

KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)
COIMBATORE – 641 029

Course Name: **B.Sc., ZOOLOGY**

Curriculum and scheme of Examination under CBCS

(Applicable to students Admitted from the Academic Year 2014-2015 onwards)

Scheme of Examinations (With 4 Sem Language Papers)

Semester	Part	Subject Code	Title of the Paper	Instruction hours/cycle	Exam. Marks			Duration of Exam (hours)	Credits
					CIA	ESE	TOTAL		
I	I	13TML101	Language I@	6	25	75	100	3	3
	II	14ENG101	English –I	6	25	75	100	3	3
	III	13UZO101	Core 1-Non-Chordata	7	25	75	100	3	5
	III	12UZO1I1 13UBO1A1	Allied 1- Sericulture I / Botany I	5	20	55	75	3	4
			C.Pr. 1- Non Chordata and Chordata	2	-	-	-	-	-
			Allied Pr. 1. Sericulture	2	-	-	-	-	-
	IV	12EVS101	Environmental Studies**	2	-	50	50	3	2
II	I	13TML202	Language II@	6	25	75	100	3	3
	II	14ENG202	English –II	6	25	75	100	3	3
	III	12UZO202	Core 2–Chordata	7	25	75	100	3	5
	III	12UZO2I2 13UBO2A2	Allied 2- Sericulture II / Botany II	5	20	55	75	3	4
		12UZO2CL	C.Pr. 1- Non Chordata and Chordata (Based on core subjects I & II semesters)	2	40	60	100	3	2
		12UZO2IL 13UBO2AL	Allied Pr. 1. Sericulture / Botany	2	20	30	50	3	2
	IV	13VED201	Value Education- Moral and Ethics **	2	-	50	50	3	2
III	I	13TML303	Language III@	6	25	75	100	3	3
	II	14ENG303	English –III	6	25	75	100	3	3
	III	13UZO303	Core 3–Physiology	5	25	75	100	3	5
	III	14UBC 3A3	Allied 3- Biochemistry	5	20	55	75	3	4
			C.Pr. 2- Physiology and Cell Biology	2	-	-	-	-	-
			Allied Pr. 2. Biochemistry	2	-	-	-	-	-
	IV	14UGA3S1	Skill Based subject 1- General Awareness	2	25	75	100	3	3
IV	IV	13TBT301/ 13TAT301/ 12UHR3N1	Basic Tamil* / Advanced Tamil** (OR) Non-major elective- I**- Human rights	2	-	75	75	3	2

APPROVED BY THE ACADEMIC COUNCIL

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K. Karthi
HOD OF ZOOLOGY
KONGUNADU ARTS & SCIENCE COLLEGE
COIMBATORE - 641029

IV	I	13TML404	Language IV@	6	25	75	100	3	3
	II	14ENG404	English -IV	6	25	75	100	3	3
	III	13UZO404	Core 4- Cell Biology	5	25	75	100	3	5
	III	14UBC4A4	Allied 4- Biochemistry	5	20	55	75	3	4
		12UZO4CM	C.Pr. 2- Physiology and Cell Biology	2	40	60	100	3	2
		12UBC4AL	Allied Pr. 2. Biochemistry	2	20	30	50	3	2
	IV	12UZO4S2	Skill Based subject 2- Health education	2	25	75	100	3	3
	IV	13TBT402/ 13TAT402/ 12UWR4N2	Basic Tamil* / Advanced Tamil** (OR) Non-major elective- II**- Women's rights	2	-	75	75	3	2
V	III	12UZO505	Core 5- Genetics	5	25	75	100	3	4
	III	12UZO506	Core 6- Biotechnology-I	5	25	75	100	3	4
	III	12UZO507	Core 7- Ecology	5	25	75	100	3	4
	III	13UZO508 14UZO508	Core 8- Biostatistics and Computer applications	5	25	75	100	3	4
			C.Pr.3: based on CP 5,7,8,11,12	2	-	-	-	-	-
			C.Pr.4: Based on CP 6,9,10	2	-	-	-	-	-
	III	14UZO5E1	Major Elective -1	4	25	75	100	3	5
	IV	12UZO5S3 14UBC/UBT 14UBC-5x1	Skill Based subject-3 CET EDC -	2	25	75	100	3	3
		14UZO5IT	Internship						Grade
VI	III	12 UZO609	Core 9 - Microbiology and Immunology	4	25	75	100	3	4
	III	13 UZO610	Core 10 - Biotechnology- II	5	25	75	100	3	4
	III	12 UZO611	Core 11 - Developmental Biology	5	25	75	100	3	4
	III	14UZO612	Core 12 - Animal diversity	4	25	75	100	3	4
		14UZO 6CN	C.Pr.3: based on CP 5,7,8,11,12	2	40	60	100	3	2
		13UZO 6CO	C.Pr.4: based on CP 6,9,10	2	40	60	100	3	2
	III	14UZO6E2	Major Elective 2	3	25	75	100	3	5
	III	14UZO6Z1	Project	3	20	80	100	3	5
	IV	12UZO6S4	Skill Based subject-4 Commercial fish culture	2	25	75	100	3	3
	V	12NCC/NSS/ YRC/ PYE101	Extension Activities*	-	50	-	50	-	1
			Total	180		3800			140

@ Hindi/Malayalam/ French/ Sanskrit – 12HIN/MLM/FRN/SAN101 - 202

* - No End-of-Semester Examinations. Only Continuous Internal Assessment (CIA)

** - No Continuous Internal Assessment (CIA). Only End-of-Semester Examinations (ESE)

*** Project Report – 60 marks; Viva voce – 20 marks; Internal – 20 marks

**** The students shall undergo an internship training / field work for a minimum period of 2 weeks at the end of the fourth semester during summer vacation and submit the report in the fifth semester. The report will be evaluated for 100marks along with the internal viva voce by the respective faculty. According to their, the grades will be awarded as given below.

Marks %	Grade
85-100	O
70-84	D
60-69	A
50-59	B
40-49	C
□40	U (Reappear)

Major Elective Papers

(2 papers are to be chosen from the following 6 papers)

1. Economic Zoology

M.E.I

2. Pest & their Management

M.E.II

3. Vermitechnology

4. Wild life conservation & Management

5. Poultry science & management

6. Human genetics & Counselling

Non-Major Elective Papers

1. Human Rights

2. Women's Rights

~~EDC~~

EDC

Biology

Medicinal Botany & Human Welfare

Biochemistry

Diagnostic Biochemistry

Biotechnology

Molecular Diagnostics

Zoology

Ornamental Fishery Technology

Note: In core/ allied subjects, no. of papers both theory and practical are included wherever applicable. However, the total credits and marks for core/allied subjects remain the same as stated below

Tally Table:

S.No.	Part	Subject	Marks	Credits
1.	I	Language – Tamil/Hindi/Malayalam/ French/ Sanskrit	400	12
2.	II	English	400	12
3.	III	Core – Theory/Practical/Project	1700	65
		Allied	400	20
		Electives	200	10
4.	IV	Basic Tamil / Advanced Tamil (OR) Non-major elective	150	4
		Skill Based subject S.D.C -	3400 100	912 3
		Environmental Studies	50	2
		Value Education	50	2
5.	V	Extension Activities NCC/NSS/YRC/PYE	50	1
		Total	3800	140

Note:

- CBCS – Choice Based Credit system
- CIA – Continuous Internal Assessment
- ESE – End of Semester Examinations

25 % CIA is applicable to all theory subjects except JOC, COP and Diploma Courses, which are considered as extra credit courses.

I - SEMESTER

CORE PAPER 1 – NON-CHORDATA

TotalCredits:5

Total Hours: 105

Objectives

1. To make the students develop a comprehensive knowledge on the classification and characteristics of Non - Chordata.
2. To make the students understand the morphological and anatomical features of important non-chordate animals.
3. To make the students to know about the parasites (clinical and economic importance).

UNIT I

21Hrs

Phylum Protozoa: Classification and characters up to Classes with suitable examples.

Type study	:	Paramecium
General Topic	:	Parasitic protozoa

Phylum Porifera

Type study	:	Leucosolenia
General Topic	:	Canal system in sponges

UNIT II

21Hrs

Phylum Coelenterata: Classification and characters up to Classes with suitable examples.

Type Study	:	Obelia
General Topic	:	Coral reefs

Phylum Aschelminthes : Classification and characters up to Classes with suitable examples.

Type Study	:	Ascaris lumbricoides
General topic	:	Diseases caused, Symptoms and Control measures of parasitic Worms- Wuchereria bancrofti, Pin worms

UNIT III

21Hrs

Phylum Platy helminthes

Type study	:	Fasciola hepatica
General topic	:	Parasitic adaptations

Phylum Annelida: Classification and characters up to Classes with suitable examples.

Type Study	:	Leech
General topics	:	Metamerism in Annelids, Vermicompost production by earthworms

UNIT IV

21Hrs

Phylum Arthropoda: Classification and characters up to Classes with suitable examples.

Type study	:	Prawn (Penaeus sp)
General topic	:	Economical importance of Arthropodes

UNIT V

21Hrs

Phylum Mollusca: Classification and characters up to Classes with suitable examples.

Type study	:	Pila globosa
General topics	:	Torsion in Gastropods, Economic importance of mollusks

Phylum Echinodermata: Classification and characters up to Classes with suitable examples.

Type study	:	Star fish
General topic	:	Larval forms of Echinoderms

Text Books

1. A Manual of Zoology - M. Ekambaranatha Iyer & Ananthakrishnan Vol I Part I& II, 1989 –S.Viswanathan Printers & publication Ltd.
2. Modern Text Book of Zoology – Invertebrata. R L Kotpal(2008), Rostagi pub.Meerut.

Reference Books

1. Barnes RD (1980) Invertebrate Zoology, Saunders college, Philadelphia.
2. Borrardalle LA Potts Easthium LES & Saunders JJT (1963). The Invertebrates. Cambridge University Press.
3. Parker AJ & Haswell WA (1943) A Text Book of Zoology Vol I Mac-Millan
4. Dhami.P.S & Dhami J K. Invertebrate Zoology. S.Chand& Co., New Delhi (2009).
5. Kotpal RL. Agarwal S.K &Ketarpai RP (2008). Modern text book of Zoology – Invertebrates. Rastogi Publications, Meerut.

I - SEMESTER

Allied A.1. SERICULTURE – I

Total Credits: 4

Total Hours: 75

Objectives

1. Introduce to create a self employment opportunity among students of both genders.
2. To equip the skills of rearing of silkworms and harvesting of cocoons.
3. To aware better breeding and grainage techniques.

UNIT I

15Hrs

Introduction

Bombyx mori : Systematics, General organisation, lifecycle, Silk gland and silk formation. Origin and economic importance of sericulture industry. Mulberry and non-mulberry (Tasar, Eri & Muga) silk producing species, their distribution and food plants (Primary, Secondary & Tertiary).

UNIT II

15Hrs

Silkworm rearing

Selection, location and orientation of rearing houses. Environmental conditions essential for rearing - temperature, humidity, ventilation and light - methods for providing optimum conditions. Different methods of rearing, quality of leaf required for different stages. Cleaning, spacing and frequency of feeding. Mounting of worms. Harvesting of cocoons.

