

VIVEKANANDA COLLEGE

College with Potential for Excellence

(Residential & Autonomous – A Gurukula Institute of Life-Training)

(Affiliated to Madurai Kamaraj University)

(Re-accredited with 'A' Grade [CGPA 3.59 out of 4.00] by NAAC)

TIRUVEDAKAM WEST, MADURAI DISTRICT – 625 234



POST GRADUATE AND RESEARCH DEPARTMENT OF ZOOLOGY

**B.Sc. ZOOLOGY
SYLLABUS**

Choice Based Credit System

(For those who join in June 2015 and after)

ABOUT THE COLLEGE

Vivekananda College was started by Founder-President Swamiji Chidhbhavanandhaji Maharaj of Sri Ramakrishna Tapovanam, Tirupparaithurai, Trichy in 1971 on the banks of the river Vaigai which is blissfully free from the noise and hurry, the crowds and distraction of the city.

Vivekananda College is a residential college functioning under Gurukula pattern. It is Man-making education that is imparted in this institution, Culture, character and curriculum are the three facets of ideal education that make man a better man. This is possible only when the teacher and taught live together, The Gurukula system of training is therefore a humble and systematic attempt in reviving the age old GURUGRIHAVASA for wholesome education, Attention to physical culture, devotion to duty, obedience to teachers, hospitality to guests, zest for life, love for the nation, and above all, humility and faith in the presence of God etc. are the values sought to be inculcated. All steps are taken to ensure the required atmosphere for the ideal life training.

Vivekananda College, Tiruvedakam West, Madurai District-625 234 is an aided college established in 1971 and offers UG and PG courses. This College is affiliated to the Madurai Kamaraj University, Madurai. The College was reaccredited with 'A' grade (CGPA 3.59 out of 4.00) by NAAC in September 2015. The college was awarded College with Potential for Excellence by UGC in 2016.

VISION AND MISSION

Our Vision: To raise an army of neo-graduates steeped in the hoary culture of the motherland and dedicated to serving her as potential leaders in the manifold spheres of national effort.

Our Mission: A harmonious enrichment of physical, emotional and intellectual facets of a student's personality to bring out his inherent PERFECTION.

OBJECTIVES OF THE INSTITUTION

1. To inculcate spiritual, ethical, moral and social values in all disciplines of study.
2. Simultaneous education of the Hand, Heart and Head. Only a sound body can hold a sound mind.
3. Provide opportunities for all round development of the students and excellence in higher education, research and extension in different disciplines.
4. Disseminate the findings of research to the community to facilitate its development.
5. To provide society citizens of sterling character.
6. To cater to the needs of the educationally backward people – the most backward, scheduled caste and tribe.

GURUKULA ADMINISTRATIVE SET UP

Secretary	Swami Niyamananda Maharaj
Principal	Dr. B. Ramamoorthy
Vice-Principal & NAAC Coordinator	Dr. S. Raja
Dean & Controller of Examinations	Dr.E. Jayakumar
IQAC Coordinator	Dr. S.Raja
IGNOU Coordinator	Sri. V. Parthasarathy
ICT Coordinator	Dr. N.Nagendran
Grievence Cell Coordinator	Dr. T. Kaliappan
Sessional Examination	Sri.P.Jeyasankar, HOD of Physics
	Sri. N.S.Lakshmikanthan
	Sri. V.Rajendran
	Dr.N.Meenakshisundaram
	Sri. S.Ganeshan
	Sri. S.Kalimuthu

I Eligibility for Admission

Admission to B.Sc. – Zoology Programme is open to candidates with +2 pass with Maths, Physics, Chemistry, Biology, Botany and Zoology as major subjects.

For B.Sc. - Zoology course offered in the college, a pass in the Higher Secondary Examination conducted by the Government of Tamil Nadu or an examination accepted as equivalent there to by the Syndicate of the MKU, subject to such conditions as may be prescribed therefore.

II Duration

The course is for a period of three years. Each academic year shall comprise of two semesters viz. Odd and Even semesters. Odd semesters shall be from June to November and Even Semesters shall be from December to April. There shall be not less than 90 working days which shall comprise 450 teaching clock hours for each semester (Exclusive of the days for the conduct of university end-semester examinations) for each semester.

III CBCS System

All Programmes offered in the college are run on Choice Based Credit System (CBCS). It is an instructional package developed to suit the needs of students to keep pace with developments in higher education and the quality assurance expected of it in the light of liberalization and globalization in higher education.

IV Semesters:

An academic year is divided into two semesters. In each semester, courses are offered in 15 teaching weeks. Each week has 30 working hours spread over 6 days a week.

