delhi.
9. Albert E. Hill, 1988, Economic Botany. A textbook of useful plants and plants Products. TATA Mc Graw – Hill publishing company Ltd. New Delhi.

IV SEMESTER			
SBE 4	**PUBLIC HEALTH**		**11SEAZ41**
Hrs / Week : 3	**Hrs / Sem : 3 x 15 = 45**	**Hrs / Unit: 9**	**Credits : 2**

Objectives:

- **To gain knowledge in the concept of public health and preventive medicine**
- **To know the current health situation in India**
- **To understand the concept of prevention**

UNIT I

a. Definition of Health- Physical -mental – social- Positive health; Spectrum of health.

b. Millennium development goals – Primary Health Care.

UNIT II

a. Determinants of health: Biological-Socio cultural-environment-socio economic – health services.

b. Natural history of disease- Pathogenesis and Pre pathogenesis- Epidemiological triad.

UNIT III

a. Modes of disease transmission: Direct transmission- direct contact- droplet infection- contact with soil- transplacental -Indirect transmission- vehicle borne- vector borne- air borne- formite borne- unclean hands and finger.

b. Disease prevention and control-Immunization Schedule

UNIT IV

a. Concept of Prevention: Levels of Prevention-Primordial- Primary-secondary-tertiary- Modes of intervention.

b. Primary health centre- Functions.

UNIT V

a. Health situation in India.

b. Health Problems –Communicable disease problems- Non communicable disease problems- Nutritional Problems- environmental sanitation problems- Medical care Problems- Population Problems-Methods of population control

PRACTICAL EXPERIENCES:

- Visit to PHC.
- Organizing health education program in rural area.
- Visit to VTC centre for AIDS.
- Visit to schools for visually and intellectually and physically challenged children.

REFERENCE BOOK

1. Park's text book of Preventive and Social Medicine, 2009. 20th edition.

V SEMESTER			
SBE 5	**DIETETICS**		**11SEAZ51**
Hrs / Week : 3	**Hrs / Sem : 3 x 15 = 45**	**Hrs / Unit: 9**	**Credits : 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 condition.
- To acquire skills on diet counseling for various disease conditions

UNIT I **Hrs: 9**

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

UNIT II **Hrs: 9**

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

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

UNIT III **Hrs: 9**

Diet in fevers - causes, types, general dietary consideration in fever, Principles of dietary management

UNIT IV **Hrs: 9**

a)Obesity and under nutrition- etiology, assessment and classification of obesity and nutritional modification.

b) Importance of fiber.

UNIT V **Hrs: 9**

Peptic ulcer, diarrhea, constipation: Principles of planning diet, etiology, and nutritional modification.

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.

VI SEMESTER			
SBE 6	**MEDICAL NUTRITION THERAPY**		**11SEAZ61**
Hrs / Week : 3	**Hrs / Sem : 3 x 15 = 45**	**Hrs / Unit: 9**	**Credits : 2**

OBJECTIVES:

To enable students to

- To plan and prepare therapeutic diets for various disease condition.
- To acquire skills in diet counseling for various disease condition

UNIT I

Diabetes Mellitus: Definition, Risk factors, Types, Symptoms, principles of planning diet, nutritional modifications and complications.

UNIT II

Diseases of kidney –Causes, Types of Renal disease, symptoms, and Principles of dietary management of Glomerulo nephritis, nephrosis, and chronic renal failure, Diet in dialysis and renal transplantation.

UNIT III

Diseases of cardio vascular system - Risk factors–Principles of dietary management in atherosclerosis, hypertension and congestive heart failure

UNIT IV

Diseases of the liver – causes, symptoms and Principles of dietary management in infective hepatitis and cirrhosis of the liver.

UNIT V

Cancer: etiology, symptoms and dietary guidelines.

AIDS- causes, signs and symptoms, and dietary modification.

Burns: degree of burns - Principles of dietary management in burns

PRACTICAL EXPERIENCES:

Planning preparing and serving diet

a. Diabetes mellitus
b. Atherosclerosis
c. Hepatitis
d. Glomerulonephritis
e. Nephrosis
f. Formula preparation for tube feeding(demonstration only)

Visits to the following

a. Dietary department in a hospital.
b. AIDS positive network centre.
c. Kidney care hospital, Diabetic care centers and cancer institute to observe the patients.