UNIT III

15Hrs

Silkworm pathology

Disinfection of rearing rooms and equipments - control and prevention of
a. Flacherie b. Muscardine c. Grasserie and d. Pebrine. Insects injurious to silkworm larva, pupa and cocoons.

UNIT IV

15Hrs

Silkworm Genetics

Genetic basis of variation in silkworm - multiple alleles in *Bombyx mori*, Sex-linked inheritance and mutation in *Bombyx mori*.

Breeding : Aims of silkworm breeding-Inbreeding and cross breeding - combining various qualities of races, maternal inheritance and its consideration in breeding.

Grainage techniques: various grainage techniques - selection of seed cocoons - emergence of moths - preparation and treatment of layings - refrigeration of over-wintered eggs.

Text book

1. A text book of sericulture .M.Madan Mohan Rao(2008) B.S publications,Hyderabad.
2. An introduction to sericulture.G. Ganga &Sulochanachetty(2006) Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.

Reference books

- 1.ComprehensiveSericulture–Vol2 Silkworm Rearing & Silk Reeling G. Ganga (2003) Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Mulberry Cultivation, Sericulture Manual-I Dr. G. Rangaswami, Dr. Manjeet S. Jolly, FAO, UN IBH Publishing Co. Pvt. Ltd. New Delhi. (1998)
3. Moriculture. Kamal Jaiswal, Sunil P. Trivedi, B.N. Pandey, R.K. Khatri , APH Publishing Corporation, Ansari Road, Daryakanj. New Delhi 2009.
4. Rearing of silkworm and silkworm diseases by Mysore Silk Association, Bangalore. (1987).

Part IV – I SEMESTER

ENVIRONMENTAL STUDIES

Total Credits: 2

Total Hours : 30

Objectives

1. To inculcate knowledge and create awareness about ecological and environmental concepts, issues and solutions to environmental problems.
2. To shape students into good “ecocitizens”, thereby catering to global environmental needs.

UNIT I MULTIDISCIPLINARY NATURE OF ENVIRONMENT 6 Hrs

- 1.1 Definition : scope and importance
- 1.2 Need for public awareness*
- 1.3 Natural resources
 - 1.3.1 Types of resources
Forest Resources – Water Resources – Mineral Resources – Food Resources – Energy Resources – Land Resources.

UNIT II ECOSYSTEMS 6 Hrs

- 2.1 Concept of an ecosystem
- 2.2 Structure and functions of an ecosystem
- 2.3 Producers, consumers and decomposers
- 2.4 Energy flow in the ecosystem
- 2.5 Ecological succession
- 2.6 Food chains, food web and ecological pyramids
- 2.7 **Structure and function of the following ecosystem***
Forest Ecosystem – Grassland Ecosystem – Desert Ecosystem – Aquatic Ecosystem.

UNIT III BIODIVERSITY AND ITS CONSERVATION 6 Hrs

- 3.1 Introduction – Definition – Genetic – Species and ecosystem diversity
- 3.2 Biogeographical classification of India
- 3.3 **Value of biodiversity***
- 3.4 Biodiversity at global, national and local levels
- 3.5 India as a mega – diversity Nation
- 3.6 Hot spot of biodiversity
- 3.7 Threats to biodiversity
- 3.8 Endangered and endemic species of India
- 3.9 Conservation of Biodiversity
insitu Conservation of Biodiversity – *exsitu* Conservation of Biodiversity

UNIT IV ENVIRONMENTAL POLLUTION

6 Hrs

- 4.1 Definition
- 4.2 Causes, effects and control measures of: Air Pollution – Water Pollution – Soil Pollution – Marine Pollution – Noise Pollution – Thermal Pollution – Nuclear Pollution.
- 4.3 Solid Waste Managements: causes, effects, control measures of urban and industrial wastes.
- 4.4 **Role of individual in prevention of pollution*.**
- 4.5 Pollution case studies – domestic waste water, effluent from paper mill and dyeing, cement pollution.
- 4.6 Disaster Management – Flood, Drought, Earthquake, Tsunami, Cyclone and Landslide.

UNIT V SOCIAL ISSUES AND THE ENVIRONMENT

6 Hrs

- 5.1 Sustainable Development
- 5.2 Urban problems related to energy
- 5.3 Water Conservation : Rain Water Harvesting and Watershed Management
- 5.4 Resettlement and rehabilitation of people, its problems and concerns, case studies – Narmatha Valley Project.
- 5.5 Environmental ethics, issues and possible solutions.
- 5.6 Climatic change, global warming, ozone layer depletion, acid rain, nuclear accidents and holocaust, case studies – Hiroshima and Nagasaki, Chernobyl.
- 5.7 Consumerism and waste products
- 5.8 Environmental Protection Act
- 5.9 Air Pollution Act (Prevention and Control)
- 5.10 Water Pollution Act (Prevention and Control)
- 5.11 Wild Life Protection Act
- 5.12 Forest Conservation Act
- 5.13 Issues involved in enforcement of environmental legislation
- 5.14 **Public awareness***
- 5.15 Human population and the environment
 - 5.15.1 Population Growth and Distribution
 - 5.15.2 **Population Explosion – Family Welfare Programme***
 - 5.15.3 Environment and Human Health
 - 5.15.4 **Human Rights***
 - 5.15.5 **Value Education***
 - 5.15.6 **HIV / AIDS***
 - 5.15.7 Women and Child Welfare
 - 5.15.8 **Role of Information Technology in Environment and Human Health*.**

*** Self Study (Questions may be asked from these topics also)**

Text Book

1. P.Arul, A Text Book of Environmental Studies, Environmental Agency, No 27, Nattar street, Velacherry main road, Velacheery, Chennai – 42, First Edition, Nov. 2004.

References

1. PurohitShammiAgarwal, A text Book of Environmental Sciences, Publisher Mrs. SaraswatiProhit, Student Edition, Behind Naswan Cinema Chopansi Road, Jodhpur.
2. Dr.Suresh and K.Dhameja, Environmental Sciences and Engineering, Publisher S.K.Kataria& Sons, 424/6, Guru Nanak Street, Vaisarak, Delhi – 110 006.
3. J.Glynn Henry and Gary W Heinke, Environmental Science and Engineering, Prentice Hall of India Private Ltd., New Delhi – 110 001.

*** Self Study (Questions may be asked from these portions also)**

Question Paper Pattern
(External only)

Duration: 3 hours

TotalMarks : 50

Answer all Questions (5 x 10 = 50 Marks)

Essay type, either or type questions from each unit.

II - SEMESTER

CORE PAPER 2 - CHORDATA

Total Credits: 5

Total Hours: 105

Objectives

1. To make the students develop a comprehensive knowledge on the classification and characteristics of major Chordata groups.
2. To make the students understand the morphological and anatomical features of important chordate animals.
3. To make the students appreciate general features, distribution and economic importance of Chordates.

Classification and characteristics. One type for each class to be studied in detail. All systems excepting endocrine system to be studied, with comparative account among the class.

UNIT I

21Hrs

Prochordata: Classification and characteristics up to Classes with suitable examples

Type study	:	Amphioxus
General topic	:	Salient features and affinities of Prochordata.

Pisces: Classification and characteristics: Chondrichthyes, Osteichthyes (Crossopterygii, Dipnoi, Actinopterygii-teleostei)

Type study	:	Shark
General topics	:	Fishes available in Indian waters and their Economic importance.

UNIT II

21Hrs

Amphibians: Classification and characteristics: (Labrynthodontia, Apoda, Urodela and Anura)

Type study	:	Frog
General topic	:	Parental care

UNIT III

21Hrs

Reptilia: Classification and characteristics: (Anapsida, Euryapsida, Parapsida, Synapsida, Diapsida, Rhynchocephalia, Squamata and Crocodilia)

Type study	:	Calotes
General topics	:	Poisonous and non-poisonous snakes, Poison apparatus and snake venom.

UNIT IV

21 Hrs

Aves: Classification and characteristics: (Archeornithes, Odontognathae, Palaognathae, Impennae and Neognathae)

Type study : Pigeon
General topic : Migration in Birds.

UNIT V

21Hrs

Mammals: Classification and characteristics: (Prototheria (Monotremata), Theria (Metatheria- Marsupalia) and Eutheria)

Type study : Rabbit
General topics : Dentition in Mammals (Rabbit & Human)
Ruminant stomach

Text Books

1. Thangamani, A. Prasannakumar, S. Narayanan, L.M. Arumugam. N CHORDATES 2009, Saras Publication
2. R.L.Kotpal - Text book of Zoology-VERTEBRATES.III Edn.2008-09 Rastogi Publication. Meerut.

Reference Books:

1. Nigam. H.C. Zoology of Chordates. 1972. 5th Edn. S.Nagin & Co. Publishers, Delhi.
2. EL Jordan & P.S Verma 1965. Chordate Zoology & Elements of Physiology. Preeti, Meerut.
3. J.Z. Young 1981, The life of the vertebrates. 3 Edition. Oxford University Press. Great Britan.
4. William N. McFarland et al., Vertebrate Life(1980). Macmillan Publishing Co., Inc., New York.
5. Talwar, P.K., Jhingran, A.G. Inland fishes.1991. Vol.2. Oxford & IBH publishing Co.Pvt.Ltd. New Delhi.

II - SEMESTER

Allied A-2 - SERICULTURE -II

Total Credits: 4

Total Hours: 75

Objectives

1. To do Sericulture and Moriculture is essential to provide feed to silkworms.
2. To develop skills about quality and processing of cocoons.
3. To aware of reeling and byproducts of reeling for other industrial development.

UNIT I

15Hrs

Moriculture: Distribution of varieties of mulberry - Climatic and other conditions for its growth - selection of land for cultivation. Different methods of cultivation - sexual and vegetative methods - merits and demerits.

UNIT II

15Hrs

Weeds and weeding - pruning methods - dormancy in mulberry - manuring. Insects injurious to the mulberry gardens - bacterial and fungal diseases of mulberry.

UNIT III

15Hrs

Silk reeling: Origin and importance of reeling industry. Selection of Raw material (cocoons). Importance of quality of cocoons - physical and commercial characteristics of cocoons - defective cocoons. Cocoons testing and classification- price fixation of raw materials.

UNIT IV

15Hrs

Processing of raw materials: Stiffling and condition of cocoons - storage - sorting - riddling of cocoons. Boiling of cocoons - Different methods - Brushing of cocoons - Reeling techniques: Reeling equipments. Comparative study of various equipments - Charka ,cottage basins, multi end basins - automatic reeling machines.

UNIT V

15Hrs

Importance of water in reeling. Raw silk examination - Lacing and skeining - Byproducts of reeling. Filature management: Layout of a filature - sections of a modern filature

Text books

1. A text book of sericulture. M.Madan Mohan Rao (2008) B.S publications Hyderabad.
2. An introduction to sericulture. G. Ganga & Sulochanachetty (2006) Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.

Reference books

1. ~~Comprehensive Sericulture~~ Vol.2 Silkworm Rearing & Silk Reeling G. Ganga (2003) Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Mulberry Cultivation, Sericulture Manual-I Dr. G. Rangaswami, Dr. Manjeet S. Jolly, FAO, UN IBH Publishing Co. Pvt. Ltd. New Delhi. (1998)
3. Moriculture. Kamal Jaiswal, Sunil P. Trivedi, B.N. Pandey, R.K. Khatri , APH Publishing Corporation, Ansari Road, Daryakanj. New Delhi 2009.
4. Rearing of silkworm and silkworm diseases by Mysore Silk Association, Bangalore (1987).

