



PSGR KRISHNAMMAL COLLEGE FOR WOMEN
College with Potential for Excellence
(An Autonomous Institution, Affiliated to Bharathiar University)
(Reaccredited with 'A' Grade by NAAC, An ISO 9001:2008 Certified Institution)
Peelamedu, Coimbatore-641004



DEPARTMENT OF ZOOLOGY

CHOICE BASED CREDIT SYSTEM

BACHELOR OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

2015 - 2018

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2015 - 2018

S e m	P a r t	Subject Code	Title of the Paper	Instruc tion Hours/ week	Duration of exam (in hrs)	Maximum Marks			Credits
						CA	ESE	Total	
I	I	TAM1401	Language Tamil Paper I	6	3	25	75	100	3
		HIN1401	Hindi Paper I						
		FRE1401	French Paper I						
	II	ENG1301/ ENG13F1	English Paper I Functional English I	6	3	25	75	100	3
		III	AS15C01	Core Paper I Invertebrata	6	3	25	75	100
	AS15CP1		Core Zoology Practical I	3	-	-	-	-	-
	CE13A01		Allied Chemistry Paper –I	4	3	20	55	75	4
	CE13AP1		Allied Chemistry Practicals	3	-	-	-	-	-
	IV	NME14B1 NME14A1 NME12WS NME12GS NME12AS	Basic Tamil Advanced Tamil Women Studies Gandhian Studies Dr. Ambedkar Studies	2	-	-	-	100	2
	II	I	TAM1402	Language Tamil Paper II	6	3	25	75	100
HIN1402			Hindi Paper II						
FRE1402			French Paper II						
II		ENG1302 ENG14F2	Part II – English Paper II Functional English II	6	3	25	75	100	3
III	AS15C02	Core Paper II Chordata	5	3	25	75	100	5	
	AS15CP1	Core Zoology Practicals – I	3	3	40	60	100	4	

		CE13A02	Allied Chemistry Paper –II	5	3	20	55	75	4	
		CE13AP1	Allied Chemistry Practicals	3	3	20	30	50	2	
	IV	NME14B2 NME14A2 OPS1409	Basic Tamil Advanced Tamil Open course	2	2	-	100	100	2	
		NM11GA W	General Awareness	Self Study		-	-	-	Grade	
III	I	TAM1303 HIN1403 FRE1403	Language Tamil Paper III Hindi Paper III French Paper III	6	3	25	75	100	3	
		II	ENG1303 ENG13F3	English Paper III/ Functional English III	5	3	25	75	100	3
		III	AS15C03	Core Paper III Ecology and Embryology	4	3	25	75	100	4
	AS15CP2		Core Zoology Practical – II	3	-	-	-	-	-	
	PL13A01 PS08A01		Allied Botany Paper- I Allied Physics Paper I	5	3	20	55	75	4	
	PL13AP1 PS08AP1		Allied Botany Practicals Allied Physics Practicals	2						
	SB11MD01 SB11WD01 SB08BC01 SB11BA01 SB11AC01		Skill Based Elective Multimedia and DTP Software-Level I Basics of Web Design I Basics Of Computer Application Business Application Software – I BUSINESS AUTOMATION Fundamentals of Business Automation APPLICATIONS WITH C C with Data Structures	3						

IV		SB11MDP1 SB11WD01 SB11ACP1	Skill Based Elective Practicals Multimedia and DTP Software Level-I –Practicals Basics of Web Design Practicals-I APPLICATIONS WITH C C with Data Structures – Practicals I							
		NM10VED	Value Education	2	3	25	75	100	2	
		JOB0409	Job Oriented Course Vermiculture and Mushroom Culture	After 3.00P M	3	-	-	-	Grade	
IV	I	TAM1304/ HIN1404/ FRE1404	Part I Language Tamil Paper IV Hindi Paper IV French Paper IV	5	3	25	75	100	3	
	II	ENG1304/ ENG13F4	Part II – English Paper IV/ Functional English IV	6	3	25	75	100	3	
	III		AS15C04	Core Paper IV Cell Biology & Biochemistry	4	3	25	75	100	4
			AS15CP2	Core Zoology Practicals – II	3	3	40	60	100	4
			PL13A02 PS09A02	Allied Botany Paper- II Allied Physics Paper II	5	3	20	55	75	4
			PL13AP1 PS08AP1	Allied Botany Practicals Allied Physics Practicals	2	3	20	30	50	2
	IV		SB11MD01 SB11WD01 SB08BC01 SB11BA01 SB11AC01	Skill Based Elective Multimedia and DTP Software-Level I Basics of Web Design I Basics Of Computer Application Business Application Software – I BUSINESS AUTOMATION Fundamentals of Business Automation APPLICATIONS WITH C C with Data Structures	3	3	25	75	100	4
			SB11DP1	Skill Based Elective Practicals	2	3	40	60	100	2

		SB11WDP 1 SB11BAP1 SB11CP1 SB11ACP1	Multimedia and DTP Software-Level I Basics of Web Design I MS Office- Practical I Business Application Software – I C with Data Structures Practicals-I						
		NM08EVS	Foundation Course II Environmental Studies	2	3	25	75	100	2
			Extension Activities NSS/NCC/ /YRC/ Eco watch/Yi Net/Rotaract/Sports & Games	-	-	-	100	100	1
V	III	AS15C05	Core Paper V Genetics and Evolution	4	3	25	75	100	4
		AS15C06	Core Paper VI Biophysics, Biostatistics & Bioinformatics	4	3	25	75	100	4
		AS15C07	Core Paper VII Biotechnology I	4	3	25	75	100	4
		AS15E01 AS15E02	Elective: 1. Pathology and Medical Laboratory Technology I 2. Sericulture I	4	3	25	75	100	4
		AS15CP3	Core Zoology Practicals – III	5	-	-	-	-	-
		AS05PR0J	Group Project	4	Viva - voce	50	50	100	5
		AS14AC1	#Advance Learners' Course I –Microbiology	-	3	-	100	100*	*5
		AS14AC2	#Advance Learners' Course I –Public Health and Hygiene	-	3	-	100	100*	*5
			Internship (15 Days)	-	-	-	100	100	2
		NM14IS1	Information Security Level I	2					
		SB11DP02 SB11WD02 SB11BC02	Skill Based Elective Multimedia and DTP Software-Level II Basics of Web Design II	3	-	-	-	-	-

	SB11BA02 SB11AC02	Basics Of Computer Application Business Application Software – II BUSINESS AUTOMATION Internet and e-commerce APPLICATIONS WITH C C with Graphics						
	SB082DP2 SB11WD02 SB08BCP2 SB08BAP2 SB08ACP2	Skill Based Elective Practicals Multimedia and DTP Software-Practical II Basics of Web Design Practical II Basics of Computer Application Business Application Practicals– II BUSINESS AUTOMATION Tally and Internet C with Graphics Practicals-II						
		Personality Development	-	-	-	-	-	Grade
		Comprehensive Exam	-	1 On line	-	-	100	Grade
		Supportive Course	-	-		-	-	Submission of certificate
	AS15C08	Core Paper VIII Physiology and Endocrinology	6	3	25	75	100	5
	AS15C09	Core Paper IX Biotechnology II	5	3	25	75	100	5
	AS15C10	Core Paper X Human Genetics and Counselling	5	3	25	75	100	5
	AS15E03 AS15E04	Elective: 1. Pathology and Medical Laboratory Technology II 2. Sericulture II	5	3	25	75	100	4
	AS14AC3	#Advance Learners' Course II -Immunology	Self Study	3	-	100	100*	*5

VI	III								
		AS14AC4	#Advance Learners' Course II – Applied Zoology	Self Study	3	-	-	100*	*5
		AS15CP3	Core Zoology Practicals- III	6	3	40	60	100	5
		SB11DP02 SB11WD02	Skill Based Elective Multimedia and DTP Software-Level II	3	3	25	75	100	4
		SB11BC02 SB11BA02 SB11AC02	Basics Of Computer Application Business Application Software – II BUSINESS AUTOMATION Internet and e-commerce APPLICATIONS WITH C C with Graphics						
SB11DP2 SB11WDP 2	Skill Based Elective Practicals Multimedia and DTP Software-Practical II		3	40	60	100	2		
SB11BCP2 SB11BAP2 SB11ACP2	Basics of Web Design Practical II Basics of Computer Application Business Application Practicals– II BUSINESS AUTOMATION Tally and Internet C with Graphics Practicals-II								
Total							3800	140	

- The credits is applicable to candidates who takes up the advanced level course exam

INTERNSHIP TRAINING

Students undergo training in groups in the software companies for 15 days in the IV semester vacation.

Internship training is evaluated on 5th semester [July 1st week].

Students has to produce attendance certificate and Report after the training

Internship Evaluation

Work Diary + Attendance	= 25
Report	= 50 (40 Pages)
Viva Voce	= 25

	<u>100</u>

PROJECT AND VIVA-VOCE

Students undergo project work for 3 months individually in the software development companies
Project evaluation is for 100 marks.

Internal (20 marks):	I Review	:	5 Marks
	II Review	:	10 Marks
	III Review	:	5 Marks
External (80 marks)			
Evaluation of project	:		60
Viva voce	:		20

An internal mark is based on the review conducted to the students. Final dissertation is submitted by the students for their viva-voce

QUESTION PAPER PATTERN (CIA)

Section A 5 x 2	=10 marks (5 out of 8)
Section B 4 x 5	=20 marks (4 out of 6)
Section C 2 x 10	=20 marks (2 3out of 3)

QUESTION PAPER PATTERN (ESE)

Section A 5 x 2 = 10 Marks (Open choice – 5 out of 8)

Section B 5 x 5 = 25 Marks (Internal choice)

Section C 5 x 8 = 40 Marks (Open choice-5 out of 7)

ALLIED

Subject options are introduced in I, II, III and IV semesters.

FOUNDATION COURSES

Semester I – Women Studies/ : 100 marks (CA I-25 + CA II -25 + MODEL - 25 +

Ambedkar studies/Gandhian studies PROJECT-25)

Semester II - General Awareness : Grade

(ONLINE SELF STUDY)

Semester II - Open Course : 25 marks (CIA)+ 75 marks (ESE)

Semester III – Value Education : 100 marks (CA I-25 + CA II -25 + MODEL - 25 +

PROJECT-25)

Semester IV – Environmental Studies : 100 marks (CA I-25 + CA II -25 + MODEL - 25 +

PROJECT-25)

Semester V- Information Security : 100 marks (CA I - 40 + CA II - 40 + Quiz-10+

assignment -10)

SKILL ORIENTED COURSE

• Distribution of theory papers and practical papers in III, IV & V Semester with 3 Hrs

per week practicals

- Maximum marks allotted for theory paper 75(ESE) + 25(CA)
- Total marks 400 with 12 credits

ADVANCE LEARNER COURSE:

- Students above 75% of marks and without any arrears are eligible for advanced level course at V and VI semester with subject options, so that the students can choose the subject of their interest.

COMPREHENSIVE EXAM

- Final year students undertake this online exam for 100 marks for 1 Hour

CREDITS

- Student receives 140 credits with 3800 marks

QUESTION PAPER PATTERN FOR INFORMATION SECURITY

Section A (5x2 = 10 Marks) (5 out of 8)

Section B (6x5 = 30 Marks) (6 out of 8)

Total = 40 Marks

Marks secured will be converted into grades

COMMUNITY ORIENTED SERVICE

UG Students should complete 30 Hrs Community Oriented Service during holidays before the end of fourth semester and can be taken up in any of the following fields: Health Awareness, Entrepreneurial agencies, Social Organizations, Schools, Orphanages, Hospitals, Old Age Homes and SHG Groups etc.

ADDITIONAL COURSES

- Add on course @ Certificate level = Job oriented course

TOTAL MARKS AND CREDITS

The course consists of

- Core = 15 papers
- Elective = 1 paper
- Practical = 3 papers
- Project = 1
- Allied = 4 papers
- Total marks = 3800
- Total credits = 140

Semester : I

Core : 1

Title : Invertebrata

Subject Code : AS15CO1

Credit : 5

Lecture Hours: 86

Objective:

To understand the basic classification, structure and functional details of invertebrates

Classification of phyla up to class level with one example each. Type study under each phylum to deal with structure, organization and life cycle.

Examples and salient features of organisms upto class level for all the five units.

Unit 1

(18 Hrs)

Phylum Protozoa

Type Study: *Paramecium caudatum* – External features, Nutrition, Locomotion- effective stroke, recovery stroke, Metachronal rhythm, Reproduction-Asexual- Binary fission , Sexual reproduction –Conjugation, Autogamy, Endomixis, Hemimixis and Cytogamy.