One week hospital internship

REFERENCE BOOKS:

1. Gopalan, C. Ramashasthri, B.V. and Balasubramanian- Nutritive Value of Indian Foods, NIN, ICMR, 1998.
2. Guthrie and Boston, Introductory Nutrition, 1989, VIII Edition.
3. Robinson C.H. and Lawery M. - Normal and therapeutic nutrition, Macmillan Publishing Co., NewYork, 1990.
4. Sri Lakshmi, B., Dietetics, Wiley eastern limited, 1993.
5. Vidya Rao, D.B. A text book of Nutrition, Discovery publishing house, 1996.

PART IV – NON MAJOR ELECTIVE OFFERRED BY ZOOLOGY DEPARTMENT FOR OTHER MAJOR STUDENTS (2011 – 2014)			
III SEMESTER			
NME 1	**FOOD PRESERVATION**		**11NEAZ31**
Hrs / Week : 3	**Hrs / Sem : 3 x 15 =45**	**Hrs / Unit : 9**	**Credits : 2**

UNIT I

Food preservation: Objectives and principles- Asepsis- Food spoilage and its prevention- Principles of sanitation to be observed in food preservation.

UNIT II

Preservation by Low temperature- refrigeration and freezing.
High temperature- Pasteurization, canning.
Radiation - Irradiated foods. Microwave heating of foods

UNIT III

Preservation by the use of chemicals- types of chemical preservatives.
Drying - Methods and effect of drying.

UNIT IV

Preservation as sugar concentrates - Method of preparation of jam, jelly, Squashes, crystallized or glazed fruits, factors affecting jam and jelly formation, sauces.

UNIT V

Preservation by Pickling - Method of preparation of vegetable, fish, mutton pickles.

PRACTICAL EXPERIENCES:

1. Hands on training in the preparation of squashes, jams, jellies, candies, different types of pickles and sauce.
2. Visit to food preservation factories.
3. A week's training in food preservation unit.

REFERENCES BOOKS:

1. Destrosier, N.N. 1987. The technology of food preservation, CBS Publishers.
2. Lal and Siddappa, 1986, Fruit and vegetable preparation, ICMR.
3. Srilakshmi, B.2001.Food science, Chemistry and experimental foods.

IV SEMESTER		
NME 2	**MUSHROOM CULTIVATION & FORESTRY**	**11NEAZ41**
Hrs / Week : 3	**Hrs / Sem : 45**	**Credits : 2**

OBJECTIVES

To enable the students

1. To know the various types of edible mushrooms and their nutritional value.
2. To understand the method of cultivation of edible mushroom and spawn production.
3. To learn the definition and importance of forest
4. To learn the conservation strategies of forest.

UNIT I

General characteristic features of mushroom, History of Mushroom Cultivation - types of mushroom - edible and non edible mushrooms.

UNIT II

Nutritional and medicinal value of mushrooms. Problems encountered in mushroom cultivation, Spawn productions.

UNIT III

Cultivation technology of Oysters mushroom, button mushroom and paddy straw mushrooms (Mass cultivation).

UNIT IV

Forest – Definition & importance - Forest conservation Systems. Silviculture - definition and scope. Forest Management. Deforestation causes & measures.

UNIT V

Afforestation: Strategies & Constraints - Social forestry, Agro forestry - types, advantages and disadvantages.

REFERENCE BOOKS:

1. Alice, D.M. Muthusamy and I. Yesuraja, 1991. Mushroom culture Ist edition Agriculture College and research Institute, Madurai.
2. Marimuthu. T., Krishnamoorthy, A.S. Sivaprakasam, K. and R. Jeyarajan. 1991. Oysters mushroom, Department of plant pathology, Coimbatore.
3. Krishna Murthy, 1993. Minor forest products of India, Suganya Pathipagam. Pandey, BP. 1988. Economic botany, S. Chand & Co. New Delhi.
4. Negi & Bhupal Singh, 1993. Forestry to India, M. D. Publications. Trease, G.E. and Eram, N.C. 1983, Pharmocognasy, Baullinie, Trendall, Enaullourne
5. Sagreiya, K.P., 1967. Forests & Forestry - National Book Trust, India. Wallis, T.E.1985. Text book of Pharmacognocy CBS Publications, Delhi