II - SEMESTER

CORE PRACTICAL – I – NON CHORDATA & CHORDATA

Total Credits: 2

Non-Chordata

Dissection: Cockroach - Digestive system, Nervous system & Reproductive system.

Mountings: Cockroach - Mouth parts & Salivary gland

Chordata

Dissections - Bony Fish - Digestive system

Frog or Rat - Digestive system, Arterial system,
Venous system, Urinogenital system,

} Virtual
laboratory approach only

Mountings: Bony Fish - Brain

Shark - Placoid scale

Spotters

Classify giving reasons: Euglena, Sponge, Obelia, sycon,

Leech, Chiton, Sea cucumber, Balanoglossus, teleost fish, non-poisonous snake, poisonous snake and Bat.

Draw labeled sketches

T.S. of Ascaris, T.S. of Nereis. T.S. of Planaria, T.S. through pharynx of Amphioxus. Skull and Vertebrae of Frog.

Relate Structure & Function

Gemmule, Nereis parapodium. Book lung of Scorpion, Cycloid, Placoid and Ctenoid scales, Quill feather and Carapace.

Write descriptive notes

Chaetopterus, Larval forms of Echinoderms (Bipinnaria, Auricularia only) Pectoral and Pelvic girdles of frog, Limb skeleton of frog.

Biological Significance

Peripatus, Limulus, Scorpion, Ammocoetus larva, Axolotl larva and Ambystoma

MODEL QUESTION PAPER FOR CORE PRACTICAL I

CIA PRACTICAL EXAM

Model Practical Exam	=	25 Marks
Observation Note	=	10 Marks
Attendance	=	5 Marks
Total	=	40 Marks

END OF SEMESTER EXAMINATION

Time-3Hours

Max Marks-60

Question1 Dissect and display-----a-----system of Cockroach or Bony fish.
(20 Marks)

Question2 Mount the -----of Cockroach or Bony fish or Shark on a glass slide
(10 Marks)

Question3 Virtual laboratory approach: Identify, draw a neat labeled sketch and write notes on the system of frog or rat displayed in the computer.
(05 Marks)

Question4 Identify and comment on the spotters A,B,C,D and E as directed.
(5x3=15 Marks)

- A – Classify and giving reasons (notes only).
- B – Draw labeled sketch (labeled diagram only).
- C – Relate structure and function (notes only).
- D – Write descriptive notes (notes only).
- E – Biological significance (notes only).

Question5 Record (10 Marks)

II - SEMESTER

Allied -A PRACTICAL -I (SERICULTURE)

Total Credits: 2

I. Moriculture:

1. Mulberry garden preparation & Maintenance
2. Preparation of Mulberry cuttings.
3. Pests & diseases of Mulberry Plant.

II. Silkworm rearing:

4. Silk worm: Life cycle.
5. Rearing house
6. Rearing equipments.
7. Pests and diseases of silkworms.

III. Eggs & Cocoons:

8. Treatment of eggs.
9. Cooking & Reeling.
10. Estimation of renditta
11. Estimation of denier.
12. Estimation of shell ratio.

IV. Field Visit/ Study Tour

MODEL QUESTION PAPER FOR ALLIED PRACTICAL I

CIA PRACTICAL EXAM

Model Practical Exam	=	10Marks
Observation Note	=	5Marks
Attendance	=	5Marks
Total	=	20 Marks

END OF SEMESTER EXAMINATION

Time = 3 hrs

MaxMarks = 30

I – Determine _____ of Cocoon characters.	10 Marks
II – Determine _____ of Cocoon characters	6 Marks
III – Spotters – Identify and comment on A,B & C (3x3)	9 Marks
IV - Submission of Record	5 Marks

PART IV – II SEMESTER

VALUE EDUCATION – MORAL AND ETHICS

(2012-13 onwards)

Total Credits : 2

Total Hours : 30

Objectives

1. To inculcate knowledge about the spiritual values among students.
2. To preserve and disseminate our moral and ethical values to the future generation.

UNIT I	The Heart of Education	6 Hrs
UNIT II	The Value of Body and Life – Energy The Marvelous Nature of Mind	6 Hrs
UNIT III	Analysis of Thoughts Benefits of Blessings	6 Hrs
UNIT IV	Moralisation of Desire Neutralisation of Anger	6 Hrs
UNIT V	Eradication of Worry* Harmonious Relationships	6 Hrs

Prescribed Text Book:

Value Education for Health, Happiness and Harmony compiled by Brain Trust,
Aliyar, The World Community Service Centre, Vethathiri Publications, Erode.

*** Self Study (Questions may be asked from these topics also)**

Question Paper Pattern

(External only)

Duration: 3 hours

Total Marks : 50

Answer all Questions (5 x 10 = 50 Marks)

Essay type, either or type questions from each unit.

III - SEMESTER

CORE PAPER -3 - PHYSIOLOGY

Total Credits: 5

Total Hours: 75

Objectives

1. To know the functioning of the living system.
2. To understand in physical and chemical terms, the mechanisms that operate in living organisms.
3. To create awareness about the importance of nutrition and diseases.

UNIT I Nutrition and Respiration

15Hrs

Nutrition : Types of nutrition, feeding mechanisms, Digestion - extra cellular and intracellular. Metabolism of carbohydrates, fats and protein. Vitamins and minerals.

Respiration : Types of respiration, respiratory pigments, transport of gases, Bohr's effect, chloride shift.

UNIT II Circulation and Excretion

15Hrs

Circulation : Types of heart, pacemaker, neurogenic and myogenic hearts. Blood and its composition, blood clotting. Lymphatic system and its functions.

Excretion : Ammonotelism, Ureotelism and Uricotelism. Mammalian nephron, urine formation, hormonal control of renal function. Osmoregulation in freshwater, marine and terrestrial animals.

UNIT III Nerve Physiology

15Hrs

Types of nerves, myelinated and non-myelinated nerve fibres, synapse. Origin and conduction of nerve impulse; interneuronal transmission, neuromuscular junction, neurotransmitters and reflex action.

UNIT IV Muscle Physiology

15Hrs

Structure of muscle, properties of muscle proteins, isotonic, isometric contractions - chemistry of muscle contraction - Physiology of muscle contraction, theories of muscle contraction.

UNIT V Endocrinology

15Hrs

Structure and functions of endocrine glands - Pituitary, Thyroid, parathyroid, islets of Langerhans, adrenals, testis, ovary, pineal and thymus. Role of hormones in regulation of metabolism.

Text Books

1. Animal Physiology P.S.Verma, V.K.Agarwal (2009) S.Chand & Company Ltd., New Delhi.
2. A Text Book of Physiology. R.Parameswaran, S.Viswanathan(1993) (Printers & Publishers Pvt. Ltd.

Reference Books

1. Hoar, W.S., (1975) General and comparative Physiology, Prentice - Hall of India, Pvt., New Delhi.
2. Prosser CL and Brown Fo Comparative Animal Physiology Second Edition. WB Saunders Co Philadelphia, Toppa Co Tokyo Japan (1961).
3. Best CH & Taylor NB(1985) Physiology basis of medical practice. The Wilkins Company Baltimore.
4. Bentley PJ (1998) comparative vertebrate endocrinology Cambridge University Press UK (S.Chand & Co.)
5. Gorbman A and Bern HAA.(1983) Text book of comparative endocrinology wiley western Pvt. Ltd ., USA.
6. Schmit - Nelson.K.(1997) Animal Physiology Adaptation and environment Cambridge Univ. Press.

Handwritten notes:
 2007, Printed
 2nd ed. 1/12
 11. 10/10

PART IV – III SEMESTER

Skill Based Subject 1 – GENERAL AWARENESS (ONLINE)

Total Credits: 3

Total Hours : 30

Objectives

1. To acquire knowledge in relation to various competitive examinations.
2. To create awareness about an online examination which is being followed in competitive examinations.

UNIT I

6 Hrs

1. Tamil and other Literatures

Tamil, English, Christian and Muslim Literatures – Ancient Literature – Bakthi Literature – Epics – Medieval Literature – Modern Literature (Novel, Dramas, Short Stories, Modern Poetry).

2. Economics and Commerce

Basic Economics – Auditing – Management – Capital Market – Foreign Trade – Companies – Banking.

3. Social studies

Indian History – Inventions – Indian Poetry – Constitution – Judiciary – Languages – Literacy – Indian Geography – Lithosphere – Climate – Soil – Agriculture – Population.

UNIT II

6 Hrs

4. Numerical Aptitude

Objective Arithmetic : Number systems – probability – **HCF and LCM of numbers*** – decimal fractions – simplification – squareroots and cuberoots – average – percentage – profit and loss – ratio and proportion – time and work – simple interest – area, **volume and surface area***.

5. Verbal Aptitude

Spot the odd one out – correct form of verb – preposition – find out the rightly spelt word – choose the correct meaning of idioms – synonyms and antonyms.

6. Abstract Reasoning

Logic Reasoning : Logic – statement – arguments – statement assumptions – Statement course of action – theme detection – deriving conclusion from passages.

Non – verbal Reasoning : Series – analogy – classification – analytical reasoning – mirror images – water images – paper folding – paper cutting – rule detection – grouping of identical figures.

UNIT III

6 Hrs

7. General Science and Technology

SCIENCE - Basic principles and concepts in Physics, Chemistry, Botany and Zoology.

TECHNOLOGY - Metallurgy, instrumentation, discoveries and inventions of techniques.

8. Computer Science

Historical evolution of computers – Computer applications – Data processing concepts – Computer codes and arithmetic – Hardware components – Data Structures.

9. Education

Development process of the learner – Principles of development (physical, social, emotional and intellectual) – Learning process – Teaching and teacher behaviour – Interaction analysis – Microteaching – Teacher as a leader – Motivation – Personality dimension – concept of mental health – Counselling.

UNIT IV

6 Hrs

10. Library and Information Science

Library and Information Science – Basics, Computer, Library Network and others like Research, Reprography etc.

11. Sports and Games

Athletics – Track Events – Field Events – Games – Indoor Games – Outdoor Games – General knowledge – Sport and Olympics – First Aid.

12. Current Affairs

State, Central and International affairs: Budgets – Politics – Sports – Education – Commerce and Industry – Inventions – Science and Technology – Currency – Agriculture – Movies – Guinness records – Awards – IT Industry – Space Research – Defence etc.

UNIT V

6 Hrs

13. National Cadet Corps (NCC)

Introduction to the Armed Forces (Army, Navy, Air Force) – Drill – Weapon Training – Map Reading – Civil Defence.

14. National Service Scheme (NSS)

History of NSS – History of Motto, Symbol, Badge – Aims and Objectives – Duties and Total Hours – Organisational and Administrative setup – History of voluntary organization – Regular activities – Special camp activities – Special programmes – awards – Important days.

15. Youth Red Cross (YRC)

History of International Red Cross – History of Indian Red Cross – History of Youth Red Cross – Main objectives of YRC – Emblem – Fundamental principles of Red Cross – Organizational Setup – Activities of Youth Red Cross – Role of different functionaries – Training programmes for YRC Program Officers – Training programme for YRC Volunteers – YRC Song – Working Hours – General orientation – Special orientation – Program skill learning.