General Essay: Locomotion in Protozoa

*Protozoan human diseases

Phylum Porifera

Type Study: *Leucosolenia botryoides*- External features, Body wall, Spicules, Canal System, Nutrition, Reproduction.

General Essay: Canal System in sponges

*Economic importance of sponges

Unit 2

(17 Hrs)

Phylum Coelenterata

Type Study: *Obelia geniculata* - External features, Histology of the colony, Cnidoblast and its functions, Life History of Obelia, Metagenesis.

General Essay: Corals & coral reefs

*Polymorphism in Coelenterates

Phylum Helminths

Type Study: *Taenia solium*- External features, Body wall, Feeding, Respiratory system, Excretory system-flame cells, Nervous system, Reproductive system, Life cycle- Oncosphere and Cysticercus larvae.

General Essay: Brief account on

- a) *Wuchereria bancrofti*
- b) *Dracunculus medinensis*
- c) *Ancylostoma duodenale*

*Parasitic adaptation in Helminthes.

Unit 3

(17 Hrs)

Phylum Annelida

Type Study: *Megascolex mauritii* - External features, Body wall, Coelom, Locomotion, Digestive system, Respiratory system, Excretory system - Meganephridia, Micronephridia, Pharyngeal nephridia, Nervous system, Reproductive system.

General Essay: Metamerism in annelids.

* A Brief Account on vermiculture.

Unit 4

(17 Hrs)

Phylum Arthropoda

Type study: *Periplaneta americana* - External features, Body wall, Mouthparts, Digestive system, Respiratory system, Circulatory system, Nervous system, Sense organs, Excretory system, Reproductive system.

General Essay: Peripatus- Affinities as a living fossil.

*A Brief Account on Apiculture.

Unit 5

(17 Hrs)

Phylum Mollusca

Type Study: *Pila globosa* - External features, Shell, Digestive system, Respiratory system, Circulatory system, Nervous system, Sense organs- Eyes, Osphradium, Statocyst, Tentacles, Excretory system, Reproductive system..

General Essay: Torsion in Mollusca.

* A Brief Account on Pearl Culture.

Phylum Echinodermata

Type Study: *Asterias rubens* - External features, Pedicellaria-Structure and Function, Digestive system, Respiratory system, Water vascular system-Structure and Function, Circulatory system-Perihaemal and Haemal system, Nervous system, Sense organs, Excretory system, Reproductive system.

General Essay: Larval forms of Echinoderms and their evolutionary significance.

*Economic importance in Echinoderms.

*Denotes Self Study

TEXT BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Jordan.E.L and Verma.P.S	Invertebrate Zoology	S. Chand and Co	2014
2	N. C. Nair, N. Soundara Pandian, S. Leelavathy, T. Murugan	A Text book of Invertebrates	Saras Publications	2013

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Jan A. Pechenik	Biology of the Invertebrates	Hill McGraw-Hill Companies	2014, 7 th Revised Edition
2	Dhami P.S. and Dhami J.K	Invertebrate Zoology	S. Chand & Co	2012, 5 th edition
3	Ekambaranatha Ayyar,M. & Ananthakrishnan,T.N	Manual of Zoology Vol-I (Invertebrata) Part I & II	Vishwanathan (p) Ltd.Chennai	2010
4	Fatik Baran Mandal	Invertebrate Zoology	Eastern Economy Edition	2012, 1 st edition
5	Kotpal R.L., Agarwal S.K and Ketarpal R.P.R	Modern Text book of Zoology Invertebrates	Rastogi Publications	2011
6	Rober D. Barnes	Invertebrate Zoology	Brooks W.B.Saunders Company	1994, 6 th edition
7	Barrington EJW	Invertebrate Structure and Function	ELBS and Nelson	1979, 2 nd edition

Semester : II
Core : 2
Title : Chordata
Subject Code : AS15CO2
Credit : 5

Lecture Hours: 71

Objective:

To understand basic classification, structural and functional details of chordates.

Salient features, classification up to order level with common examples.

UNIT I: Phylum Chordata

(15 Hrs)

Introduction, Three fundamental Chordate characters, Advancements of Chordates over other phyla. Brief classification of chordate with characters.

PROTOCHORDATA- General Characters

Type study: Amphioxus - Affinities and Systematic Position, Habits and Habitat, External features, Body wall, Coelom, Atrium, Digestive System, Respiratory mechanism, Circulatory system, excretory system and Reproductive system.

General Essay: Dipnoi- lungfishes-affinities and systematic Position

PISCES- General Characters

Type study: Shark - Systematic Position, Habits and Habitat, External features, Exoskeleton- Placoid Scales, Digestive System, Respiratory system & Mechanism of respiration, Circulatory system -Blood, Heart and pericardium, Arterial system, Venous system, Nervous system-Brain, Spinal cord, cranial nerves and spinal nerves. Sense organs-Olfactory organs, Eyes, Internal ears, Neuromast or lateral line system, Ampullae of Lorenzini. Urinogenital system.

General Essay: Accessory respiratory organs in fishes.

* General account of a) *Oreochromis mossambicus*

b) *Labeo rohita*

c) *Catla catla*

UNIT II: AMPHIBIA - General Characters

(14 Hrs)

Type study: Frog - Systematic Position, Habits and Habitat, External features, Endoskeleton-Axial skeleton- Skull, Ribs, Sternum Appendicular skeleton-Girdles and Limbs, Sexual dimorphism, Digestive System, Respiratory system- Cutaneous respiration, Buccal respiration and Pulmonary respiration. Respiratory mechanism-inspiration and expiration. Circulatory system-Blood, Heart-Internal structure, Arterial system, Venous system.Nervous system-Brain, Spinal cord, cranial nerves and spinal nerves.Sense organs- Tangoreceptors, Tastebuds, Olfactory organs, Internal structure and functions of Eye and Ear, Urinogenital system

General Essay: Parental care in Amphibia

*Neoteny in Amphibia

UNIT III: REPTILIA - General Characters

(14 Hrs)

Type study: Calotes - Systematic Position, Habits and Habitat, External features, Digestive System, Respiratory system- Respiratory mechanism, Circulatory system-Blood,Heart-Internal structure, Arterial system, Venous system. Nervous system- Brain, Spinal cord, cranial nerves and spinal nerves. Sense organs, Jacobson's organs, Internal structure and functions of Eye and Ear, Urinogenital system

General Essay: Poison apparatus, Biting mechanism, First aid treatment for snake bite.

*Common poisonous and non – poisonous snakes in India.

UNIT IV: AVES - General Characters

(14 Hrs)

Type study: Pigeon -Systematic Position, Habits and Habitat, External features, Feathers-Structure of a typical feather in Pigeon, Types of feathers in pigeon .Muscular System- Flight muscles, Digestive System, Respiratory system- Syrinx and voice production, Air sacs and functions. Respiratory mechanism, Circulatory system-Blood, Heart-Internal structure, Arterial system, Venous system. Nervous system-Brain, Spinal cord, cranial nerves and spinal nerves, Structure and function of Eye and Ear, Urinogenital system.

General Essay: Flightless birds

*Migration in birds.

UNIT V: MAMMALIA - General Characters**(14 Hrs)**

Type study: Rabbit - Systematic Position, Habits and Habitat, External features, Digestive System, Respiratory system, Circulatory system-Blood, Heart-Internal structure, Arterial system, Venous system. Nervous system-Brain, Spinal cord, cranial nerves and spinal nerves. Structure and function of Eye and Ear, Excretory system, Reproductive system.

General Essay: An account on Prototheria, Metatheria and Eutheria

*Aquatic adaptations in mammals.

* Denotes self study

TEXT BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Jordan.E.L and Verma.P.S	Chordate Zoology	S.Chand & Co	2014
2	A. Thangamani S. Prasanna kumar L.M. Narayanan N. Arumugam,	A Text book of Chordates	Saras Publications	2013

REFERENCE BOOKS

S. No.	Authors	Title of the Book	Publishers	Year of Publication
1	Ekambaranatha Ayyar.M & Ananthkrishnan.T.N	A Manual of Zoology Vol.II- Part I & II	S.Vishwanathan Pvt.Ltd	2010
2	Kotpal R.L	Modern Text book of Zoology – Vertebrates	Global Media Publications	2012
3	B Waterman, Allyn J	Chordate Structure and Function	Mac Milan & Co	1971

Semester : I & II
Practical Lab : 2
Title : Core Practical I
Subject Code : AS15CP1
Credit : 4

Lecture Hours: 90 Hrs

Dissections

1. Cockroach Digestive system, Nervous system,
Male & Female Reproductive systems (6 Hrs)
2. Fish (*Tilapia*)- Viscera, Digestive system, Reproductive system (4 Hrs)

Mounting:

1. Mounting of scales of a marketable fish.
2. Mounting of gill arch.
3. Mounting of earthworm setae (2 Hrs)
3. Digital Dissection (5 Hrs)

Spotters:

Classify giving reasons: -Paramecium, Leucosolenia, Obelia colony, Prawn, Octopus, Star fish, Ascidian, Shark, Salamander, Pigeon, Bat (8 Hrs)

Draw labelled sketches: -T.S. of Tape worm, Leech, Amphioxus, Frog – Skull, Vertebrae-typical, VIII,IX,X,Pectoral girdle, Pelvic girdle, Fore limb and Hind limb (8 Hrs)

Relate structure and function: - Gemmule, Scolex of tapeworm, Nereis -parapodium, Heteronereis, Prawn - Appendages, Honey bee-Queen, Drone, Worker; Quill feather, Tortoise – Carapace and plastron, Narcine – Electric organ, Placoid scale, Snake poison apparatus. (8 Hrs)

Write descriptive notes: - Nauplius larva , Pila, Bipinnaria larva, Balanoglossus,

Echeneis - Sucker fish, Draco - Flying lizard, Rat snake, Cobra, Hyla (7 Hrs)

Give biological significance: - Tape worm entire, Chaetopterus, Peripatus, Limulus, Scorpion, Pearl oyster, Hippocampus male and female, Exocetus – Flying fish, Chameleon (6 Hrs)

Observations on the Metamorphosis of silkworm. (1 Hr)

Field observations combined with photography and/or videography

1) Study of live water specimens in nearby water bodies (5 Hrs)

2) Study of insect fauna in the college campus (5 Hrs)

3) Visit to a sericulture farm (5 Hrs)

4) Visit to an Apiary (5 Hrs)

5) Study of a pond ecosystem (5 Hrs)

6) Visit to a Museum (5 Hrs)

Culture Methods

1) Culture of unicellular organisms (Amoeba, Paramecium, and Euglena)

2) Culture of multicellular organisms (Earthworm) (5 Hrs)

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Sinha. J, Chatterjee. A. K, Chattopadhyay. P	Advanced Zoology Practical	Arunabha Sen Books and Allied (P) Ltd	2011
2	Lal S. S., A	Textbook of Practical Zoology Vertebrate	Rastogi Publication	2004
3	Lal S. S., A	Textbook of Practical Zoology Invertebrate	Rastogi Publication	2004

Open Course

Semester : II
Open Course : 2
Title : GENERAL BIOLOGY OF MAN
Subject Code : OPS1409
Credit : 2

Lecture Hours: 30

Objectives:

This course, meant for non-majors, is a formal encounter with Biology, during their college career. As interest in himself undermines man's basic nature, the course caters to it, venturing to capture and hold the students' interest in the basic principles and working of the human system.

UNIT I (6 Hrs)

DIGESTION - Digestion: Digestive System, Digestive Glands, Digestion and absorption of food
Nutrition: Proteins, Carbohydrates, Fats, Water, Minerals & Vitamins; Balanced Diet. Diseases related to digestive system-Ulcer, Appendicitis, Hernia.

UNIT II (6 Hrs)

RESPIRATION - Respiration: Definition; Respiratory organs; Respiration process-expiration and inspiration. Common respiratory diseases-Bronchitis, asthma.

UNIT III (6 Hrs)

CIRCULATION - Circulation: Definition; Structure of Heart, Blood and its function. Blood Vessels-arteries, veins; Lymphatic System. Immune system in Man. Common Circulatory diseases- Myocardial infarction, Angina pectoris, CHD etc.

UNIT IV**(6 Hrs)**

NERVOUS SYSTEM & SENSE ORGANS - Nervous System: Definition, Structure & Functions of brain, Spinal cord and nerves. Sense Organs: Skin, Tongue, Nose, Eye, Ear

UNIT V**(6 Hrs)**

REPRODUCTION Reproduction in Man - Male and female reproductive system; Menstrual cycle; and childbirth; Birth control and family planning.