*** Self Study (Questions may be asked from these topics also)**

Text Book

1. VBC 1 – General Awareness, Question Bank, Kongunadu Arts and Science College, Coimbatore – 29, 2006.
-

Question Paper Pattern

Max. Marks 100

End of Semester Examination (ESE)- On-Line Examination **75 Marks**

1. 150 questions are to be given. Each question carries ½ mark.
2. In each unit, 30 questions are to be given, covering all the 5 units.

Continuous Internal Assessment (CIA) (through On-Line) **25 Marks**

- | | |
|-----------------|----------|
| a) Two Exams. | 15 Marks |
| b) Assignment** | 5 Marks |
| c) Attendance | 5 Marks |

** Each student has to submit an assignment in the topic Current Affairs area.

Part IV – III Semester

Non- Major Elective - I “Human Rights”

Total Credits: 2

Total Hours :30

Objectives

1. To impart knowledge of human values, ethics and human rights to the students.
2. To reinforce positive personality traits and enhance physical, mental, social ethical and spiritual well-being of the students.

**UNIT I Concept of Human Values, Value Education towards
Personal Development 6 Hrs**

Aim of education and value education; Evolution of value-oriented education; Concept of human values; types of values; Components of value education.

Personal Development:

Self-analysis and introspection; sensitization towards gender equality, physically-challenged, intellectually-challenged. Respect to - age, experience, maturity, family members, neighbours, co-workers.

Character Formation towards Positive Personality:

Truthfulness, Constructivity, Sacrifice, Sincerity, Self-Control, Altruism, Tolerance, Scientific vision.

**UNIT II Value Education towards National and Global Development
National and International Values 6 Hrs**

Constitutional or national values - Democracy, socialism, secularism, equality, justice, liberty, freedom and fraternity.

Social Values - Pity and probity, self-control, universal brotherhood.

Professional Values - Knowledge thirst, sincerity in profession, regularity, punctuality and faith.

Religious Values - Tolerance, wisdom, character*.

Aesthetic Values - Love and appreciation of literature and fine arts and respect for the same.

National Integration and international understanding.

UNIT III Impact of Global Development on Ethics and Values 6 Hrs

Conflict of cross-cultural influences, mass media, cross-border education, materialistic values, professional challenges and compromise.

Modern challenges of adolescent emotions and behaviour; sex and spirituality: comparison and competition; positive and negative thoughts.

Adolescent emotions, arrogance, anger, sexual instability, selfishness, defiance.

UNIT IV Therapeutic Measures

6 Hrs

Control of the mind through

- a. Simplified physical exercise
- b. Meditation – objectives, types, effect on body, mind and soul
- c. Yoga – objectives, types, Asanas
- d. **Activities:***
 - (i) Moralisation of Desires
 - (ii) Neutralisation of Anger
 - (iii) Eradication of Worries
 - (iv) Benefits of Blessings

UNIT V Human Rights

6 Hrs

1. Concept of Human Rights -- Indian and International Perspectives
 - a. Evolution of Human Rights
 - b. Definitions under Indian and International documents
2. Broad classification of Human Rights and Relevant Constitutional Provisions.
 - a. Right to Life, Liberty and Dignity
 - b. Right to Equality
 - c. Right against Exploitation
 - d. Cultural and Educational Rights
 - e. Economic Rights
 - f. Political Rights
 - g. Social Rights
 - h. Rights to Information
3. Human Rights of Women and Children
 - a. Social Practice and Constitutional Safeguards
 - (i) Female Foeticide and Infanticide
 - (ii) Physical assault and harassment
 - (iii) Domestic violence
 - (iv) Conditions of working women
4. Institutions for Implementation
 - a. Human Rights Commission
 - b. Judiciary
5. Violations and Redressal
 - a. Violation by State
 - b. Violation by Individuals
 - c. Nuclear weapons and terrorism
 - d. Safeguards

*** Self-study(Questions may be asked from these topics also)**

Prescribed Book : Human Rights, Compiled by Bharathiar University, Coimbatore - 46

IV - SEMESTER

CORE PAPER – 4 - CELL BIOLOGY**Total Credits: 5****Total Hours: 75****Objectives**

1. Cell biology helps to study cytological characteristics.
2. Cell biology provides to produce vaccines, monoclonal antibodies.
3. Cell biology is the platform for the emergency of different fields like genetic engineering, cell culture, biotechnology and molecular biology.

UNIT-I**15Hrs**

Microscopy: Compound and Electron Microscopes, Microtome-Stains-Nuclear and cytoplasmic stains and staining techniques. Introduction to cell and cell types. Structure of Prokaryotes and Eukaryotes.

UNIT – II**15Hrs**

Structure and function of plasma membrane, Lysosomes, Golgi bodies and Ribosomes.

UNIT – III**15Hrs**

Structure, function and origin of Endoplasmic reticulum, Mitochondria and Nucleus.

UNIT-IV**15Hrs**

Chromosome types, organization, polytene and lampbrush chromosomes, Structure and functions of centrosomes. Mitosis and meiosis, significance of crossing over spindle fibres - structure and functions.

UNIT – V**15Hrs**

Nucleic acids - Structure of DNA and RNA

DNA replication - protein synthesis - Cell aging and study of cancer cells.

Text Books

1. Text book of cytology- P.S.Verma and V.K.Agarwal, (1999) S.Chand& Company (Pvt.) Ltd, New Delhi.
2. Cell Biology - N.Arumugam 6th revised edition(2007) - Saras Publications, Gomee, Shanmugapuram, Kanyakumari.

Reference Books

1. Cell & Molecular Biology S.C.Rastogi, (2003) 2nd Edition, New Age International (P) Limited, Publishers, New Delhi.
2. Cell Biology, E.J.Ambrose, Dorothy.M.Easty(1970) Second Edition, The English language book society & Nelson, Great Britain at the camelot Press Ltd, Southampton.
3. Introduction to Cell Biology, Stephen L.Wolfe (1999) Wadsworth Publishing Company, Belmont, California, A Division of Wadsworth, Inc.
4. Cell Biology, C.B.Power(2009) Himalaya Publishing House, Mumbai.
5. Animal cytology & Evolution, M.J.D. White Third Edition, (1973) Vikas Publishing House Pvt Ltd. New Delhi.

IV - SEMESTER

CORE PRACTICAL II - PHYSIOLOGY AND CELL BIOLOGY**Total credits: 2****PHYSIOLOGY**

1. Estimation of oxygen consumption in an aquatic animal (Fish)
2. Influence of temperature on the ciliary, **activity in freshwater mussel** and calculation of Q_{10} value.
3. Qualitative detection of excretory products **of aquatic and terrestrial animals.**
4. Preparation of haemin crystals in human blood
5. Total count of RBC and WBC in human blood
6. Preparation of blood smear in human
7. Survey of digestive enzymes in cockroach
8. Blood grouping

CELL BIOLOGY

1. Squash preparation of onion root tip to show Mitosis
2. Mounting of Buccal smear (man)

Spotters

1. Stages of Mitosis
2. Stages of Meiosis
3. Haemocytometer
4. Anti A and B serum
5. DNA Model
6. Sphygmomanometer
7. Glucometer
8. Haemoglobinometer

MODEL QUESTION PAPER FOR CORE PRACTICAL II

CIA PRACTICAL EXAM

Model Practical Exam	= 25 Marks
Observation Note	= 10 Marks
Attendance	= 5 Marks
Total	= 40Marks

END OF SEMESTER EXAMINATION

Time-3Hours

MaxMarks-60

Q I : Major Experiment	= 25 marks
Q II : Minor Experiment	=10 marks
Q III :Spotters 3x5	=15 marks
Q IV :Record	=10 marks
Total	=60 marks

IV - SEMESTER

SKILL BASED SUBJECT 2 - HEALTH EDUCATION

Total Credit: 3

Total Hours: 30

Objectives

1. Health education helps people to follow and maintain healthy practices and life styles
2. Health education provides information about the environmental changes which are necessary for healthy life.
3. Health education discusses about the various methods to conduct professional training to improve the health status of the people

UNIT I

6Hrs

Concept of health

Determinants of health- Indicators of Health- Personal hygiene- Public health- **Concepts of disease-Agent- Host and Environment Dynamics of disease transmission**
Sources and routes of transmission.

UNIT II

6Hrs

Nutrition and health

Proteins, Carbohydrates, Fat, Trace elements- Food hygiene- Energy requirements- balanced diet- Malnutrition.

UNIT III

6Hrs

Environment and health

Water pollution and health effects- Air pollution and health effects- Solid pollution and health effects.

UNIT IV

6Hrs

Communicable disease

Viral and bacterial disease (AIDS, STD, Mumps, Tuberculosis, Typhoid)

Non communicable diseases

Diabetes, Cancer, Heart attack, Kidney problems.

Vector- borne diseases

Malaria.

UNIT V

6Hrs

Health care of the community

Concept of prevention- Health care services- Health programmes in India.

Text Books

1. Health and Healthy Body- Vedanta Kerari. Ramakrishna math, Chennai
2. Total Health- Paramjit Rana 2002 English Edition, Mumbai

Reference Books

1. Health-Ruth Ann Aalthaus 1987, Scottforesman-xx.
2. Hand book of Pollution, control processes. Robert noyesjaico publishing house, Mumbai. (2001).
3. You and your health, Harnold Shyrlock, Hubert. O. Swartout Pacafic press publishing association- London, (1998).
4. Health. Bud Getchell, Rurtypipin. Jill Varnes, Stephen. D.C. Health and Company, Massachusetts, (2000).

Part IV – IV SEMESTER

Non- Major Elective - II “Women’s Rights”

Total credits: 2

Total Hours: 30

Objectives

1. To impart specific and up-to-date information about national and international laws related to the welfare of women.
2. To create awareness about crimes against women, legal rights of women in the country and access to justice.

UNIT I LAWS, LEGAL SYSTEMS AND CHANGE 6 Hrs

Definition - Constitutional law, CEDAW and International Human Rights – Laws and Norms – Laws and Social Context – Constitutional and Legal Framework.

UNIT II POLITICS OF LAND AND GENDER IN INDIA 6 Hrs

Introduction – Faces of Poverty – Land as Productive Resources – Locating Identities – Women’s Claims to Land – Right to Property - Case Studies.

UNIT III WOMEN’S RIGHTS: ACCESS TO JUSTICE 6 Hrs

Introduction – Criminal Law – Crime Against Women – Domestic Violence – **Dowry Related Harassment* and Dowry Deaths*** – Molestation – Sexual Abuse and Rape – Loopholes in Practice – Law Enforcement Agency.

UNIT IV WOMEN’S RIGHTS 6 Hrs

Violence Against Women – Domestic Violence - The Protection of Women from Domestic Violence Act, 2005 - The Marriage Validation Act, 1982 - The Hindu Widow Re-marriage Act, 1856 - The Dowry Prohibition Act, 1961

UNIT V SPECIAL WOMEN WELFARE LAWS 6 Hrs

Sexual Harassment at Work Places – Rape and Indecent Representation – The Indecent Representation (Prohibition) Act, 1986 - Immoral Trafficking – The Immoral Traffic (Prevention) Act, 1956 - Acts Enacted for Women Development and Empowerment - Role of Rape Crisis Centers.