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Pearce E.C.	Anatomy and Physiology for Nurses	Jaypee Brothers	1997
2	Singh H D	Handbook of Basic Human Physiology	S.Chand & Co	2007
3	Sood M.S, Sood A.K, Sood A	Anatomy and Physiology for Nurses	CBS Publishers and Distributors	1998
4	Studio K.S. Kohli	An Atlas of Human Anatomy	Rohan Book Company	2000

Semester : III
Core : 3
Title : Ecology and Embryology
Subject Code : AS15C03
Credits : 4

Lecture Hours: 56

Objective:

To inculcate environmental awareness and to unravel the mystery of 'Embryogenesis of organisms.

UNIT I (12 Hrs)

Scope of Environmental Biology - Abiotic factors – Soil, Water, Light, Temperature. Biotic factors, Animal Relationships: Symbiosis, Mutualism, Commensalism, Antagonism, Parasitism, Predation, Competition, Population attributes: natality, mortality, population growth, population density, growth curves, Age pyramids, Biotic potential and Population regulation.

*Biogeochemical cycles–Carbon, Oxygen, Nitrogen, Phosphorus and Sulphur cycles.

UNIT II (11 Hrs)

Community ecology – Definition, Types and Characteristics of community, Ecotone and Edge Effect, Ecological niche, Concepts of community, Ecological succession- sere and climax, Significance of succession. **Habitat ecology** – Marine Habitat-Definition, Stratification, Pelagic region – communities, plankton, Pelagic adaptations; Intertidal seashore – rocky, muddy, sandy – biota and adaptations.

*Estuary Habitat-Mangroves.

UNIT III (11 Hrs)

Scope of Developmental Biology - definition, sub-divisions (Descriptive, Comparative, Experimental and Chemical). Early history of embryology (Preformation and Epigenesis, Recapitulation theory or Biogenetic law, Germplasm theory (Weisman). Gametogenesis-Spermatogenesis –Spermiogenesis, Structure of human sperm; Oogenesis- Growth of oocyte, pre-vitellogenesis, vitellogenesis, organization of egg cytoplasm, Polarity and Symmetry, Maturation

of egg, egg envelopes, Structure of Ovum; Fertilization-Definition, Types of fertilization, Mechanism of fertilization. Cleavage- Planes of cleavage and Patterns of cleavage; Types of cleavage - meroblastic and holoblastic. Blastulation-Types of Blastula; Fate map of frog, Gastrulation.

*Types of eggs.

UNIT IV

(11 Hrs)

Organogenesis in frog – Ectodermal derivative-Brain, Mesodermal derivative-Heart and Endodermal derivative-Alimentary canal. Organizer concept: Embryonic Induction, Role of organizers in development- Transplantation experiments of Spemann and Mangold.. Extra embryonic membranes in chick. Placentation in mammals-Classification of placenta based on Nature of contact, Mode of implantation,Histological intimacy of foetal and maternal tissue. Functions of placenta.

* Metamorphosis in frog

UNIT V

(11 Hrs)

Human Reproduction - Puberty, Menstrual cycle, Reproductive Hormones Menopause, Pregnancy, Parturition, Lactation, Artificial Reproductive Technology-.ZIFT, GIFT and IVF. Infertility, Artificial insemination, Cryopreservation, Embryo transfer, An overview of stem cells.

*Test-tube baby and its Merits & Demerits.

* Denotes self study

TEXT BOOKS

S. No.	Authors	Title of the Book	Publishers	Year of Publication
1	Arumugam,N	A Text book of Embryology	Saras Publication	2003
2	Verma P.S., Agarwal., V.K	Environmental Biology	S. Chand & Company	2000

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Balinsky, B.I	Introduction to Embryology	Saunders College Publishing	1981
2	Berrill, N.J	Developmental Biology	Tata Mc Graw Hill Publication Co.Ltd	1986
3	Clarke,G.L.	Elements of Ecology	John Wiley & Son Inc. New York & London	1954
4	Kotpal,R.L. and Bali,N.P.	Concepts of Ecology	Vishal Publication, Delhi	1986
5	Odum, E.P.	Basic Ecology	Saunders College Publishing , New York	1983
6	Scott F. Gilbert,	Developmental Biology	Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts	1997
7	Madhab C Dash	Fundamentals of Ecology	Tata Mc.Graw Publishing Company, 2007	2007
8	Vincent Terrence Robello, John P.C. and Prema A K	Developmental Biology	Zoological Society Study Material Series, Zoological Society of Kerala, Kottayam	2012
9	Chapman J.L and M.J.Reiss	Ecology – Principles and Applications	Cambridge University Press	1999

Semester : IV
Core : 4
Title : Cell Biology and Biochemistry
Sub code : AS15C04
Credits : 5

Lecture Hours: 56

Objective:

To enable the students to explore the intricacies of cell architecture and their complex biochemical interactions.

UNIT I

(12 Hrs)

Scope of Cell Biology; Cell theory, General Characteristics of Prokaryotes, Structure of a Typical Animal Cell and its Organelles, Plasma Membrane - Structure, Fluid Mosaic Model, Unit Membrane Model – Functions- Active Transport, Passive Transport - Cytoskeleton

*Microscopes – Principle and Uses of Optical, Phase Contrast, Oil Immersion and Electron Microscope

UNIT II

(11 Hrs)

Golgi Bodies – Ultra Structure and Functions, **Endoplasmic Reticulum** - Ultrastructure, Types and Functions, **Lysosomes** - Ultrastructure and Functions, Polymorphism in Lysosomes, **Ribosomes** – Structure and Functions **Cell centre** - Structure and Functions

* Cancer – Types and Properties of Cancer Cells; Theories on Carcinogenesis-

UNIT III

(11Hrs)

Mitochondria – Ultrastructure, mDNA and functions, Mitochondrial enzymes, Oxidative phosphorylation, Krebs's cycle, Fatty acid oxidation, ATP production. Ultrastructure of Interphase **Nucleus** and **Nucleolus**; **Chromosome** – structure, organization, types and functions.

*Giant chromosomes – polytene, lamp brush chromosomes.

UNIT IV**(11 Hrs)**

DNA – Structure, Chemical Composition, Watson and Crick, Replication; RNA - Structure, Chemical Composition, Types – mRNA, tRNA, rRNA; DNA Repair Mechanism – Enzymatic Photo reactivation, Excision Repair, Recombination Repair; cell cycle.

* Cell Cycle and Cell Division

UNIT V**(11 Hrs)**

Scope of Biochemistry–Classification–Aldoses, Ketoses, Monosaccharide, Disaccharides, Polysaccharides (homo,hetero). Proteins–Types of Amino Acids, Primary, Secondary, Tertiary Structure of Proteins. Lipids – Simple lipids, Complex lipids, Phospholipids, Glycolipids, Lipoproteins. Enzymes– Michaelis–Menten Equation

*Enzyme action – Factors Affecting Enzyme Action, Mechanism of Enzyme Action

* Denotes self study.

TEXT BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Satyanarayana U and Chakrapani U	Essentials of Biochemistry	Book and Allied (P) Ltd.	2009
2	Verma P.S., Agarwal., V.K	Cytology	S. Chand & Company	2012
3	Veer BalaRastogi	Introduction to Cytology	Introduction to Cytology	2003

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Albert L Lehninger	Biochemistry, Second Edition	Kalyani Publishers, New Delhi	2 nd Edition
2	De Robertis, E.D.P. and De Robertis, E.M.F	Cell and Molecular Biology	Lippincott Williams and Wilkins, Philadelphia	8 th Edition
3	James Darnell	Molecular Biology	Scientific American Books Inc	1998
4	Karp, G	Cell and Molecular Biology: Concepts and Experiments	John Wiley & Sons. Inc.	6 th Edition, 2010
5	Swamon, C.P -	The Cell	Prentice Hall of India Pvt.Ltd	8 th Edition, 1990
6	G.M Cooper and, Robert E. Hausman	The Cell: A Molecular Approach	Sinauer Associates.	2009
7	William H Elliott and Daphne C Elliott	Biochemistry and Molecular Biology	Oxford University Press	1997

Semester : III & IV
Title : Core Practical II
Sub Code : AS15CP2
Credits : 4

Lecture Hours: 90

CELL BIOLOGY

(12 Hrs)

1. Squash preparation of onion root tip.
2. Squash preparation of Grasshopper Testis/ Tradescantia anther.

BIOCHEMISTRY

(10 Hrs)

1. Qualitative analysis of carbohydrates, proteins and lipids.

ENVIRONMENTAL BIOLOGY

(54 Hrs)

1. Estimation of dissolved oxygen in water samples by Winkler's method.
2. Estimation of salinity, pH and temperature in water samples.
3. Estimation of free carbon dioxide in water samples.
4. Mounting and identification of Marine and Freshwater plankton.
5. Identification and study of inter tidal, rocky sandy and muddy shore fauna.
6. Estimation of total alkalinity of water and soil.
7. Estimation of total hardness of water.
8. Trip to a terrestrial ecosystem
9. Visit to a pond ecosystem

DEVELOPMENTAL BIOLOGY

(14 Hrs)

Spotters

1. Observation of different types of eggs – Amphioxus, frog, hen's egg, ovum of mammal
2. Observation of different types of sperms- Sperm of frog, sperm of man.
3. Embryology of Frog – Cleavage, Blastula, Gastrula, Yolk plug.
3. Chick embryo whole mount – 24, 48, 72 & 96 hours.
4. Metamorphosis in frog.
5. Placenta of mammals - pig, sheep and man.

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Sinha. J, Chatterjee. A. K, Chattopadhyay. P	Advanced Zoology Practical	Arunabha Sen Books and Allied (P) Ltd	2011
2	Lal S. S., A	Textbook of Practical Zoology Vertebrate	Rastogi Publication	2004
3	Lal S. S., A	Textbook of Practical Zoology Invertebrate	Rastogi Publication	2004

Semester : III & IV
Title : **Multimedia and DTP Software-Level I**
Sub Code : **SB11MD01**
Credits : 4

Lecture Hours: 43

Objective:

To provide a conceptual understanding of the basics of Adobe Pagemaker and indepth coverage of drawing and editing tools.

UNIT I (9 Hrs)

About the Work Area-Using the toolbox- Creating and opening publications- Creating a publication from scratch-Opening an existing publication - Opening publications created in previous PageMaker versions-About templates - Opening templates. Working with pages: Adding and deleting pages-Viewing pages- Applying masters to new pages as you create them-Naming and saving a publication.

Working with Palettes- Adding text and graphics to templates-Building your own template.

UNIT II (9 Hrs)

Specifying a save option preference: -Saving publication with a new or in a different location-Saving linked and associated files with publication-Saving a file to open in an earlier version of PageMaker-closing a publication-Setting up pages-Changing document setup options.

About Master Pages: - Creating master pages-Applying master pages-Applying Grids.

Text Formatting and word processing: selecting text or text objects-Importing text-Editing text-Threading text blocks-Threading text frames.

UNIT III (9 Hrs)

Balancing columns-controlling page and column breaks-Adding jump lines. Setting text preferences: -About formatting text-Formatting characters-Formatting paragraphs-Setting indents and tabs-Adding rules above or below paragraphs-Using paragraph styles-Understanding how text is composed-Tracking type-Setting word and letter spacing-Customizing hyphenation for specific

words- Customizing hyphenation for paragraphs-Leading: Adjusting the space between lines of text.

UNIT IV

(8 Hrs)

Manipulating an object using the control palette- Grouping and ungrouping objects-Locking objects- Masking objects-Aligning and distributing objects-Rotating, skewing, and reflecting objects. Drawing and editing lines and shapes-Using frames-Changing the stacking order of objects-Deleting an object-Manipulating an object using the control palette. Cropping a Graphic-Wrapping text around graphics- Attaching a graphic to text.

UNIT V

(8Hrs)

Using image control on a bitmap-Using Photoshop effects- Compressing and decompressing a TIFF image- Viewing images on-screen at different resolutions-Keylining-Viewing clip-art images-Using layers. About hypertext links-About Adobe PDF-Preparing a PageMaker publication for Adobe PDF-Exporting a document to Adobe PDF-Changing distiller options in PageMaker-Preparing a PageMaker publication for HTML.