*** Self-study (Questions may be asked from these topics also)**

Prescribed Book :

Women’s Rights Compiled by Kongunadu Arts and Science College,
Coimbatore-29.

References

1. NityaRao "Good Women do not Inherit Land" Social Science Press and Orient Blackswan 2008
2. International Solidarity Network "Knowing Our Rights" An imprint of Kali for Women 2006
3. P.D. Kaushik "Women Rights" Bookwell Publication 2007
4. Aruna Goal "Violence Protective Measures for Women Development and Empowerment" Deep and Deep Publications Pvt. 2004
5. Monica Chawla "Gender Justice" Deep and Deep Publications Pvt. Ltd. 2006
6. Preeti Mishra "Domestic Violence Against Women" Deep and Deep Publications Pvt. 2007
7. Clair M. Renzetti, Jeffrey L. Edleson, Raquel Kennedy Bergen, Source Book on "Violence Against Women" Sage Publications 2001.

NON-MAJOR ELECTIVES I & II (2012 - 2013 onwards)

QUESTION PAPER PATTERN

Duration: 3 Hours

Max. Marks: 75

Answer ALL Questions

SECTION A

(5 x 5 = 25 marks)

Short answers, either or type, one question from each unit.

SECTION B

(5 x 10 = 50 marks)

Essay type questions, either or type, one question from each unit.

V - SEMESTER

CORE PAPER - 5 - GENETICS

Total Credits: 4

Total Hours: 75

Objectives

1. To make the students develop a comprehensive knowledge of pioneers and their contributions to genetics
2. To make the students understand various principles of heredity.
3. To make the students know about the application of genetic principles in different populations.

UNIT-I

15Hrs

Mendelian principles: Mendel's monohybrid and dihybrid experiments and inferences. Interactions of genes: Incomplete dominance, co-dominance, complementary genes, supplementary genes and duplicate genes. Multiple alleles with examples: Drosophila, coat colour in rabbit. Human blood group inheritance: ABO, Rh factor.

UNIT-II

15Hrs

Linkage in Drosophila. Crossing over: kinds of crossing over, crossing over in Drosophila, Cytological basis of crossing over - Stern's Experiment. Sex determination in Man, Drosophila, Birds and Honeybees. Sex-linked inheritance in Drosophila.

UNIT-III

15Hrs

Fine structure of gene (cistron, muton and recon). Gene mutation and chromosomal aberration. Detection of mutation by CLB Method. Mutagens: Physical and chemical.

UNIT-IV

15Hrs

Genetic code. Sex linkage in Man; Colour blindness, Haemophilia. Gene - protein relationship with reference to sickle cell anemia. Genetic disorders in Man: Klinefelter's syndrome and Turner's syndrome. Biochemical Genetics: phenylketonuria, albinism, alkaptonuria

UNIT-V

15Hrs

Inbreeding, outbreeding and hybrid vigour. Population genetics: Hardy - Weinberg law. Eugenics and Genetic counseling. Human Genome Project.

Text Books

1. A text book of Genetics – Veer Bala Rastogi(2010) 3rdEdnKadarnathRamnath, New Delhi.
2. Genetics - Verma, P.S & Agarwal V.K. (2007) S.Chand& Company Pvt. Ltd, New Delhi.

Reference book

1. Principles of Genetics - Gardner E.J. (1991) Wiley Eastern Pvt. Ltd., New Delhi.
2. Principle of Genetics – Sinnot, E.W. Dunn. L.C. Dobzhausky (2004) McGraw Hill Book Company, New York
3. Genetics- Winchester A.M.(1967) Oxfrord IBH, Madras
4. Elementary Genetics - Singleton, W.R.(1963) Van Nostrand Company, New York
5. Principles of Genetics - Robert - H - Lewin, (2002) Tata Mc. Graw Hill Publishing Company Ltd., New Delhi.

V - SEMESTER

CORE PAPER – 6 – BIOTECHNOLOGY – I

Total Credits: 4

Total Hours: 75

Objectives

1. Biotechnology helps to protect agriculture.
2. Biotechnology provides to invent new drugs for various diseases.
3. Biotechnology discusses to improve the industrial sector.

UNIT I Biotechnology - Scope and importance 15Hrs

Major areas of Biotechnology and the products related to medicine, agriculture and environment, Biotechnology centres in India and the scope for future development, IPR and patenting.

UNIT II Tools of genetic Engineering 15Hrs

Agarose gel electrophoresis for protein and DNA isolation, Blotting Techniques, Polymerase Chain Reaction (PCR), Gene synthesis by using mRNA.

UNIT III Basics of Genetic Engineering 15Hrs

Restriction enzymes and their importance. Vectors of bacterial, viral and fungal sources. (Plasmids ; phage vector - insertion vector and yeast artificial chromosome). Gene cloning in Bacteria and Eukaryotic organisms. - Screening of recombinants.

UNIT IV Animal Cell, Tissue and Organ Culture 15Hrs

Requirements for animal cell and tissue culture. Methods of primary cell culture and evolution of cell line. Products obtained through cell culture. Methods of cryopreservation.

UNIT V Culture techniques of plant cells 15Hrs

Requirements for invitro cultures. Methods of plant cell / tissue culture: Inoculation - Explant culture - Callus formation and micropropagation. Transgenic plants. Protoplast culture : Protoplast fusion and somatic hybridization.

Text Books

1. A Text Book of Biotechnology - R.C.Dubey, (2009) S.Chand & Co.Publications New Delhi.
2. Biotechnology - V.Kumaresan (2009) - Saras Publications, Kanyakumari.

Reference Books

1. Advances in Bio technology - S.N. Jogdand. Fifth revised edition 2005. Published by Himalaya publishing house.
2. Gene cloning and DNA analysis - T.A.Brown, fourth edition, Blackwell Publishing 2001.
3. Biotechnology - Mohan. P. Arora. First Edition 2003, Published by Himalaya Publishing House. Edited by Chander Kanta.
4. Animal Cell Biotechnology, Volume-2, Edited by R.E.Spier & J.B.Griffiths (1985) Academic press London Limited.
5. Animal Cell Biotechnology, Volume-1, Edited by R.E.Spier & J.B.Griffiths (1985) Academic press London Limited.

V - SEMESTER

CORE PAPER - 7 – ECOLOGY

Total Credits: 4

Total Hours: 75

Objectives

1. To know the fundamental principles that govern the functioning of the environment.
2. To understand the concept of ecosystem and balance of nature.
3. To assess the relationship between environment and organisms.

UNIT – I

15Hrs

Introduction to environment: Abiotic factors of the environment - Temperature, Light, Oxygen and Carbondioxide.

Biotic factors of the environment: Commensalism and mutualism.

UNIT-II

15Hrs

Ecosystem: Components of Ecosystem, pond as an example of Ecosystem - Food chain- Food web-Ecological pyramid and energy flow.

UNIT-III

15Hrs

Biogeochemical cycle - Water cycle- nitrogen and phosphorus cycles.

Population ecology: Density- Natalty- Mortality- Age distribution-Population growth and Dispersal.

UNIT-IV

15Hrs

Community ecology: characters- Structure- Dominance- Stratification- Periodicity- Ecotone- Edge effect-Ecological niches and Ecological succession.

UNIT-V

15Hrs

Habitat ecology: Zonation-Characters-Flora and Fauna and their adaptation of aquatic habitats - fresh water, estuary and marine.

Terrestrial habitat: Physico-chemical characteristics - Forests, tundra, grasslands and deserts.

Text books

1. Animal ecology and Distribution of Animals. M. S. Jeyaraj and Veerbala Rastogi (1989), KedarnathRamnath publishers, Meerut, Delhi.
2. Concepts of Ecology by N. Arumugam (2008), Saras publications, TamilNadu.

Reference books

1. Environmental Biology - P. S. Verma and V. K. Agarwal (1999) S.Chand& co, New Delhi
2. Ecology and Environment - P. D. Sharma (2000) RostogiPublications,Meerut, India.
3. Environmental Biology - Agarwal, K. C. (1987) Agro Botanical Publisher,India.
4. Ecology and Ethology - V. K. Agarwal and Usha Gupta, S.chand& Company (2002) Ramnagar New Delhi.
5. Odum, E.P.1969. Fundamentals of Ecology. W.B. Saunders publications, London.

V - SEMESTER

SKILL BASED SUBJECT- 3. CLINICAL LABORATORY TECHNOLOGY

Total Credits: 3

Total Hours: 30

Objectives

1. CLT gives clear idea about handling the apparatus in the laboratory.
2. CLT helps to widen the knowledge not only in Zoology but also in haematology, biochemistry and microbiology.
3. CLT provides individuals to interpret the results of their own reports.

UNIT I Essential Pre- requisites of a clinical Laboratory 6Hrs

1. Introduction – Scope of the subject CLT.
2. Collection of Specimens, maintenance of records and preparation of reports.
3. Cleaning and maintenance and care of glass wares.
4. Sterilization – Physical and Chemical methods.
5. Disposal of specimens and infected materials.
6. Safety precautions in the laboratory.
7. Knowledge of first aid treatment of superficial wounds, burns and scalds, chemical poisoning, contamination of infected microbiological specimens and electric shock.

UNIT II Laboratory Instrument 6Hrs

1. Parts of light microscope and their work.
2. Care and maintenance of microscope, Centrifuge and weighing balance.
3. Haemocytometer.
4. Albuminometer
5. Urinometer.
6. Sahlis Haemoglobinometer.

UNIT III Clinical Hematology

6Hrs

1. Collection of Blood (Venous and Capillary) Plasma and serum for analysis.
2. Total erythrocyte count.
3. Total leucocyte count and differential count.
4. Haemoglobin estimation by Sahli method.
5. Erythrocyte sedimentation rate (ESR) (Wintrobe and wester methods)
6. Bleeding and clotting time.
7. Estimation of packed cell volume (PCV)
8. Thin and thick blood film preparation, staining and identification of material parasites.
9. Blood film preparation, staining and identification of *Wuchereria bancrofti* and *Brugia malayi*

UNIT IV Blood Grouping

6Hrs

1. Testing of the Donor.
2. Compatibility Test (Coomb's Test)
3. A-B-O Grouping- Tile method, Standarad tube technique.
4. Causes of False positive and False negative results.
5. Sub groups of A and differentiation of groups A1 and A2 using lection.
6. Rhesus grouping Techniques.

UNIT V Clinical Chemistry

6Hrs

1. Glucose haemostasis- Interpretation of blood and urine glucose levels.
2. Oral Glucose Tolerance Test (OGTT) and GTT curves.
3. Diabetes mellitus.
4. Fasting blood glucose level and estimation of blood glucose.
5. Plasma lipids and lipoprotein levels.
6. Diagnosis of cholesterol and triglycerides level in plasma.
7. Blood urea estimation.

Text books:

1. Medical Laboratory Technology. Methods and interpretations, Vol I (6) – Ramnik Sood (1985), Jaypee brothers medical publisher Pvt. Ltd. New Delhi.
2. Medical Laboratory Technology. A procedure manual for routine diagnostic tests, Vol I – Kanai L. Mukherjee and Tata McGraw (1988), Hill publishing company limited, New Delhi.