TEXT BOOKS: Course materials will be provided

REFERENCE BOOKS

S. No.	Author	Title of book	Publisher	Year of publication
1	Halsall, Fred	Multimedia Communications	Prentice Hall	2003
2	Koegel Buford, John F	Multimedia Systems	Pearson Education	2003

NOTE:

*During Semester III UNIT –I, Unit –II, Unit – III, Unit –IV till Aligning and Distributing Objects

**During Semester IV in Unit –IV from Drawing and Editing Lines and Unit V

Semester : III & IV

Title : Multimedia and DTP Software--Practical I

Sub Code : SB11MDP1

Credits : 2

Lecture Hours: 45

LAB PROGRAMS

1. How to create business cards using pagemaker.
2. How to create a certificate using pagemaker
3. How to create a greeting Card using page maker
4. How to give Drop cap effect to the text
5. How to make a slam book
6. How to create a simple logo using pagemaker.
7. How to import a picture and give mask effect.
8. Create an object and give reflect and rotate effect.
9. Newspaper For Three Page And Insert Images
10. How to draw 2 or more objects in a same place and bring forward and backward using the arrange options.

Semester : V
Core : 5
Title : **Genetics and Evolution**
Sub Code : AS15C05
Credits : 4

Lecture Hours: 56

Objective:

To enable the students to understand the principles and mechanism of inheritance and to delve into the origin and diversity of organisms.

UNIT I

(12 Hrs)

Mendelian Principles- Monohybrid cross and Dihybrid cross, Interaction of genes- Supplementary genes, Complementary genes, Epistasis, Atavism, Linkage in Drosophila – Complete and Incomplete Linkage, Theories of linkage, factors affecting linkage; Crossing over- types of crossing over, mechanism of crossing over, Cytological basis of crossing over – Stern's experiment, Significance and factors affecting crossing over.

*Sex Linked Inheritance- Inheritance of eye colour in Drosophila; Inheritance of colour blindness and Haemophilia in man; Y linked inheritance- hypertrichosis, Sex limited inheritance

UNIT II

(11 Hrs)

Fine structure of a gene -Cistron, Recon, Muton, Operon Concept, Genetic Code. Gene mutation -Molecular basis- tautomerism, base analogues, Gene mutations-Spontaneous and induced mutations. Detection of mutation by CLB method. Chromosomal aberrations- Types Intrachromosomal aberrations: deficiencies, duplication, inversions, shifts & isochromosomes. Inter chromosomal aberrations: translocation. Ploidy – Euploidy, aneuploidy.

*Mutagens- physical and chemical

UNIT III

(11 Hrs)

Animal breeding, inbreeding, out breeding-heterosis / hybrid vigour, Eugenics Positive and Negative Eugenics; Euphenics and Euthenics; Inborn errors of metabolism Phenyl Ketonuria, Galactosemia, Genetic disorders in man – Klinefelter's syndrome, Turner's syndrome, Down's syndrome, Cri – du – chat, Inherited single gene disorder- Sickle cell anaemia, Cystic

fibrosis, Thalassaemia; Sex determination – Heterogametic male and Heterogametic female.
 Geneic balance theory of Bridges

*Gene Therapy.

UNIT IV

(11 Hrs)

Origin of life - Abiogenesis and Biogenesis. Concept of Oparin - Haldane, Miller-Urey Experiments, Pre-Darwanian, Lamarck, Darwin and Wallace and Post Darwanian. Concepts of variation, adaptation, struggle, fitness and natural selection-spontaneity of mutation and the evolutionary synthesis; Geological time scale - eras, periods and epochs, Major events in evolutionary timescale; Fossils –fossilization and its significance, Dating of fossils, Fossils in India; Mass extinction and its consequences,

*Evolution of Man- *Ramapithecus*, *Australopethicus*, Java man, Peking man, Neanderthal man, Cro- Magnon man and Modern man

UNIT V

(11 Hrs)

Population Genetics - Gene pool, gene frequency, Factors affecting Hardy-Weinberg Law, Isolating mechanisms and speciation; Micro, Macro and Mega evolution. Co-evolution, Modern Synthetic Theory of evolution.

Continental Drift – distribution of animals, Evolutionary significance, Genetic and speciation- Genetic variation in natural population, Phenotypic variation, Species concept – Modes of speciation – Allopatric, Sympatric, Parapatric, and Quantum Speciation.

* Origin of India and its Mega diversity

*Denotes self study

TEXT BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Verma, P.S and Agarwal,V.K	Genetics	S.Chand & Co	1995, 8 th Edn.
2	Verma,P.S and Agarwal,V.K	Concept of Evolution	S.Chand &Co	2002

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Dodson, E.O	Evolution: Process & Product	East West Press Co	1968
2	Gardner E.J.	Principles of Genetics	Wiley Eastern Pvt. Ltd	1972
3	Robert H.Tamarin	Principles of Genetics	Tata McGraw Hill	2002
4	Sinnott. E.W. Dunn. L.C and Dobzhansky. T.	Principles of Genetics	Tata McGraw Hill	1973. 4 th Edn.
5	Gangane, S. D.	Human Genetics	Churchill Livingstone	2000
6	Hall, B. K. and Hallgrimsson, B.	Evolution	Jones and Bartlett	2008, 4 th Edn.
7	Dobzansky, T.	Genetics and the origin of species	Oxford and IBH Co	1976
8	Savage, J.M.	Evolution	Amerind Publishing Co	1976

Semester : V
Core : 6
Title : **Biophysics, Biostatistics & Bioinformatics**
Sub Code : AS15C06
Credits : 4

Lecture Hours: 56

Objective:

Higher studies pave the way to research. Research is scientific and systematic search for information. It starts with conducting experiments for which concepts in Biophysics will be required, proceeds with analysis of data when statistical tools will be applicable and ends with presentation of report when knowledge of computers will come in handy. Hence this paper dealing with all the above three subjects is prescribed.

UNIT I: Biophysics (12 Hrs)

Light - components – its effect on living organisms – Vision, Pigmentation, Bioluminescence. Laws (First and Second law) of Thermodynamics - Living systems and Entropy changes – Free Energy - Living systems and Equilibrium State. Radioactivity : Isotopes – General properties of radioactive reactions – Alpha, Beta and Gamma radiation – Half-life, Unit of radioactivity.

*Uses of Radioactivity

UNIT II: Biophysics (11 Hrs)

PH meter: Digital, Analog - Colorimetry and Spectrophotometry : Principle, Instrument description and Application - Chromatography :Paper, Thin Layer chromatography, Ion exchange chromatography and Applications - Electrophoresis: Paper and Gel electrophoresis - Principle and Applications. Centrifuge - Basic Principle of Centrifugation, Instrumentation of Ultracentrifuge

* Colloids-description, types, properties and separation.

UNIT III: Biostatistics (11 Hrs)

Organization of Statistical investigation- object and scope - Data: Sources, primary and secondary methods of collection, tabulation - Types of variables: Continuous and discontinuous variables,

Qualitative and quantitative-variables. Diagrammatic representation: line, bar, pie, pictogram, cartogram – Graphic representation: Histogram, Frequency polygon, Frequency curve, Ogive Frequency distribution. (Direct Method)

* Frequency graphs.

UNIT IV: Biostatistics

(11 Hrs)

Arithmetic mean - Standard deviation - Standard error - Chi – square test - Students ‘t’ test - Regression – Correlation – ANOVA one way (Direct Method).

* Basics of Research Methodology.

UNIT V: Bioinformatics

(11 Hrs)

Introduction to bioinformatics - Databases: Protein databases (PDB) – DNA database, Comparison of sequences: pairwise and multiple alignments – popular search methods – FASTA, BLAST & CLUSTAL – GENBANK, EMBL. Molecular visualization tools : RasMol.

*Applications of Bioinformatics in the field of Biology; Medical Transcription.

* Denotes self study

TEXT BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Daniel, M	Basic Biophysics and Biologists	Wiley International, New Delhi	1992
2	Das, D	Biophysics and Biological Chemistry	Academic Publishers, Calcutta	1996
3	Mani K and Vijayaraj . N	Bioinformatics for Beginners	Kalaikathir Achchagam, Tamil Nadu	2002
4	Palanichamy S and M. Manoharan	Statistical methods for Biologists	Paramount Publications	2009
5	Pranab Kumar Banerjee	Introduction to Biostatistics	S. Chand Publishers	2011
6	Roy R N	A Textbook of Biophysics	Publisher, New Central Book Agency	2001

7	Snedecor, G.W. and W.G. Cochran	Statistical Methods	Oxford & IBH Publishing, New Delhi	2001
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REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Arthur. M. Lesk	Introduction to Bioinformatics	Oxford University Press	2003
2	Gupta S P	Statistical Methods	S. Chand & Sons	2008
3	Zar, J.H	Biostatistical analysis	Prentice Hall Inc., New Jersey, USA	1974

Semester : V
Core : 7
Title : **Biotechnology – I**
Sub Code : AS15C07
Credits : 4

Lecture Hours: 56

Objective:

Though Biotechnology has ancient roots, recent developments in genetic engineering has made this subject more attractive.

UNIT I (12 Hrs)

Definition and landmarks in the history of Biotechnology. Global impact of Biotechnology- Biotechnology in India - International Centre for Genetic Engineering and Biotechnology – Achievements of Biotechnology – Prevention of misuse of Biotechnology - Microorganisms important in Biotechnology.

*Major areas of Biotechnology.

UNIT II (11 Hrs)

Basics of genetic engineering (DNA Technology). Enzymes :Exonucleases, Endonucleases, Restriction enzymes, S1 nuclease, DNA Ligase, DNA Polymerase - Vectors : Plasmid vectors, Vectors based on the lambda Bacteriophage, Cosmids, M13 vectors, Expression vectors, Vectors for cloning and expression in Eukaryotic cells, Super vectors : YACs and BACs. plasmids, phage vectors, Insertion vector, Replacement vector, Cosmids and phasmids, High expression vector

*Genomic library

UNIT III (11 Hrs)

Technique of genetic engineering – cDNA library - Gene transfer - Bacterial Conjugation, Transformation, Transduction, Episomes, Plasmids, Microinjection, Electroporation, Microprojectile, Shotgun method, Ultrasonication, Liposome fusion, Microlaser - Application of the cloned genes in diagnosis of diseases through DNA probe, Prevention of diseases – Vaccines

for Polio virus, Hepatitis B virus, Rabies virus, Small pox virus, Malaria vaccines. Antenatal diagnosis. Monoclonal antibodies production and application.

*Polymerase chain reaction

UNIT IV

(11 Hrs)

DNA Finger printing, Methods of DNA profiling - Applications of DNA finger printing— Hurdles of DNA profiling — Satellite DNA,. Biosensors – Types of biosensors, Biochips - Principles of Biochips - Applications of biochips. Antisense RNA technology - Flavor,savor tomatoes

*Human genome project.

UNIT V

(11 Hrs)

Principles and techniques of animal tissue culture: Requirements for animal cell, tissue and organ culture – Cultivation of animal cell in bioreactor – Somatic cell culture, Organ culture – Insect culture, Production of commercial products from insect culture –.Transgenic Technology – Manipulation of reproduction in animals – In-vitro fertilization and gene transfer in Humans - Transgenic Fish, Sheep.

*Transgenic Mice

*Denotes self study

TEXT BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Ignachimuthu, S.	Basic Biotechnology	Tata McGraw Hill Publishing Company Ltd., New Delhi	1998
2	Dubey R.C.	A Text book of Biotechnology	S. Chand & Co., Ltd., New Delhi	2005
3	Kumaresan, V.	Biotechnology	Saras Publications, Nagercoil	2004
4	Bhatia, S.C.	Textbook of Biotechnology	Atlantic	2006

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Alexander, N. Glazer and Hiroshi Nikado	Microbial Biotechnology: Fundamentals of Applied Microbiology	Cambridge University Press	1995
2	Glick, B.R., Pasternak, J.J.	Molecular Biotechnology	ASM Publisher	2003
3	Jogdand, S.N.	Environmental Biotechnology	Himalaya Publishing House, Bombay	1995
4	Old, R.W. and Primrose, S.B.	Principles of Gene manipulation	Blackwell Scientific Publications	1994
5	Das, H.K.	Textbook of Biotechnology, Second Edition	Wiley-India Publications	2010
6	Sangita Malvee	Biotechnology-An Introduction	SBS Publishers and Distributors	2007
7	Prakash, M.	Textbook of Biotechnology	Sonali Publication	2009

Semester : V
Elective : 1
Title : **Pathology & Medical Laboratory Technology Paper I**
Sub Code : AS15E01
Credits : 4

Lecture Hours: 56

Objective:

To understand the role of medical laboratory technology in saving human lives and to utilize the methods used in the laboratories to help diagnose diseases.

UNIT I: Essential pre – requisites of a medical laboratory (12 Hrs)

Introduction, Scope of CLT, Collection of specimens-Collection of blood, Collection of CSF & other fluids, Urine collection. Use of preservatives. Anticoagulants. Maintenance of Laboratory records and preparation of reports. Cleaning, maintenance and care of glassware-Definitions of sterilization, disinfection, antiseptis. Classification of sterilization and disinfection. Different methods of sterilization: Heat, radiation, filtration, chemical methods. Selection of material for sterilization or disinfection. Different types of chemical agents used for disinfection. Disposal of specimens and infected materials, Safety precautions against infection by microbiological specimens.