Reference:

1. Introduction to Medical Laboratory Technology. F.H. Baker and R.E. Silvertown ELBS (1978).
2. A Medical Laboratory for Developing Countries M. King ELBS (1983).
3. Practical Clinical Biochemistry Vol.1 & II. H. Varley, A.H. Gowenlock, M.Bell William Heinemann Medical Books London (1980).
4. Medical Laboratory Technology, Dr. RamlikSood, Dr. Jaypee Brothers, New Delhi (1987).
5. Clinical Haematology in Medical practice – G. C. De Gruchy, CBS publisher and distributors, Delhi (1984).

VI - SEMESTER

CORE PAPER - 9 MICROBIOLOGY AND IMMUNOLOGY

Total Credits: 4

Total Hours: 60

Objectives

1. To aware basic knowledge on microorganisms like bacteria and virus
2. To know about economic importance in relation to Agriculture, industry and medicine.
3. To inculcate the fundamental knowledge on immunology studies focused on immune system, antigen antibody reactions and vaccinations.

UNIT I

12Hrs

General bacteriology - Bacterial morphology, Structure, Identification and staining - Culture methods - Bacterial taxonomy.

UNIT II

12Hrs

Morphology and chemical properties and classification of virus-ultra structure of a bacteriophage-Lytic and lysogenic cycle of bacteriophage. - Economic importance of algae, fungi (In Medicine, Industry, Agriculture), Microbiology of water, soil and air. Commercial production of Antibiotics.

UNIT III

12Hrs

Microbial Disease of Man

Causative organisms: Basic structure, Toxicity, symptoms and preventive measures; Protozoan diseases, Typhoid, Diphtheria, Whooping cough, Pneumonia, Poliomyelitis, AIDS.

UNIT IV

12Hrs

Cells and Organs of Immune System cells of the Immune system

Cells of lymphoid and myeloid lineage. Primary lymphoid organs (thymus, bone marrow)
Secondary lymphoid organs (lymph node, spleen, mucosal associated lymphoid tissue)

Types of immunity: Innate immunity and acquired immunity.

UNIT V

12Hrs

Antigen and antibody, structure, functions and interactions. Immune Response: Primary and secondary, cell mediated and humoral immunity, Vaccination preparation types. Complements-types, Salient features and functions.

Text Books

1. Microbiology-Michael. J.Pelczar, (1993) MC Grand Hillpublications,Chennai.
2. Immunology-Dulsy Fatima &Arumugam.N(2000) Saras Publication, Nagercoil.

Reference Books

1. Microbiology-C.B.Power and Daginawala.H.F (1984) Himalaya Publishing houses Bombay.
2. General Microbiology-Roger. Y.Stanier (1992) Macmillan Publications, London.
3. Industrial Microbiology - Casida. L.E (2007) Newage International (P) limited, New Delhi.
4. The short text books of Medical Microbiology - SatishGupte, Jaypeebrothers (2006) Medical Publishers (P) Ltd - Culcutta.
5. Immunology – Duby.J (1999) - W.G.Freeman & Co, New York

VI - SEMESTER

CORE PAPER - 10 - BIOTECHNOLOGY-II

Total Credits: 4

Total Hours: 75

Objectives

1. Biotechnology helps to learn application oriented aspects.
2. Biotechnology provides to learn advanced topics.
3. Biotechnology helps to understand Global scenario.

UNIT I Industrial and microbial biotechnology

15Hrs

Basic design of a fermentor - micro-organisms and their products - stages of down stream processing.

Microbial products - microorganisms used in ethanol production. Antibiotics - antibiotics produced by micro-organisms (eg. Penicillin)

UNIT II Agricultural biotechnology

15Hrs

Production of algal biomass - mass cultivation of spirulina, (SCP). Production of yeast biomass. Mushroom cultivation - Cultivation methods (any one type) - Biological Nitrogen Fixation - mechanism of N_2 fixation and ammonia assimilation in non symbiotic and symbiotic microbes.

UNIT III Biofertilizers

15Hrs

Biofertilizers - Nitrogen biofertilizers - Phosphate biofertilizers - Method of production of VAM inoculum for application.

Biopesticides - Biological control of plant pathogens. Types of antagonists used as biopesticides. Examples of predation and parasitism.

UNIT IV Biotechnology in Human and Animal Health Care

15Hrs

Industrial production of 1. Insulin, 2. Somatotropin, 3. Human interferon (any one example)
Production of different kinds of vaccine, (any one example)

UNIT V Environmental Biotechnology

15Hrs

Biogas technology in India. Biogas production, Hydrogen as a biofuel - Types of bioremediation - sewage treatment processes - Bioconversion of solid by biological organisms (any one example).

Text books

1. Biotechnology - V.Kumaresan (2009) - Saras Publications, Kanyakumari.
2. A text books of Biotechnology - R.C.Dubey (2009) S.Chand and Company, New Delhi.

Reference Books

1. Recombinant DNA - A short course James D Watson, John Tooke and Tkurtl (1983) Scientific American Books.
2. Biochemical methods - S.Sadasivam (2004). New Age International Publications.
3. Advances in Bio technology - S.N.Jogdand. fifth revised edition (2005). Published by Himalaya publishing house.
4. Gene cloning and DNA analysis - T.A.Brown, fourth edition (2001), Blackwell Publishing.
5. Biotechnology - Mohan.P.Arora. First Edition (2003), Published by Himalaya Publishing House. Edited by ChanderKanta.

VI - SEMESTER

CORE PAPER - 11 - DEVELOPMENTAL BIOLOGY

Total Credits: 4

Total Hours: 75

Objective

1. Development of an organism from the egg to an adult.
2. Comparative embryology deals with evolution and polygenetic significances.
3. Recent technology in embryo development and embryo transfer.

UNIT-I Theories of Development

15Hrs

Theories of Preformation, Epigenesis, Pangenesis, Bear's law, Biogenetic law, Germplasm theory, Mosaic theory, Regulative theory, Gradient theory and Theory of Organizer

Gametogenesis

Spermatogenesis, Oogenesis, Types of egg, polarity - Symmetry

UNIT II Fertilization

15Hrs

Sexual cycles-Hormonal control, physico-chemical aspects of fertilization.

Theories of fertilization, In Vitro fertilization (IVF)

UNIT/III Cleavage

15Hrs

Planes of cleavage - Patterns of cleavage - Laws of cleavage.

Patterns of cleavage as illustrated in Amphioxus, Frog, chick and pig.

Blastulation,

Types of blastula, Fate maps

UNIT IV Gastrulation

15Hrs

Morphogenetic movements - Gastrulation in Frog and Chick.

Organogenesis in frog

Development of Brain, Eye, Ear, Heart

UNIT V

15Hrs

Embryonic Nutrition

Extra embryonic membranes in chick and Pig.

Placentation in mammals.

Experimental Embryology

Gradients Spemann's experiments on organizer.

Text Books

1. A text book of Embryology Dr. N. Arumugam (2005) Saras Publications, New Delhi.
2. Chordate Embryology. P.S. Verma, (1995).V.K. Agarwal, S. Chand Company Ltd., New Delhi.

Reference Book

1. Developmental Biology. Scott. F. Gilbert (2010) Sinauee Associates Inc.
2. An Introduction to Embryology - Balanisky (2008), B.I. Saunder's Company, Pub. Philadelphia.
3. Developmental Biology - Beril, D.B (2002) Naeosa publishing house Pvt Ltd New Delhi.
4. Foundation of Embryology- B.M. and Carlson, B.M (2007) Tata McGraw Hill. New Delhi.
5. CHR. P. Raven (1959) Pergamon Press. New York.

VI - SEMESTER

CORE PRACTICAL - III - {cp.3,5,7,8,11,13,14}

Total Credit: 2

ECOLOGY

I: Analysis of water – Pond and Sewage.

1. Estimation of dissolved oxygen
2. Salinity
3. pH
4. Carbonates and bicarbonates
5. Carbondioxide

II. Qualitative analysis of plankton

III. Study of intertidal rocky, sandy and muddy shore fauna

DEVELOPMENTAL BIOLOGY

Frog embryology slides: Stages of cleavage – 2 cell stage, 4 cell stage, 8 cell stage, Blastula and Gastrula.

1. Chick embryology - Stages of development 24hr, 48hr, 72hr & 96hr.
2. Placenta of Pig, Sheep and Man.

FIELD STUDY

1. Visit to coastal area to study the intertidal fauna

SERICULTURE

1. Study of life history of *Bombyxmori* using live specimens.
2. Practical knowledge of methods of Silkworm rearing. Visit to Silkworm rearing center.
3. Assessment of cocoon characters- Shell ratio, Denier and Renditta.

VERMICULTURE

1. Rearing of earthworm.
2. Preparation of Vermibed.

PESTS AND THEIR CONTROL

Spotters: Identify and comment on

1. Coconut pest
2. Brinjal pest
3. Mosquitoes (Adults of Culex and Aedes)
4. House fly
5. Bed bug
6. Head louse

MODEL QUESTION PAPER FOR CORE PRACTICAL III

CIA PRACTICAL EXAM

Model Practical Exam	=	25 Marks
Observation Note	=	10 Marks
Attendance	=	5 Marks
Total	=	40 Marks

END OF SEMESTER EXAMINATION

Time- 3 Hours

Max Marks-60

Q I : Major Experiment	-	20 Marks
Q II : Minor Experiment	-	15 Marks
Q III : Spotters 3x5	-	15 Marks
Q IV : Record	-	10 Marks
Total	-	60 Marks

VI - SEMESTER

CORE PRACTICAL-IV-{cp.6,9,10}

Total Credit: 2

1. Sterilization Techniques
2. Media preparation
3. Distribution of microbes in air and water media
4. Isolation of DNA from a tissue sample
5. Isolation of protein by precipitation method
6. Determination of protein content ;
7. Isolation and determination of Carbohydrate from a sample
8. Determination of Microbiological quality of milk by MBR Test.
9. Hanging drop culture of cells from an animal source.
10. Determination of number of cells by haemocytometer.
11. Gel electrophoresis (Demonstration only).
12. Determination of phosphatase activity. .
13. Determination of antigen - antibody reaction by precipitation method (Blood group / Rh factor).
14. Visit to industries related to Biotechnology

Spotters

1. Electrophoretic instruments.
2. Vaccine (Viral vaccine)
3. Antibiotic (Penicillin)
4. Laminar air flow chamber
5. Plant saplings produced through plant tissue culture
6. Spirulina (SCP) Biopesticides (Neem, Pongamia)
7. Biofertilizer (Azolla)
8. Mushrooms
9. Nitrogen fixing plant
10. Vermicompost
11. Autoclave
12. Cell culture media
13. Insulin (commercial)

MODEL QUESTION PAPER FOR CORE PRACTICAL IV

CIA PRACTICAL EXAM

Model Practical Exam	=	25 Marks
Observation Note	=	10 Marks
Attendance	=	5 Marks
Total	=	40Marks

END OF SEMESTER EXAMINATION

Time-3Hours

MaxMarks-60

Q I: Major Experiment	-	20Marks
Q II : Minor Experiment	-	15 Marks
Q III :Spotters 3x5	-	15 Marks
Q IV :Record	-	10 Marks
Total	-	60 Marks

MAJOR ELECTIVE PAPER 1. ECONOMIC ZOOLOGY

Total Credits: 5

Total Hours: 60

Objectives

1. To understand the significance of sustainable agriculture, organic farming and waste management using Vermitechnology
2. To acquire knowledge on sericulture, Apiculture and lac culture rearing and harvesting techniques.
3. To inculcate knowledge on poultry and animal husbandry aspects.

UNIT I

12Hrs

VERMICULTURE & VERMITECHNOLOGY

Vermiculture - Selection of suitable species based on their characteristics, Vermicomposting and their advantages, role of earthworms in sustainable agriculture and organic farming, Miscellaneous uses of earthworms (Poultry, Fisheries and Medicine).

UNIT II

12Hrs

SERICULTURE

Types of silkworms - Life cycle - Rearing methods - Harvesting - Processing of Silk - Marketing of Cocoons - Economic importance of sericulture - Problems in sericulture.

UNIT III

12Hrs

APICULTURE AND LAC CULTURE

Types of honey bees - Diseases and pests of bees and lac insects - Harvesting and processing of honey and lac - Marketing of honey and lac - economic importance of apiculture & lac culture. Problems in apiculture and lac culture.

UNIT IV

12Hrs

POULTRY FARMING

Types of birds for poultry - Diseases and pests of bird - Egg and meat production - poultry feed - Marketing of poultry products - Economic importance of poultry keeping - problems in poultry keeping.

UNIT V

12Hrs

ANIMAL HUSBANDRY

Types of animals for animal husbandry - Disease and pests of animals - Milk and meat production - Processing of milk and meat products - Marketing - Economic importance of animal husbandry - problems in animal husbandry.

Text Books

1. Bhatnagar, R.K and Paltra, R. K. Vermiculture and Vermicomposting. Kalyani Publishers, New Delhi, 1996.
2. Vasantharaj David. B and T. Kumarasami, Elements of Economic Entomology, Popular Book depot, Madras -15, 1982.
3. D.B. Tembhare, Modern Entomology, Himalaya publishing house – Delhi, 1997.
4. M. Madan Mohan Rao. A Text Book of Sericulture. B.S. Publications, Hyderabad. 1998.
5. Ed. Lokeshwar, R. Hand Book of Animal Husbandry, ICAR, New Delhi. 2002.
6. D.R. Khanna & P.R. Yadav , Biology of fishes, Discovery Publishing House, New Delhi. 2004.

Reference Books

1. Nayar K.K and T.N. Anathakrishnan and B.V. David. - General and applied Entomology, Tata McGraw Hill publishing Co. Ltd., New Delhi. pp.589, 1983.
2. Richard and Owen, A.D.Text Book of Entomology. Imms, Vol.I & II Ed. by ELBS, 1997.
3. P.G. Fenemore, A. Prakash, Applied Entomology, New age international (P) publishers - New delhi.2, 2002.
4. Manju Yadav, Economic Zoology, Discovery Publishing House, New Delhi. 2003.
5. Fred V.Theobald, Economic Zoology, Print well Publisher. Jaipur. India, 1989.

MAJOR ELECTIVE- 2 PESTS AND THEIR MANAGEMENT

Total Credits: 5

Total Hours: 45

Objectives

1. As an elective subject, applied aspect of Zoology is being included.
2. Study on crop protection is necessary for food grain production.
3. To focuss economical importance mainly in relation to agricultural and medicinal topics.

UNIT I

9Hrs

Insects of agricultural importance - types of damage on crops - insects in relation to plant diseases.

UNIT II

9Hrs

Biology, nature of damage on crops and control measures of one major pest of each of the following crops: paddy, sugarcane, cotton and coconut.

UNIT III

9Hrs

Biology, nature of damage on crops and control measures of plant nematodes, mites, crabs, snails, birds and rats.

UNIT IV

9Hrs

Insects in relation to public health- biology, role of insect vectors of human and control measures of mosquitoes, house flies, bed bug and head louse.

UNIT V

9Hrs

Insect pests of stored produces- rice weevil (*Sitophilusoryzae*), Red flour beetle (*Triboliumcastaneum*) and Pulse beetle (*Callosbruchuschinensis*).

Text Books

1. Vasantharaj David. B and T. Kumarasami 1982. Elements of Economic Entomology, Popular Book depot, Madras-15.
2. D.B. Tembhare - Modern Entomology- (2000) Himalaya Publishing House- Delhi.
3. General & Applied Entomology TN Anantha Krishnan 2007. Tata Mc Gran Hill Pub. Co.Ltd.

Reference Books

1. Nayar K.K & T.N. Anathakrishnan and B.V. David. 1983 - General & applied Entomology, Tata McGraw Hill publishing Co. Ltd., New Delhi.pp. 589
2. Applied Entomology - 2002 P.G. Fenemore, A. Prakash New age International (P) publishers- New Delhi.

MAJOR ELECTIVE PAPER-3 VERMITECHNOLOGY

Total Credits: 5

Total Hours: 45

Objectives

1. It is a general awareness study programme for UG students to maintain clean environment.
2. To aware the significance of sustainable agriculture and organic farming.
3. To inoculate basic knowledge on recycling of biodegradable waste of different kinds.

UNIT I

9Hrs

Distribution- different species of earthworm. General body structure- External characters- Body wall- Food and feeding habits digestive system - Gut microflora and their importance - Reproductive system cocoon formation.

UNIT II

9Hrs

Role of Earthworms in sustainable agriculture - organic farming - Earthworm activities - soil fertility and texture - soil aeration. Vermitechnology - Definition.

UNIT III

9Hrs

Advantages of vermiculture – Vermi – cast - Decomposition of bio - degradable Wastes and vermicomposting - Selection of suitable species - Basic characteristics of suitable species - Description of suitable species - Maintenance of Base culture.

UNIT IV

9Hrs

Vermicomposting - Advantages of vermicomposting - small scale vermicomposting - large scale vermi composting. Type of Vermicomposting - requirements for Vermicomposting - maintenance of vermicomposting.

UNIT V

9Hrs

Recycling of different wastes by vermicomposting - Organic wastes - Solid wastes - Municipal wastes - Animal Dung - Agricultural wastes. Application of Vermicompost - In horticulture- in agriculture.

Text Books

1. Vermiculture and vermicomposting. Bhatnagar, R.K. and Palta, R.K., Kalyani publishers, New Delhi (1996).
2. A text book of Annelida R.L. Kotpal published by RakashK.Rastroji for Rastroji publications Shivaji road Meerut- 250002- (1988).

Reference Book

1. Vermicompost - Crown Jewel of organic farming, R.D. Kale, Author publication, 4-Archana apartment, (S-1), 12th cross, Margosa Rd. Malleswaram, Bangalore-560 003, India (2006).
2. A Hand book of organic forming, Arun K.Sharma, Agrobios, Jothpur, India (2002).
3. The Earthworm book, S.A.Ismail. other India press. Goa 403 507, India (2005).
4. Earthworms in Agriculture, Talashilkar & Dosani. Published by Agrobios (India). Chopasani Road Jodhpur- 342003.
5. The complete technology book on “ Vermiculture and Vermicompost” published by National Institute of Industrial Research, Delhi(2004).

MAJOR ELECTIVE PAPER 4

WILD LIFE ECOLOGY AND MANAGEMENT

Total Credits: 5

Total Hours: 45

Objectives

1. To make the students understand and appreciate biodiversity and the Act to protect the wild species.
2. To make the students learn different techniques to study wild life and develop knowledge of the benefits of ecosystem.
3. To make the students analytically know about various methods to conserve biodiversity.

UNIT I

9Hrs

Ecosystem aquatic ecosystem- Pond, terrestrial ecosystem- forest trophic relations in ecosystems, foodchain, foodweb, ecological pyramids - productivity of ecosystem- primary and secondary production. Energy flow in ecosystem. Biotic community and ecological niche.

UNIT II

9Hrs

Wild life of India – Ecological sub regions of India. Endangered flora and fauna. Wild life management in India - Indian board for wild life. Protected areas network. National parks and sanctuaries. Special projects for endangered species.

UNIT III

9Hrs

BIODIVERSITY

Biodiversity-kinds of biodiversity; Biogeography-continental shift, zoogeography, biodiversity hot spots, endemism; biodiversity assessment; Endangered species-Indian Wild life protection Act 1972 and International Redlist Species Criteria, concept and assessment

UNIT IV

9Hrs

FIELD SAMPLING TECHNIQUES

Population estimation-concept, line transect, quadrat sampling; Animal Trapping Techniques – Pitfall funnel, Sherman traps; marking and recapture techniques; use of indirect evidences in species inventory; Basic methods in behavioral and food habit studies; Wildlife management techniques.

UNIT V

9Hrs

ECOSYSTEM SERVICES

Animal plant interactions-pollinators, seed dispersal, biological pest control, vector; Wildlife products - food, medicine, Germplasm, domestication; Ecological balance - prey predator relationships. herbivory and scavengers.

Text Book:

1. Ecology and Environment. P.D.Sharma. 2009/10th Ed. Rastogi publications. Meerut.
2. Concepts in Wild Life Management Hoselli BB (2008) Daya publishing house New Delhi 110002.

References

1. Ecology and evolution of communities. Cody, M.L.and J.M Diamond 1975.Harvard University Press.Cambridge. Wildlife Management Techniques. Giles.H. 1984. Natraj Publishers, Dehra Dun.
2. Fundamentals of Wildlife Management. Gopal, R. 1992. Justice Home. Allahabad. Biodiversity - Gaston, K.J. 1996.
3. A biology of numbers and difference. Blackwell Science, Oxford. Ecology. V.K.Agarwal and Usha Gupta. 2004. 1st Ed. S.Chand and Company Ltd.New Delhi.
4. Environmental Studies. D.K.Asthana and Meerut Asthana. 2006 1st Ed. (Reprint 2007). S. Chand and company Ltd. New Delhi.
5. Fundamentals of Ecology. Madhab Chandra Desh and Sathya Prakash Desh. 2009. 3rd Ed. Tata McGraw Hill Education Pvt.Ltd. New Delhi.

MAJOR ELECTIVE PAPER – 5. POULTRY SCIENCE AND MANAGEMENT

Total Credits:5

Total Hours:45

Objective

1. To make the students develop knowledge on the history and the role of poultry in rural development and its structure.
2. To make the students learn methods of rearing, breeding and production of poultry.
3. To make the students know about the preparation of feed antibiotics, vaccines and marketing.

UNIT I

9Hrs

History and importance of Poultry farming, Role of the Poultry in rural development, employment potential, Economics and contribution to national productivity, Egg production, Table bird production, manure as by-product. Anatomy and physiology of poultry birds with reference to digestive and reproductive system.

UNIT II

9Hrs

Breeds of poultry birds and scientific methods of breeding Hybrid and cross breed. Indian and exotic selecting chicks and parents for production factors in selection, Hatching, selecting eggs for hatching, Natural and artificial incubations, Types of incubators. Maintenance of temperature and humidity sterilization of room during hatching, separation and selling.

UNIT III

9Hrs

Poultry house and equipment, space requirement, types of house, number birds, equipments for feeding, protection from enemies and adverse conditions.

UNIT IV

9Hrs

Nutrition of Poultry birds, requirement according to age feed formulation, classification of feed stuffs. Milling by products, distilleries and brewery by products. Availability of raw materials and their cost, food grinders and mixtures, use of antibiotics.