* First aid treatment of superficial wounds, burns, scalds, chemical poisoning and electric shock etc.

UNIT II: Laboratory instruments (11 Hrs)

Method of measuring liquids and weighing solids, care of single pan balance, analytical balance, electrical and electronic balance. General laboratory equipments-Principle, use and maintenance of the following instruments / apparatus - centrifuge, cold centrifuge, homogenizer, desiccators, vortex mixer, magnetic stirrer, centrifuges , Albuminometer, Urinometer and Sahli's haemoglobinometer. Care and maintenance of microscopes , Methods of use of microscopes for the demonstration of wet films and dry preparations.

*Spectrophotometry.

UNIT III: Clinical haematology (11 Hrs)

Blood and its constituents, Collection of blood –capillary and venous blood collection, various anticoagulants and their uses, advantages and disadvantages, Total count of RBCs, WBC (with correction of NRBC), Eosinophils and platelets, Different types of haemocytometers, their ruling and uses. Micropipette methods and Bulk dilution technique, their advantages and disadvantages. Haemoglobin and Estimation of Haemoglobin – Principles, techniques, advantages and disadvantages of different methods. Normal and abnormal values. Haemoglobin estimation by Sahli's method. Abnormal Haemoglobin Method of identification of abnormal Haemoglobin. Sickling phenomenon. Hb-F and its demonstration. Erythrocyte Sedimentation Rate (ESR) (Wintrobe and Westergren method), Principles and different methods of determining ESR and PCV. Advantages and disadvantages of each method. Clinical significance of ESR and PCV, Normal values. Methods of determination of Red Cell Indices (MCV, MCH, MCHC and Colour Indices) and its significance. Absolute eosinophil count, LE cell preparation, Bleeding time, clotting time, clot retraction and clot lysis, tourniquet test

*Total RBC, WBC count and Differential count

UNIT IV: Blood grouping

(11 Hrs)

Principles of blood groups and antigen antibody reactions Blood groups – ABO system, Blood grouping & typing. Crossmatching .Blood transfusion – Indication, universal donor and recipient concept. Selection criteria of a blood donor. Transfusion reactions Anticoagulants – Classification, examples and uses. Testing the donor:Screening donor's blood for infectious agents - HIV, HCV, HBV, Trepanoma palladium, Plasmodium, HTLV. Compatibility test (Coombs test) and its significance, A – B – O Grouping : Tile method, Standard tube technique. Causes of false positive and false negative results, Sub – groups of A: differentiation of group A1 and A2 using lectines, HLA antigens and their significance

*Rhesus grouping techniques

UNIT V: Clinical Chemistry

(11 Hrs)

Glucose haemostasis – interpretation of blood and urine glucose level, Oral Glucose Tolerance Test (OGTT) and (GTT) curves, Diabetes mellitus, Fasting blood glucose levels and estimation of blood glucose, Plasma lipids and lipoprotein levels, Lipid profile, Blood urea estimation

*VDRL test – Kahn and flocculation test; Serum cholesterol estimation.

*Denotes self study

TEXT BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Kanai, L Mukherjee	Medical Laboratory Technology	Tata McGraw Hill Publishing Company Ltd., New Delhi	1998
2	Ramnicks Sood, M.D	Medical Laboratory Technology	Medical Publishers(P)Ltd	1985

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Arumugam.N	Microbiology (General & Applied)	Saras Publication	2000
2	Madhavan Kutty,K	Textbook of Medical Laboratory Technology	Medcen Poonthanam	1992
3	Mary Ellen Wedding, Sally A Toenjas	Medical Laboratory Procedures	Jaypee Brothers Medical Publishers	1992
4	Samuel, K.M	Notes on Clinical Lab Techniques	Published by M.K.Gopalan, Chrompet	1999
5	Sathish Gupte	Short Textbook of Medical Laboratory for Technicians	Jaypee Brothers, Medical Publishers	1998
6	Baker F.J. And Silverton R.E	Introduction to Medical Laboratory Technology	Hodder Education Publishers	1998

Semester : V
Elective : 2
Title : Sericulture I
Sub Code : AS15E02
Credits : 4

Lecture Hours: 56

Objectives:

In recent years the government of many developing countries has given added attention to the production of natural silk. It can be done by sericulture which offers many advantages such as

- Provides employment opportunities to the rural people and prevent their migration to the towns.
- Helps to earn much needed foreign currency.
- Provides raw materials for cottage as well as large scale textile industries
- No large investment is required

UNIT I

(12 Hrs)

Introduction to sericulture – History and present status, Definition, Economic importance of sericulture. Origin and history of Sericulture- spread of Sericulture to Europe, South Korea, Japan, India and other countries.

*Role of silk fibers amongst natural fibers

UNIT II

(11 Hrs)

Classification and Taxonomic characters: Phylum, class, order, family, genus and Species- Distribution and varieties of silkworms – Mulberry & non-mulberry – Tasar, Eri, Muga worms. Distribution and Races: Geographical distribution in the world and India and Exotic and indigenous races

*Integrated pest and disease management in Mulberry

UNIT III

(11 Hrs)

Egg: External and internal morphology and colour change. Larvae: Mouth parts, legs, prolegs, spiracles, eyes, claspers and integumentary hair and sexual markings. Pupa: Male and Female

Morphology and sexual dimorphism Adult : Mouth parts, antenna, wings, external genitalia. Digestive system : Alimentary canal and physiology of digestion. Silk glands : Structure, development and mechanism of silk synthesis. Circulatory system : Dorsal vessel, haemolymph and haemocytes. Reproductive system : Male and female systems, mechanism of egg development.

*Circadian rhythm and behavior in silk worm

UNIT IV

(11 Hrs)

Life cycle of *Bombyx mori* – Reproductive system, Morphology of egg, larva, pupa and adult life span and bionomics, circadian rhythm, and behavior and growth rate of *Bombyx mori*., Endocrine system : Endocrine glands in larva and pupa and synthesis of hormone. Hormonal control: on metamorphosis, diapause, silk synthesis and reproduction. Exocrine glands : Structure, morphology and secretion of exocrine glands

*Pheromone: sex attractants and their role in mating.

UNIT V

(11 Hrs)

Diseases of silkworms – Viral, bacterial, fungal, and protozoan diseases, pathogens –Flacherie, Grasserie, Muscardine, Pebrine. Causes of various diseases, precaution Measures, control of diseases – disinfection methods

* Disinfection and maintenance of hygiene during silkworm rearing

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Ganga, G and Sulochana Chetty	An Introduction to Sericulture	Oxford and IBH Publishing Co., Pvt., Ltd., New Delhi	1991
2	Venkata Narasiah	Sericulture in India	Ashesh Publishing House, New Delhi	2003
3	Dr. N. G. Djha and Dr.PriyanPanday	Silk Production	APH publishing Corporation, New Delhi	2004

Semester : V
Advance Learners Course : 1
Title : **Microbiology**
Sub Code : **AS14AC1**
Credits : 5 *

Objective:

Knowledge of different aspects of Microbiology has become crucial and indispensable to everyone in the society.

UNIT I

Introduction: History and scope of Microbiology; Classification and biology of virus, bacteria, fungi; Application of microbes in food, industry, genetic engineering, biotechnology, agriculture, environment, medicine, pollution.

UNIT II

Culture techniques: Sterilization techniques- physical and chemical agents in control. Nutrient requirements: types of microorganisms, growth factors. Culture media: types, collection of samples, methods of isolation, identification and maintenance of culture Culture media- Simple and Special nutritional media. Nutrient broth. Microbial growth: pattern, factors, measurement of growth-growth curve.

Unit III

Food Microbiology: Food spoilage-intrinsic and extrinsic factors; food preservation – filtration, low or high temperature, chemicals and radiation; food borne diseases- fermented food products – wine and beer. Botulism

Unit IV

Environmental Microbiology: Microbial Analysis of Water, Sanitary Test for Coliforms- Sewage Treatment, Bioremediation - Petroleum Prospecting and Formation of Oil Spills, Wastewater Treatment, Chemical Degradation, Heavy Metals – Indicator Microorganism in Polluted Water

Unit V

Medical Microbiology: Viral diseases Chickenpox, Measles, Influenza, Rubella, Yellow Fever, Rabies, Hepatitis, Poliomyelitis, Aids. Bacterial Diseases-Diphtheria, Tuberculosis, Pertussis, Leprosy, Gonorrhoea, Syphilis, Cholera and Salmonellosis. Fungal Diseases – Superficial, Cutaneous, Sub-Cutaneous, Systemic and Opportunistic Mycoses.

TEXT BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Dubey, R.C. and Maheswari, D.K.	A Text book of Microbiology	S. Chand and Company Ltd.,	2006
2	Sundara Rajan, S	College Microbiology – Vol. I to IV	Vardhana Publications, Bangalore	2002

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Alcamco, I.D.	Fundamentals of Microbiology	The Benjamin Cummings Publishing Co.,	1997, 5 th Edn.
2	Atlas, R.M.	Principles of Microbiology	Mosby-Year Book, Inc., Missouri.,	1995, 1 st Edn.
3	Barry L. Batzing	Microbiology-An Introduction	Wadsworth Group	2000, 1 st Edn.
4	Lansing M. Prescott, John P. Harley, Donald A. Klein.	Microbiology	McGraw Hill Companies	1999, 4 th Edn.
5	Mani, A., Selvaraj, A.M., Narayanan, L.M. and Arumugam, N.	Microbiology – General and Applied	Saras Publications	1999
6	Powar, C.B. and Daginawala, H.F.	General Microbiology	Himalaya Publishing House	2001

Semester : V
Advance Learners Course : 2
Paper : 2
Title : **Public Health and Hygiene**
Sub code : **AS14AC2**
Credits : 5 *

Objectives:

To train human resources in the science of public health, with a firm understanding of the determinants of health and the public health system in the country, the community context, the determinative influences of globalization, urbanization, global and national policies and a strong foundation in research methodology.

UNIT I

Determinants of health. Health indicators; Personal hygiene; Public health; health - Dynamics of disease transmission – host, agents, environment.

UNIT II

Concepts of Health and Disease. Nutrition and Health: Classification of foods – Nutritional deficiencies - Vitamin and Mineral deficiencies - Balanced diet - Nutritional requirements of special groups.

UNIT III

Environment and Health: Types of Pollution - Air Pollution, Water Pollution, Soil Pollution, Noise Pollution Radiation – effects; Solid waste and excreta disposal. Impact of pollutants on Health.

UNIT IV

Communicable Diseases: Measles, Cholera, Amoebiasis, Malaria, Filariasis, Japanese encephalitis, Swine flu, STD and AIDS. Non Communicable Diseases: Coronary Heart Disease. Hypertension Diabetes, Obesity, Stroke, Cancer.

UNIT V

Health Education: Health care services in India. Health planning in India. Health Programmes in India, WHO, Non-Governmental Voluntary Health organizations. First Aid and Nursing: Methods, Dressing, Care, Duties, Preparations

TEXT BOOKS

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Park and Park.	Text Book of Preventive and Social Medicine	Banarsidas Bhanot Publishers, Jabalpur	1995
2	Verma, S.	Medical Zoology	Rastogi Publications	1998

Semester	: VI
Core	: 8
Title	: Physiology & Endocrinology
Sub code	: AS15C08
Credits	: 5

Lecture Hours: 86

Objectives

Physiology is the fountain head of "Natural Sciences" as it deals with the functions of the body of organisms. The reactions are vehicles through chemical co – ordination of hormones – hence this combined subject on physiology and endocrinology is prescribed.

UNIT I:

(18 Hrs)

NUTRITION

Nutrition in animals, mechanisms of food intake in different animals, Neuronal and hormonal regulation of nutritional intake, hunger drive, thirst, Physiology of digestion and absorption; Metabolism of carbohydrates, proteins & lipids; vitamins. Obesity- causes and consequences, outline of hormonal involvement, Leptin: synthesis, secretion and its role in adipogenesis

*Balanced diet.