UNIT V

9Hrs

Brooding and rearing, sexing, vaccination, natural and artificial breeding, types of brooding, temp. requirement culling. Debreking, characters of good layers and broilers caponettes and and capons, rearing of chicks.

Text Books

1. A Hand book of poultry practice. Keith Wilson (2007) 2nd Ed. Agrobios (India), Jodhpur.
2. The poultry science L.C.R. Norris Elye. 2005. Biotech books.Delhi.35.

Reference Books

1. Economic Zoology: Manju Yadav.2003. 1st Ed. Discovery publishing house. New Delhi
2. Feeding of Poultry. B. Pande. V.R.Reddy, V.R.Sadagopen and A.K.Shrinivasan. 1984 (reprinted 1997), Indian council of Agricultural research. Power Printers New Delhi.
3. Poultry farm guide. Dr.R.Venkatakrishnan, 1995. 1st Ed. Balaji publications. Madras.
4. Hand book of Animal Husbandry Indian Council of Agricultural Research 1997. 2nd Ed. (reprint) published by Dr.R.D.Sharma, Director Directratre of Publications and information on Agriculture. New Delhi.

MAJOR ELECTIVE 6 - HUMAN GENETICS AND COUNSELLING

Total Credits: 5

Total Hours: 45

Objectives

1. To make the students develop knowledge on the blood types, transfusion and diseases.
2. To make the students know about applications of aminocentesis, dermatoglyphics and Population genetics.
3. To make the students learn applications of Genetic engineering and Genetic counseling.

UNIT I

9Hrs

Blood groups (major types) Blood transfusion, Erythroblastosis foetalis.

Physiology and genetic of blood groups.

UNIT II

9Hrs

Aminocentesis, Dermatoglyphics: Terminology, methods of observation and printing, dermatoglyphic features of syndrome.

UNIT III

9Hrs

Population genetics, Hardy-Weinberg principle and its application in human population.

UNIT IV

9Hrs

Genetic engineering and its applications in human being, Cancer, AIDS.

UNIT V

9Hrs

Genetic counseling, definition, aims, procedure in genetic counseling and its limitation. Pedigree chart and its uses.

Text Books

1. Genetics. Veer Bala Rastogi. 2009 (reprint 2010) 3rd Ed. Kadarnath Ramnath publishers. Meerut. New Delhi.
2. Genetics. Alice Marcus. 2009. MJP Publishers, Chennai.

References

1. Ursula Goodenough (1984) - 3rd Edit. Saunders College Publishing.
2. Genetics by H. Eldon Sutton, Robert P. Wagner (1985) - Macmillan publishing company New York.
3. Basic Human Genetics. Elaine J. Mange and Arthur P. Mange (1991). 2nd Edit. Sinaver Associates Inc. publishers Sunder land.
4. Principles of Genetics. Robert H. Tamarin. 2002. 7th Ed. Tata McGraw Hill publication company Ltd. New Delhi.
5. Applied Genetics. C. Emmanuel, S. Ignachimuthu and S. Vincent. 2006. MJP Publishers, Chennai.
6. Genetics. Susan L. Elrod and William D. Stansfield. Adapted by G. Bhowmik 2009 4th Ed. Mc Graw - Hill publication company Ltd. New Delhi.
7. Cell and Molecular Biology. P.J. Russel, S.L. Wolte, P.E. Hertz, C. Sterr and B. Mc Millan. 2009 1st Ed. (Indianprint), Cengage learning India Pvt. Ltd. New Delhi.

VI - SEMESTER

SKILL BASED SUBJECT 4 COMMERCIAL FISH CULTURE

Total Credits: 3

Total Hours: 30

Objectives

1. Developing the knowledge in characteristics, structure and resources of fisheries.
2. Increase sector performance by production, culture practices and farm management.
3. Develop the trade and contribution to the economy.

UNIT I	Introduction i. Scope of fish culture. ii. Freshwater resources- ponds, lakes, rivers, dams	6Hrs
UNIT II	Commercially important fish species Criteria for species collection, Murrels, major carps, minor carps and others.	6Hrs
UNIT III	Fish Pond Site selection, design and construction of artificial ponds. Water quality characteristics and management, culture practices.	6Hrs
UNIT IV	Nutritional requirement Feeding habits, supplementary feed, artificial feed and feed formulation.	6Hrs
UNIT V	Farm Management Weed control, harvesting of fishes and economics.	6Hrs

Text books

1. C.B.L. Srivasta 2002, A text book of fishery science and Indian fisheries, kitab Mahal, Allahabad.
2. Dr. N. Arumugam 2008, Aquaculture, Saras Publication, Nagercoil.

Reference books

1. Santhanam, R. 1990. *Fisheries Science*, Daya publishing House, New Delhi.
2. Rath, R.K. 2000. Fresh water Aquaculture, Scientific (India), Jodhpur.
3. Venkataramanujam, K. Ramanathan, N., and Venkataramani, V.K. 1997. *Introduction to Fishery Science*, Janshi, Tuticorin.

I - SEMESTER

Allied A. Paper I. NON-CHORDATA AND CHORDATA

Total Credits:4

Total Hours: 75

(For Chemistry, Plant Biology and Plant Biotechnology & Biochemistry)

Objectives

1. To learn the animal distribution.
2. To understand the functions of all living system.
3. To improve the knowledge of Non - Chordata and their significance in biology.

UNIT I

15Hrs

Phylum Protozoa	:	Paramecium
Phylum Porifera	:	Leucosolenia
Phylum Coelenterata	:	Obelia

UNIT II

15Hrs

Phylum Platyhelminthes	:	Fasciola hepatica
Phylum Aschelminthes	:	Ascaris lumbricoides
Phylum Annelida	:	Earthworm - Megasculexmauritii

UNIT III

15Hrs

Phylum Arthropoda	:	Cockroach
Phylum Mollusca	:	Pila
Phylum Echinodermata	:	Starfish

UNIT IV

15Hrs

Phylum Chordata	:	Shark, Frog, Calotes (Excluding endoskeleton)
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UNIT V

15Hrs

Pigeon, Rabbit (Excluding endoskeleton)

Text Books

1. N. SoundaraPandian, T. Murugan, N.C.Nair, S Leelavathi and Prof. N. Arumugam 2010.Invertebrate Zoology Vol. 1, Seventh revised edition ,Saras Publications, Nagercoil, Tamilnadu.
2. Thangamani, L.M. Narayanan, S.Prasannakumar and Prof. N. Arumugam 2010.Chordate Zoology Vol.2.Seventh revised edition,Saras Publications, Nagercoil, Tamilnadu.

Reference Books

1. Prof. M. Ekambaranatha Ayyar and Prof. T.N.Ananthakrishnan - S.Viswanathan 1981.Manual of Zoology Vol. 1 & Vol.2.Printers & Publishers Pvt.Ltd, Chennai.
2. R.L. Kotpal, 2009. Modern Text book Zoology INVERTEBRATES (Animal Diversity- 1). Rastogi Publications, Meerut - India.
3. R.L. Kotpal, 2009. Modern Text book Zoology CHORDATES (Animal Diversity - II) Rastogi Publications, Meerut - India.

II - SEMESTER

**Allied A-Paper 2 CELL BIOLOGY, GENETICS, EMBRYOLOGY, PHYSIOLOGY,
ECOLOGY & EVOLUTION**

Total Credits: 4

Total Hours: 75

(For Chemistry, Plant Biology and Plant Biotechnology & Biochemistry)

Objectives

1. To learn the outline of Zoology.
2. To understand the basic concepts of Zoology.
3. To learn the relationship between organism and environment.

UNIT I

15Hrs

Structure of an animal cell, structure and functions of Mitochondria, Golgi body, Centrosome, Lysosomes and Nucleus. Mendel's laws of inheritance, Human genetic disorders-haemophilia and colour blindness.

UNIT II

15Hrs

Types of vertebrate eggs. Cleavage, blastulation and gastrulation in Frog

UNIT III

15Hrs

Nutrition in man-Food constituents and enzymes, digestion and absorption.

UNIT IV

15Hrs

Ecosystem and its components, food chain, energy flow, Pollution of water, air and noise.

UNIT V

15Hrs

Evidences of Evolution - morphological, anatomical, embryological and biochemical. Theories of evolution - Lamarkism, Darwinism and De Vries, Mutation theory.

Text Books

1. Prof. N.Arumugam and R. Meyyan, 2010. Cell Biology, Genetics and Evolution. Seventh edition. Saras Publications, Nagercoil, Tamilnadu
2. Prof. N.Arumugam, 2010. Embryology, Ecology and Physiology. Seventh edition. Saras Publications, Nagercoil, Tamilnadu.

Reference Books

1. P.S. Verma and V.K. Agarwal, 1999. Cytology, Genetics & Embryology. S.Chand & Company Ltd, New Delhi.
2. Veer Bala Rastogi and M. S. Jayaraj 2008. Physiology, Ecology and Evolution. Kedar Nath Ram Nath Publishers, Meerut, New Delhi.

II - SEMESTER

Allied – A - PRACTICAL-1

Total Credits: 2

DISSECTION

Cockroach : Mouth parts, Digestive system, Nervous system and Reproductive System.

Fish : Mounting of Brain and Digestive system

Spotters : Paramecium entire, Conjugation, Obelia colony, Obeliamedusa, Liver Fluke, Ascaris, Earthworm, Cockroach, Pila, Starfish, Amphioxus, Shark, Frog, Skeleton of frog, Quill feather, Frog Embryology, - egg, sperm, blastula and gastrula.

MODEL QUESTION PAPER FOR ALLIED PRACTICAL I

CIA PRACTICAL EXAM

Model Practical Exam = 10 Marks

Observation Note = 5 Marks

Attendance = 5 Marks

Total = 20Marks

END OF SEMESTER EXAMINATION

Time-3Hours

MaxMarks-30

- | | |
|--|----------|
| I : Dissect and display _____ system of _____ | 10 Marks |
| II : Mount the _____ of _____ on a watch glass | 5 Marks |
| III : Spotters – Identify and comment on | 10 Marks |
| IV : Record submission | 5 Marks |

QUESTION PAPER PATTERN for CIA and ESE

Theory (Core)

Maximum marks 75

Section A (10 x 1 = 10 marks)

Q.No. 1 to 10 : Multiple choice type alone with four distractors each.

Section B (5 x 5 = 25 marks)

Q.No. 11 to 15 : Either or / short notes type questions (one question 'a' or 'b' from each unit).

Section C (5 x 8 = 40 marks)

Q.No. 16 to 20 : Either or / essay type questions (one question 'a' or 'b' from each unit).

Break up Marks for CIA of Theory

CIA Exam	-	15
Assignment	-	5
Attendance	-	5
		<hr/>
Total		25
		<hr/>

QUESTION PAPER PATTERN for CIA and ESE

Theory (Allied)

Maximum marks 55

Section A (10 x 1 = 10 marks)

Q.No. 1 to 10: Multiple choice types alone with four distractors each.

Section B (5 x 3= 15 marks)

Q.No. 11 to 15 : Either or / short notes type questions (one question 'a' or 'b' from each unit).

Section C (5 x 6 = 30 marks)

Q.No. 16 to 20 : Either or / essay type questions (one question 'a' or 'b' from each unit).

Break up Marks for CIA of Theory

CIA Exam	-	10
Assignment	-	5
Attendance	-	5
		<hr/>
Total	-	20
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