RESPIRATION

Types of respiration; Pulmonary ventilation, respiratory muscles, surfactants. Respiratory centers and periodic breathing; Regulation of respiration, Exchange & transport of gases; Respiratory Quotient and Bohr's effect, Chloride shift/Hamberger's phenomenon; Respiration in unusual environment – foetal and neonatal respiration, high altitude, diving; Metabolic rate : basal metabolic rate and its measurement

* Structure and functioning of respiratory pigments

UNIT II:

(17 Hrs)

CIRCULATION

Composition and Functions of blood; Types of heart - chambered heart, tubular heart, ampullar heart, lymph heart, neurogenic and myogenic heart, Cardiac Cycle; Cardiac rhythm; Cardiac

output; Pace makers and specialized conducting fibers; Origin of heart beat and its regulation; ECG and its principle; myocardial infarction, Blood pressure; Blood clotting; Circulatory shock, Circulatory arrest, Abnormal Heart Rhythm-Arrhythmia

*Human congenital heart diseases

EXCRETION

Classification of animals based on excretory products- ammonotelic, ureotelic, uricotelic; Vertebrate kidney, Structure of nephron, Physiology and regulation of urine formation; Hormonal regulation of urine formation, Regulation of water balance, electrolyte balance and acid-base balance. Dialysis, artificial kidney, kidney transplantation, kidney disorders.

* Osmoregulation in freshwater, marine and terrestrial animals.

UNIT III:

(17 Hrs)

NERVE PHYSIOLOGY

Structure of a neuron; types of neurons, Electrical and chemical transmission. Synaptic transmission of impulse, Modifications of synaptic transmission during fatigue, acidosis, alkalosis, hypoxia and drugs. Neuromuscular Junction: organization and properties of neuromuscular junction, neuromodulators, Neurotransmitters, EEG, MRI, memory, neural disorders in man – Alzheimer's, Parkinson's and meningitis, Multiple sclerosis.

* Autonomic nervous system.

UNIT IV:

(17 Hrs)

MUSCLE PHYSIOLOGY

Structure of a muscle; Comparative physiology of skeletal, smooth and cardiac muscles, Skeletal muscle- ultrastructure and molecular organization , Red and white muscles,. Mechanism of muscle contraction and relaxation. Energetics of muscle contraction. Effect of exercise on muscles. Catch muscle and fibrillar muscle, simple muscle twitch, latent and refractory periods, tetanus, tonus, fatigue, oxygen

debt.

* Chemistry of muscle proteins.

UNIT V:**(17 Hrs)****ENDOCRINOLOGY**

Endocrine glands-structure, Neuro-endocrine regulation of hormone action, Secretions and functions of– Pituitary, Thyroid, Pancreas, Adrenal & Gonadal hormones.

* Diabetes mellitus.

* Denotes self study

TEXT BOOKS

S.No.	Author	Title of the Book	Publisher	Year of Publication
1	Verma P.S., Agarwal V.K. and Tyagi, B.S	Animal Physiology	S. Chand & Co	1995
2	Berry,A.K	A Text book of Animal Physiology with related Biochemistry	Emkay Publications	1993
3	Sarada Subrahmanyam., Madhavan Kutty , K., & Singh H.D	Text Book of Human Physiology	S. Chand & Co	2012

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Lauralee Sherwood, Human	Physiology 6 th Edition	Thomson Brooks, United States	2007
2	Hoar. W.S	General and Comparative Physiology	Prentice – Hall of India Pvt., Ltd	1995
3	G.J.Tortora & B.Derrickson	Principles of Anatomy and Physiology	John Wiley and Sons, Inc	2009
4	Guyton, A.C	Text Book of Medical Physiology	Prism Books Pvt.Ltd	1996
5	Ganong, W.F	Review of Medical Physiology	McGraw Hill, New Delhi	2003
6	Prosser, C.L	Comparative Animal Physiology	W.B.Saunders Co	1978
7	Schmidt-Nielson K	Animal Physiology	Prentice Hall India Ltd	2002

8	Vander, A.J., Sherman, J.H. and Luciano D.S.	Human Physiology	Mac Graw Hill Publishing Co., New Delhi	1998
9	Withers P.C	Comparative animal physiology	Saunders College Publishing	1992

Semester : VI
Core : 9
Title : **Biotechnology II**
Sub code : AS15C09
Credits : 5

Lecture Hours: 71

Objective:

Biotechnology encompasses all aspects of human life and its applications must be studied in detail.

UNIT I (15 Hrs)

Fermentation Technology – Fermenter design and types - Culture of microorganisms: Solid, Semisolid, Batch culture, Continuous culture, Fed-batch culture – Metabolic pathways in microorganisms – microbial products: Primary metabolites - Amylases, Proteases, Ethanol, Citric acid and Lipases, Secondary metabolites - Penicillin, Tetracycline, Streptomycin, Vitamin B12

* Biogas production.

UNIT II (14 Hrs)

Applications of genetic engineering in industry - Alcoholic fermentation: Ethanol - Medicine: Insulin, Antibiotic production, Penicillin - Agriculture: Nitrogen fixation by symbiotic and non-symbiotic bacteria nodule formation, Cloning of nif genes

*Genomes and its applications to health.

Unit III (14 Hrs)

Source and production of commercially important enzymes – Cellulase, Amylase, Pectinase. Proteinases. Immobilization of enzymes and its applications - Applications of microbial enzymes – Biofertilizers – Mass cultivation of *Rhizobium*, *Azotobacter*, *Azolla*, *Azospirillum* - Biopesticides- Biological control of plant pathogens, insects pests and weeds. Genetic engineering of biocontrol agents.

*Benefits from Biofertilizers.

UNIT IV**(14 Hrs)**

Production of Single Cell Protein (SCP) - Advantages of producing microbial protein – Microorganisms used as SCP – Substrates used for the production of Bacterial, Algal. Fungal and Yeast biomass - Nutritional value of SCP - Genetic improvements of microbial cells. Cryobiology – methods for cryopreservation

*Mushroom culture

UNIT V**(14 Hrs)**

Bioremediation – *In-situ* and *Ex-situ* bioremediation – Factors affecting bioremediation – Use of genetically engineered bacterial strains – VAM fungi – Bioremediation of heavy metals, Xenobiotics, dyes - Microbial leaching: copper leaching - Biosafety – IPR – Patenting. Biowar, Bio Privacy, Plant Breeder right (PBR)

* Bacteriology of water and sewage.

* Denotes self study

TEXT BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Ignachimuthu, S.	Basic Biotechnology	Tata McGraw Hill Publishing Company Ltd., New Delhi	1998
2	Dubey R.C.	A Text Book of Biotechnology	S. Chand & Co., Ltd., New Delhi	2005
3	Kumaresan, V.	Biotechnology	Saras Publications, Nagercoil	2004
4	Bhatia, S.C.	Textbook of Biotechnology	Atlantic	2006

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Alexander, N. Glazer and Hiroshi Nikado	Microbial Biotechnology: Fundamentals of Applied Microbiology	Cambridge University Press	1995
2	Glick, B.R., Pasternak, J.J.	Molecular Biotechnology	ASM Publisher	2003
3	Jogdand, S.N.	Environmental Biotechnology	Himalaya Publishing House, Bombay	1995
4	Old, R.W. and Primrose, S.B.	Principles of Gene manipulation	Blackwell Scientific Publications	1994
5	Das, H.K.	Textbook of Biotechnology, Second Edition	Wiley-India Publications	2010
6	Sangita Malvee	Biotechnology-An Introduction	SBS Publishers and Distributors	2007
7	Prakash, M.	Textbook of Biotechnology	Sonali Publication	2009

Semester : VI
Core : 10
Title : **Human Genetics and Counselling**
Sub code : AS15C10
Credits : 5

Lecture Hours: 71

Objective:

To make the students understand the central and unifying position of genetics in biological services and to create awareness for a better community)

UNIT I

(15 Hrs)

Human chromosomes: Karyotyping, Idiogram – Chromosome classification & Nomenclature – Lyon’s hypothesis- Barr Body, Chromosomal study based on leukocyte culture – Banding Techniques – C, R, Q and G Banding - Uses of chromosomal analysis.

*Chromosomal Aberrations (Structural)

UNIT II

(14 Hrs)

Chromosomal Aberrations (Numerical) – Syndromes – Down’s, Turner’s, Klinefelter’s, Cat cry, Ulrich’s – Ploidy, Autosome linked genetic disease – Sickle cell anemia, Alkaptonuria, Phenylketonuria - Dermatoglyphics

*Sex linked genetic diseases: Hemophilia, Color blindness.

UNIT III

(14 Hrs)

Blood groups – ABO group. MN Group, Rh factor – Cancer: Oncogenes and oncogenicity – Population genetics – Gene pool, Panmixis - Hardy Weinberg Law – Definition and factors affecting equilibrium - Calculating gene frequencies in a population – Autosomal gene, Sex linked gene.

*Twins: Monozygotic, Dizygotic, Siamese twins

UNIT IV**(14 Hrs)**

Pedigree analysis – pedigree chart for hemophilia – problem solving in pedigree analysis,
 Genetic Counseling – marriage – consanguineous marriage – disputed parentage – child adoption:
 legal implication, procedure, and laws.

*Future of human genetics – Eugenics, Euthenics, Euphenics

UNIT V**(14 Hrs)**

Diagnosis of genetic diseases - ® - Thalassemia, Alkaptonuria, Phenylketonuria, Sickle cell
 anemia – Analysis of human genome – Blotting techniques – Southern, Northern, Western and
 Dot blotting – Prenatal diagnosis: Amniocentesis, Chronic villi sampling, Cordocentesis, and
 Scanning.

*Embryonic Stem Cell

* Denotes self study

TEXT BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Bhatnagar S M, Kothari Lopa M L.	Essentials of Human Genetics	Orient Longman (P) Ltd.,	1999 (Reprint 2004) 4th Edn.
2	Mandal S	Fundamentals of Human Genetics	New Central Book Agency	2002

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Lewin	Genes VIII	Pearson Prentice Hall International	1985
2	Monre. W. Stick Berger	Genetics	Eastern Economy	2003, 3 rd Edn.
3	Rickie Lewis	Human genetics – Concept and application	Tata Mc. Graw Hill	2011, 2 nd Edn.
4	Robert. H Tamarin	Principles of Genetics	Tata Mc. Graw Hill	2002

Semester : VI
Elective : 3
Title : Pathology & Medical Laboratory Technology Paper II
Sub code : AS15E03
Credits : 4

Lecture Hours: 71

Objective:

To understand the role of medical laboratory technology in saving precious human lives and also to know the methods used in the laboratories.

UNIT I: Gastric & liver function tests (14 Hrs)

Composition of normal gastric juice; Routine Gastric juice examination, Stimulation of gastric juice secretion. Collection of Gastric Juice. Tests for Gastric Function, Gastric Test meals, Tubeless Gastric Analysis, Basal Gastric Secretion, Augmented histamine test; Estimation of titratable free and total acidity and inference. Measurements of other Gastric Components, Malabsorption, Tests for malabsorption studies, Schilling test.

Functions of Liver, Fouchest test, Lugol's iodine test for bilirubin .Qualitative test for urine urobilinogen. Scheleringer's test for urine urobilin. Disease of the liver-Jaundice, acute and chronic hepatitis, Cirrhosis, Cholestasis etc.

* Estimation of glucose and urea

UNIT II: Urine Analysis (14 Hrs)

Collection of urine and its preservation, 24 hour urine collection for protein. Physical examination of urine. Chemical examination of urine- Heat and acetic acid test, Sulfosalicylic acid test. Microscopical examination of urine- Urine sediment preparation, Microscopic examination of organized and unorganized deposits and blood; Urine test for bile salts. Detection of protein in urine (Bence Jones protein test);Determination of specific gravity using urinometer. Urine Culture

* Urine composition, volume ,appearance, color, collection and preservation of urine for analysis

UNIT III: Faecal Examination**(14 Hrs)**

Collection and preservation, examination of faeces for color, mucus, consistency, ova, ameba, cysts, parasites, pus cells, RBC and crystals. Detection of occult blood in stool- Benezidine test, Guaiac test, Orthotolidine test. Microscopic examination of faeces for impaired digestion of food stuffs due to severe pancreatic disorder. Stool concentration methods- Sodium chloride and formaldehyde methods for concentration of parasites. Staining of faecal smears and blood films. Techniques for the measurements of the size of parasite eggs. Morphological characters of common parasitic protozoa. Examination of faeces for adult helminth worms. (*Ascaris lumbricoides*, *Enterobius vermicularis*, *Ancylostoma duodenalis*, *Trichuris trichura*).

* Examination of faeces for ova and cysts of *Entamoeba coli* – *E. histolytica*, *Giardia lamblia*, *Enterobius vermicularis*

UNIT IV: Microbiological Examination**(14 Hrs)**

Microscopic examination of bacteria smearing ; Hanging drop preparation and wet preparation. Staining *Corynebacterium diphtheriae*. Examination of sputum. Volume, Consistency, Appearance and color. Examination of throat swab. Collection and preparation of smears. Bacteriological examination of urine. VDRL – test. Brief biology and pathology of *Vibrio cholera*, *Corynebacterium diphtheriae*, *Mycobacterium tuberculosis*, *M. leprae*, *Treponema palladium*, *Salmonella typhi* and *Clostridium tetani*,

* Hanging drop preparation – gram's staining +ve and –ve ; Outline biology of fungi

UNIT V: Microorganisms and pathology**(15 Hrs)**

Collection of microbiological specimens and precautionary measures for investigation. Bacterial toxins and their effects Routine mycological methods. Laboratory diagnosis of mycotic infection. Superficial wounds and pathology of Poliomyelitis, Rhinovirus group, Influenza virus, Measles virus (Rubella), Meningitis virus, Serum hepatitis virus (HBV)

* Indigenous microbial flora of man- Its significance in health and diseases of man.

*Denotes self study

TEXT BOOKS:

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Kanai, L Mukherjee	Medical Laboratory Technology	Tata McGraw Hill Publishing Company Ltd., New Delhi	1998
2	Ramnicks Sood, M.D	Medical Laboratory Technology	Medical Publishers(P)Ltd	1985

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Arumugam.N	Microbiology(General & Applied)	Saras Publication	2000
2	Madhavan Kutty,K	Text Book of Medical Laboratory Technology	MedcenPoonthana m	1992
3	Mary Ellen Wedding, Sally A Toenjas	Medical Laboratory Procedures	Jaypee Brothers Medical Publishers	1992
4	Samuel, K.M	Notes on Clinical Lab Techniques	Published by M.K.Gopalan, Chrompet	1999
5	Sathish Gupte	Short Textbook of Medical Laboratory for Technicians	Jaypee Brothers, Medical Publishers	1998
6	Baker F.J. And Silverton R.E	Introduction to Medical Laboratory Technology	Hodder Education Publishers	1998

Semester : VI
Elective : 4
Title : Sericulture II
Sub code : AS15E04
Credits : 4

Lecture Hours: 71

Objectives:

In recent years the government of many developing countries has given added attention to the production of natural silk. It can be done by sericulture which offers many advantages such as,

- Provides employment opportunities to the rural people and prevent their migration to the towns.
- Helps to earn much needed foreign currency.
- Provides raw materials for cottage as well as large scale textile industries
- No large investment is required

UNIT I

(15 Hrs)

Moriculture – Definition and history of moriculture; Classification of Mulberry; Popular varieties in India; External features of mulberry plant – plant height, stem, leaves, inflorescence; Biochemical composition of mulberry leaves; Environmental conditions for mulberry cultivation – soil, climate, temperature, rainfall, humidity, sunshine.

*Non-mulberry sericulture and its relevance to social forestry

UNIT II:

(14 Hrs)

Mulberry cultivation: Preparation of land – methods of propagation - planting practices – methods of irrigation – manuring – mulching – inter-cultivation; Types of fertilizers - methods of application; Pruning ; Harvesting of leaves; Breeding for drought resistant mulberry; Storage of mulberry – Diseases and pests of mulberry – Control methods. *General account of common disease of mulberry plant

UNIT III**(14 Hrs)**

Rearing- rearing house and appliances, types of brushing and rearing, Seed (grainage); rearing by *chawki*/young worms and rearing of late aged worms, Shoot rearing-Care during rearing and cleaning, optimum feeding, bed cleaning, spacing Optimum environmental conditions and selection of ripe worms- mounting-process ripening- process of spinning- Identification of spinning larva; spinning; mounting and mounting density; types of mountages, their advantages and disadvantages; environmental requirements during spinning. harvesting- storage and transport

* Improved rearing methods for young stage and late stage silkworms

UNIT IV**(14 Hrs)**

Cocoon composition-Physical and Commercial characteristics of cocoons- defective cocoons and their pathology. Stiffling-Reeling appliances- Process of Reeling – Finishing and testing- By-Products of silk reeling and silk marketing-Economics of sericulture.

Selection of Coccons of silkworm for breeding based on various characters

UNIT V**(14 Hrs)**

Sericulture as cottage industry- Farm Management: Training of Farmers- subsidy and loan for farm development. Silkworm as a model animal for biotechnological studies- transgenic and gene expression studies.

*Sericulture marketing organization – cocoon market and silk exchange

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Ganga, G and Sulochana Chetty	An Introduction to Sericulture	Oxford and IBH Publishing Co., Pvt., Ltd., New Delhi	1991
2	Venkata Narasiah	Sericulture in India	Ashesh Publishing House, New Delhi	2003
3	Dr. N. G. Djha and Dr.Priyan Panday	Silk Production	APH publishing Corporation, New Delhi	2004

Semester : VI
Advance Learners Course : 3
Paper : 3
Title : Immunology
Sub code : AS14AC3
Credits : 5**

Objectives:

1. Immunology gives fundamental information on immune systems
2. It helps each and everyone to keep his own defense systems in a better working condition and to lead a disease free life
3. Application of immunology in the clinical field is remarkable.

UNIT I

History & Scope of Immunology, Types of Immunity- Innate, Acquired Cell Mediated Immunity. Humoral Mediated Immunity. Active & Passive Immunity. Vaccination.

UNIT II

Antigens – Structure And Types. Antibodies – Immunoglobulins Family of Proteins - Structure and Types of Antibodies. Interaction of Antibodies with Antigens. Functions of Antibodies. Agglutination, Precipitation, ELIZA, Blotting Techniques.

UNIT III

Lymphoid Organs – Primary, Secondary & Tertiary Lymphoid Organs. Cells of the Immune System – Lymphocytes (T&B Cells). Macrophage, Granulocyte, Natural Killer Cells. Cytokines, Lymphokines, Interleukins, Complement System

UNIT IV

Immune Response against disease – Life Cycle, Symptoms, Causative agent : Treatment, Malaria, AIDS, Hepatitis, Meadow Disease, Avian Flu. Immune response to tumor

UNIT V

Transplantations. Types Of Grafts, Graft Rejection, Immunosuppressive Drugs. Autoimmune Diseases – Addison’s disease, Rheumatoid Arthritis. Hypersensitivity – I, II, III & IV Stem Cell and Its Applications

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	P. Madhavee Latha	A Text Book of Immunology	S.Chand	2012
2	Dulsy Fatima and Arumugam N	Immunology	Saras Publications	2000
3	Kuby, J	Immunology	W.H. Freeman and Company, New York	1997
4	Roitt, I.M.	Essentials of Immunology	ELBS Editors, London	1998
5	Brown, F. and Chamock, R.A.	Vaccines 86 : New Approaches to Immunization	Lerner Colsspring Harbour Lab	1986

Semester : VI
Advance Learners Course : 4
Paper : 4
Title : **Applied Zoology**
Sub code : **AS14AC4**
Credits : **5****

Objectives:

To emphasis entrepreneurial potential and skills by incorporating applied topics in the field of Zoology

UNIT I

Parasites in Man : Protozoan Parasites – *Entamoeba histolytica*, *Giardia lamblia*, *Plasmodium*, *Trypanosoma gambiense*; Helminth Parasite – *Ancylostoma duodenale*, *Ascaris lumbricoides*, *Enterobius vermicularis*, *Wuchereria bancrofti*, *Taenia solium*; Host Parasite Relationship.

UNIT II

Beneficial Insects – **Apiculture** – Different Species; Social Organization; Equipment connected with bee keeping ; Newton hive; Bee products: Honey extraction – Bee wax and their uses; Diseases and enemies of bees. **Sericulture**: Different types of silkworms used in sericulture; Life history of *Bombyx mori*; Rearing; Silk extraction and reeling; Diseases of silkworm; Economic importance. Lac insect –biology and life cycle

UNIT III

Insect Pests – Salient features, Nature of destruction and control measures of the following - Pests of rice: Rice stem borer, Green rice leafhopper. Pests of Cotton: Cotton leaf hopper, Pink bollworms. Pests of coconut: Rhinoceros beetle, Black headed caterpillar. Pests of Sugarcane - Indian sugarcane leaf hopper, Sugarcane root borer, Sugarcane top shoot borer.

UNIT IV

Aquaculture: Kinds of aquaculture – Mono, Poly-extensive, Semi intensive, Intensive; Monosex sewage integrated fish farming (brief account). Culture of selected species – Major carps, oysters. Recent developments in aquaculture: Application of hormones – Spawning-Eye stalk ablation. Preservation and processing of fish, prawns, Chilling, Freezing, Freeze drying, Salting, Smoking, Canning (Briefly). Fish parasites and diseases (any3). Ornamental Fish Culture

UNIT V

Economic importance of birds and mammals. Different breeds of fowls – Selective breeding; Housing and rearing; Role of nutrition in egg laying; Common diseases. Indirect and direct value of mammals - Dairy, Sheep, and piggery farming; Novel methods of breeding livestock.

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Ahsan, J. and Sinha, S.P.	Handbook of Economic Zoology	S. Chand & Co., New Delhi	1985
2	Ayyar, T.V.T.M	Handbook of Economic Entomology for South India	Govt. Press. Madras	1963
3	Banerjee, G.C.	Poultry	Oxford and IBH Publishing Co., Pvt Ltd.	1992
4	Bardach, John E., Ryther, John, H. and McLamey William, O.	Aqua culture	John Wiley and Sons Inc., New Delhi	1972
5	Crofton, H.D.	Nematodes	Hutchinson University Library, London	1966
6	Chaterjee, K.D	Parasitology	Chaterjee Medical Publishers Calcutta	1982
7	Ganga, G. and Sulochana Chetty	An Introduction to Sericulture	Oxford and IBH Publishing Co., Pvt., Ltd.,	1991

Semester : V & VI
Title : Core Practical III
Sub code : AS15CP3
Credits : 5

Lecture Hours: 90

GENETICS AND STATISTICS

(25 Hrs)

1. Study of phenotypic characters of drosophila
2. Drosophila handling, culture and experimentation
3. Preparation and identification of salivary gland polytene chromosomes from drosophila/chironomous larvae
4. Blood group in man (ABO and Rh)
5. Observation of Barr body in human epithelia
6. Study of frequency of Mendelian traits in a population (tongue rolling and folding, use of hands – left, right)
7. Verification of Monohybrid and Dihybrid cross through chi-square test
8. Pedigree analysis
9. Measures of central tendency
10. Measures of dispersion
11. Correlation analysis,
12. Regression analysis
13. Student t-test

PHYSIOLOGY & ENDOCRINOLOGY, EVOLUTION & BIOTECHNOLOGY (25Hrs)

1. Qualitative analysis of excretory products – Ammonia, Urea, Uric acid
2. Kymograph - Instrument
3. Preparation of Haemin crystals
4. Preparation of blood smear
5. Endocrinology-Pituitary gland, Islets of Langerhans, thyroid, adrenal gland.
6. Homologous organs – Fore and Hind limb skeleton of vertebrates
7. Analogues organs-wings of butterfly, bird, bat.

8. Isolation and estimation of DNA & RNA.
9. Blotting techniques- observation and photographs.
10. Techniques of sterilization dry and wet.
11. Preparation of medium – nutrient agar, nutrient broth.
12. Antibiotic sensitivity
13. Distribution of microbes in soil, air and water.
14. Composition of blood
15. Determination of microbiological quality of milk using MBR test.
16. Visit to a clinical laboratory
17. Visit to a museum
18. Visit to a biotechnological industry – A report to be submitted.

SPOTTERS

(10 Hrs)

Spirulina; *Bacillus thuringiensis*- Biopesticide; Mushroom seed; Yeast; Antibiotic – Erythromycin/ Streptomycin; Azolla-Biofertilizer; Test kits – Typhoid kit, Syphilis kit, Agarose electrophoresis kit, Instruments used such as autoclave, air filter, centrifuge.

MEDICAL LABORATORY TECHNOLOGY

(30 Hrs)

1. RBC Total count
2. Haemoglobin estimation
3. Bleeding time
4. Clotting time
5. Differential count of WBC
6. Preparation of Haemin Crystals in human blood
7. Urine specific gravity
8. Urine albumin
9. Glucose in urine.
10. Motility of bacteria using hanging drop method
11. Gram's staining
12. Spotters - Entamoeba, malarial parasite, Pinworm (*Enterobius vermicularis*), hookworm, *Ascaris*, *Wuchereria bancrofti*; instruments used such as albuminometer, Hamocytometer, ESR

tube, Urinometer, Haemoglobinometer, Sphygmomanometer, glucometer, stethoscope, blood pressure monitor, heart rate monitor, Body Fat Analyzer Digital Monitor,

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Sinha J, Chatterjee A K, Chattopadhyay P	Advanced Zoology Practical	Arunabha Sen Books and Allied (P) Ltd	2011
2	Gupta S P	Statistical Methods	S. Chand & Sons	2008
3	Pranab Kumar Banerjee	Introduction to Biostatistics	S. Chand Publishers	2011
4	Kanai, L Mukherjee	Medical Laboratory Technology	Tata McGraw Hill Publishing Company Ltd., New Delhi	1998
5	Ramnicks Sood, M.D	Medical Laboratory Technology	Medical Publishers(P)Ltd	1985
6	Sathish Gupte	Short Textbook of Medical Laboratory for Technicians	Jaypee Brothers, Medical Publishers	1998

Semester : V & VI
Title : **Multimedia and DTP Software-Level II**
Sub Code : **SB11MD02**
Credits : 4

Lecture Hours : 43

Objective: To provide a thorough discussion of the fundamentals of Adobe Photoshop and provide knowledge of how to design web pages.

UNIT I (9 Hrs)

Introduction-Tools Descriptions-Rectangular Marquee Tool (M)-Move Tool (V)-Polygon Lasso Tool (L)-Magic Wand Tool (W)-Crop Tool (C)-Slice Tool (K)-Healing Brush Tool (J)-Brush Tool (B)-Clone Stamp Tool (S).

UNIT II (9 Hrs)

History Brush Tool (H)-Eraser Tool (E)-Gradient Tool (G)-Blur Tool (R)-Dodge Tool (O)-Path Selection Tool (A)-Horizontal Type Tool (T)-Pen Tool (P)-Rectangle Tool (U)-Notes Tool (N)-Eyedropper Tool (I)-Hand Tool (T)-Zoom Tool (Z).

UNIT III (9Hrs)

Working with Layers: Active Layer-Color Modes: RGB-Indexed Color. Hue/Saturation: Hue Saturation shifts entire ranges of color within the image-Color modes.

UNIT IV (8 Hrs)

Color Channels: Introduction-Image Types-Image Sizes and Pixels-blending modes-Using filters-Previewing filters-To apply a filter-To add a drop shadow to text-To convert a color photo to black-and-white-Converting images to Bitmap mode.

UNIT V (8 Hrs)

Designing web pages: Page design-Slices-Rollovers-Animations-Preparation in Adobe GoLive-Automating the workflow. Slicing web pages: Introduction-Slice types-To create a slice with the Slice tool-Bitmap images and vector graphics.

TEXT BOOKS: Course materials will be provided

REFERENCE BOOKS

S. No	Author	Title of book	Publisher	Year of Publication
1	Scott Kelby	The Adobe Photoshop CS5 Book for Digital Photographers	New Riders	2011
2	Deke McClelland	Adobe Photoshop CS5 one – on- one	Deke Press	2010
3	Ashok Banerji, Ananda Mohan Ghosh	Multimedia Technologies	Tata McGraw Hill	2010

Note

*During Semester V UNIT I, UNIT II till Horizontal Type Tool (T)

** During Semester VI in UNIT II from Pen Tool (P), UNIT III, IV & V

Semester : V & VI

Title : **Multimedia and DTP Software--Practical II**

Sub Code : SB11MDP2

Credits : 2

Lecture Hours : 45

ADOBE PHOTOSHOP

Import an image and then cut a particular part and move into another screen using rectangular marquee tool, move tool, polygon lasso tool and magic wand tool.

1. Import a damaged picture and modified into a perfect picture using clone stamp tool and healing brush tool.
2. Import two or more pictures and split that picture and make it a new picture.
3. Import a face and remove the unwanted scratches and make it a clarity using blur tool, dodge tool, hand tool and zoom tool.
4. Import a natural picture and insert your own quotes using horizontal type tool.
6. Modify a picture using some tools and prepare a note about your changes using notes tool.
7. Merge two or more pictures using the layer options.
8. Convert a black and white picture into a color picture using color modes and Hue / saturation options.
9. Convert a color photo into a black and white one.
10. Display a picture in paint and glass effects using filter options.
11. Create an image with multiple layers and give blending options.
12. Display a picture in texture and spherize effects using filter options.
13. Create a web page using slice tool and give link to it.

Note:

*During Semester V Program 1 to program 8

**During Semester VI Program 9 to program 13

Semester : IV
Allied : 1
Title : **Invertebrata and Chordata**
Subject Code : AS15A01
Credits : 4

Lecture Hours: 71

Objectives:

Study of natural sciences deals with gaining knowledge of things in nature. Hence, science students are offered allied paper in Zoology to fill up the lacunae in the study of natural sciences.

Outline classification of animal kingdom upto class level with two examples each. Type study under each phylum to deal with structure, organization and life cycle.

UNIT I (14 Hrs)

Phylum Protozoa - Structure and life cycle of Paramecium

Phylum Coelenterata Structure and life cycle of Hydra

UNIT II (14 Hrs)

Phylum Helminthes- Structure and life cycle of Tapeworm

Phylum Annelida- Structure and life cycle of Earthworm

UNIT III (14 Hrs)

Phylum Arthropoda- Structure and life cycle of Cockroach

Phylum Mollusca- Structure and life cycle of Pila

Phylum Echinodermata- Structure and life cycle of Starfish

UNIT IV (14 Hrs)

Phylum Chordata-Morphology and organ systems of Shark &Frog (Excluding endoskeleton)

UNIT V (15 Hrs)

Phylum Chordata - Morphology and organ systems of Pigeon & rabbit (excluding endoskeleton)

TEXT BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Jordon. E.L & Verma, P.S.	Invertebrate Zoology	S. Chand & Co., New Delhi	1993
2	Jordan. E.L and Verma. P.S.	Chordate Zoology	S. Chand & Co, New Delhi	1993

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Ekambaranatha Ayyar, M.	Outlines of Zoology	Viswanathan Publication	1992
2	Fatik Baran Mandal	Invertebrate Zoology Ist Edn	Eastern Economy Edition	2012
3	Kotpal R.L., Agarwal S.K and Ketarpal R.P.R	Modern Text Book of Zoology Invertebrates	Rastogi Publications	2011
4	Parker and Haswell	Text Book of Zoology, Vol-I (Invertebrata)	T.B.S Publishers and Distributors,	1964

Semester : IV
Allied : 2
Title : **General Principles in Zoology**
Subject Code : AS15A02
Credits : 4

Lecture Hours: 71

Objective:

To enable the students to explore the intricacies of cell architecture and their complex biochemical interactions. Venturing to capture and hold the students' interest on the basic principles and working of the human system.

UNIT I (14 Hrs)

Cell Biology & Genetics

Cell concept, Prokaryotic cells and Eukaryotic cell structure, Animal cell – Structure and functions of Plasma membrane, Golgi apparatus, Mitochondria, Nucleus, Cell division Mitosis, Mendel's Laws of inheritance

*Sex determination in man

UNIT II (14 Hrs)

Embryology

Gametogenesis – spermatogenesis and oogenesis, cleavage- Study of cleavage patterns. Radial and spiral cleavage- Early cleavage in frog- uncleaved egg, two cell stage, morula stage, Blastulation, Gastrulation in Frog

*Types of eggs- Study of different types of eggs- Classification based on amount and distribution of yolk.

UNIT III (14 Hrs)

Physiology: Nutrition in man – food types, Digestion and absorption of food in man,

*Balanced diet

UNIT IV**(14 Hrs)**

Endocrinology: Structure and function of pituitary, thyroid and reproductive glands – testes, ovary, placenta.

*Diabetes mellitus

UNIT V**(15 Hrs)**

Evolution: Origin of life. Evidences of evolution -Morphological, Anatomical, Embryological and Paleontological evidences. Theories on evolution by Lamarck, Charles Darwin & De Vries.

* Origin of India and its Mega diversity

TEXT BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Verma P.S., Agarwal., V.K.	Cytology Reprint Edition	S. Chand and Company	2012
2	Veer Bala Rastogi	Introduction to Cytology	Kedarnath Publishers	2003
3	Arumugam, N.	Cell Biology, Genetics, Embryology	S. Chand and Company	2012
4	Arumugam, N	Cell Biology, Genetics & Evolution Volume-3.	Saras Publication	1999
5	Prakash S Lohar	Endocrinology – Hormones & Human Health	MJP Publishers	2007
6	Parameswaran R.S., Viswanthan	Animal Physiology & Endocrinology	J.P. Printers & Publishers Pvt. Ltd	1975.

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Arumugam, N	Cell Biology & Molecular Biology	Saras Publications	2002
2	Berry, A.K.	A Text Book of Animal Physiology with related Biochemistry	Emkay Publications	1993
3	Sarada Subrahmanyam., Madhavan Kutty, K., & Singh H.D.	Text Book of Human Physiology, Reprint	S. Chand & Co,	2012

Semester	: III & IV
Title	: Allied Zoology Practical
Subject Code	: AS14AP1
Credits	: 2
Lecture Hours	: 60

Dissections: Demonstration Only (12 Hrs)

Cockroach: Mounting of Mouthparts, Digestive system, Nervous system, Reproductive system.

Fish: Ctenoid scales mount

Spotters (30 Hrs)

Paramecium – Entire, binary fission, conjugation

Leucosolenia

Hydra vulgaris – Entire

Taenia solium – Entire, T.S

Ascaris - male, female

Earth worm

Pila

Star fish

Amphioxus

Shark

Frog

Skeleton of frog- Skull, Vertebrae-Typical, VIII, IX, X, Girdles and Limbs

Calotes

Pigeon

Quill feather

Rabbit

Mitosis stages

Frog embryology

a) Egg

b) Sperm

- c) Blastula
- d) Gastrula

Field observations combined with photography and/or videography

- 1) Study of insect fauna in the college campus (4 Hrs)

Culture methods

- 1) Culture of unicellular organisms. (2 Hrs)

Models

(12 Hrs)

- 1) Animal Cell
- 2) Mitochondria
- 3) DNA
- 4) RNA
- 5) Chromosomes
- 6) Alimentary Canal of Man
- 7) Male Reproductive Tract
- 8) Female Reproductive Tract
- 9) Human Placenta
- 10) Protein Structure

Semester : III & IV
Paper : Job Oriented Course
Title : Vermiculture and Mushroom Culture
Subject Code : JOB0409

Lecture Hours: 40

Objective:

Vermicompost is a valuable fertilizer and edible mushrooms are a rich source of proteins. Simple cultivation methods, which can be practiced even at home, if the students are interested, can help them become entrepreneurs.

UNIT I

(6 Hrs)

Earthworm – A brief introduction. General morphology of earthworm – body structure, colour, anatomy, biology, reproduction. Three common species: *Eisenia foetida*, *Eudrilus eugeniae*, *Megascolex* (or *Lampito*) *mauritii*. Definitions of vermiculture, vermicompost, vermitechnology.

UNIT II

(6 Hrs)

Vermiculture and production of vermicompost: Vermicomposting materials – animal refuse, agricultural waste, forestry waste, kitchen waste, city refuse, industrial waste. Types of vermicomposting: small scale, large scale. Requirements: environmental-air, moisture, temperature. Setting up a vermiculture unit. Value addition of vermicompost.

UNIT III

(6 Hrs)

Vermicomposting schemes; maintenance of beds, harvesting worms and compost. Advantages of vermicomposting; vermitechnology - chemical composition of vermicompost; vermicompost as quality manure; Vermi wash. Uses of earthworms in animal feed industry – biochemical and biotechnological studies – Bioremediation through vermitechnology

UNIT IV

(6 Hrs)

Mushroom culture-importance of mushrooms; Edible and poisonous mushrooms; Morphology of edible mushrooms; Advantages of mushrooms: nutritive and medicinal values.

UNIT V**(6 Hrs)**

Steps in mushroom growing: selection of type, Methods of culture: Bed method, Polythene bag method; Production of culture: preparation of spawn, preparation of substrate, spawning, harvesting, storage-short term, long term, preservation and processing, marketing. Recipes of mushrooms – biriyani, cutlet, etc.

FIELD VISIT: To vermiculture and mushroom culture unit**(10 Hrs)****REFERENCE BOOKS**

S. No.	Author	Title of the Book	Publisher	Year of Publication
1	Tripathi G	Vermisource Technology	Discovery Publishing House	2003
2	Ismail S.A	Vermicology: The biology of Earthworm.	Orient Longman,	1997
3	Ranganathan L.S	Vermibiotechnology:– From Soil Health to Human Health	Agrobios India	2006
4	Gupta P.K	Vermicomposting for Sustainable Agriculture	Agrobios India	2008, 1 st Edn.
5	Sathe T.V	Vermiculture and Organic Farming	Daya Publishing House	2004