V Credits:

The term 'Credit' refers to the weightage given to a course, usually in relation to the instructional hours assigned to it. The total minimum credits, required for completing the B.Sc., Programme is 140. The details of credits for individual components and individual courses are given in the above table.

VI Course:

Each Course is to be designed variously under lectures / laboratory / seminar / practical training / assignments to meet effective teaching and learning needs.

VII Examinations:

i). There shall be examinations at the end of each semester, for odd semesters in the month of October / November; for even semesters in April/May. A candidate who does not pass the examination in any course(s) shall be permitted to appear in such failed course(s) in the subsequent examinations to be held in October / November or April/May.

ii). A candidate should get registered for the first semester examination. If registration is not possible owing to shortage of attendance beyond condonation limit / regulations prescribed or belated joining or on medical grounds, the candidates are permitted to move to the next semester. Such candidates shall re-do the missed semester after the completion of the programme.

VIII Condonation

Students must have 75% of attendance in each paper for appearing the examination. Students who have 65% to 74% of attendance shall apply for condonation in the prescribed form with the prescribed fee. Students who have 50% to 64% of attendance shall apply for condonation in prescribed form with the prescribed fee along with the Medical Certificate. Students who have below 50% of attendance are not eligible to appear for the examination. They shall compensate the shortage after the completion of the programme.

IX Question Paper Pattern

Time: 3 Hours

Maximum Marks: 75

SECTION-A (10 X 1 =10 Marks)

Answer All Questions

(1-5) Multiple Choice

(6-10) Short Answer Questions

Two questions from each unit

SECTION-B (5 X 7 = 35 Marks)

Answer All Questions

(11-15) Questions shall be in the format of either (a) or (b)

One question from each unit

SECTION-C (3 X 10 = 30 Marks)

Answer any THREE Questions

(16-20) One question from each unit.

X Evaluation:

Performances of the students are evaluated objectively. Evaluation is done both internally and externally. They will be assessed continuously through Internal Assessment System and finally through summative (end) semester examination. To assess internally, there will be three examinations conducted centrally with duration of two hours for each paper. In addition to continuous evaluation, the summative semester examination, which will be a written examination of three hours duration, would also

form an integral component of the evaluation. The ratio of marks to be allotted to continuous internal assessment and to end semester examination is 25: 75.

The pattern of internal valuation shall be:

Test: 20 Marks (the average of best two tests out of three tests)

Assignment: 5 marks

Total: 25 marks.

In respect of practical papers, the ratio of marks to be allotted to internal assessment and to summative (end) semester examination is 40 : 60. The internal marks will be calculated on the basis of marks secured at the model examination and marks awarded for the preparation of practical note book. The external marks will be calculated on the basis of the marks awarded by the internal examiner and the external examiner at the summative semester examination.

XI Passing Minimum:

There is no passing minimum for Internal Assessment. The passing minimum for external Examinations shall be 27 out of 75 marks and passing minimum for a paper is 40%.

XII Classification of Students:

Candidates who have secured not less than 40% of marks in each paper shall be declared to have passed in that paper. Candidates who obtain 40% and above but below 50% shall be declared to have passed in Third Class. Candidates who obtain 50% and above but below 60% of the aggregate marks in Part-III shall be declared to have passed in Second Class and those who obtain 60% of marks and above shall be placed in the First Class. Candidates who obtain 75% and above shall be declared to have passed in Distinction provided he has not re-appeared for any paper during the course of the study.

XIII Failed Candidates:

A candidate who has arrears in any paper in a semester examination will be permitted to proceed to the next semester classes. A candidate who has arrears may appear again in these failed papers at the November/April examinations. The internal assessment marks already obtained by him shall be carried over for the subsequent appearance also.

XIV Improvement of Internal Marks:

The student desirous of improving the internal assessment marks may request the Head of the Department. After obtaining permission from the Staff Council Meeting by the Head, the student may write improvement examinations in consultation with the course teacher. The marks obtained (when it is more than the previous marks) will be submitted to the Controller of Examinations for further adoption.

XV Study Tour

Students are expected to participate in the field visit and the study tours organized by the department. Though study tour/field trip carries no credit, it is compulsory for the students to attend whereby the students can get an opportunity to gain practical knowledge. As such, observational visit to selected social welfare organizations, industries, trade centres, exhibitions, places of historical importance and the like will be considered as extra-curricular activities.

XVI Extra Credits:

Extra 2 credits will be awarded to the final year Zoology Major Students for mini project on Voluntary basis at the VI Semester

Post Graduate and Research Department of Zoology

The Department of Zoology, Institutional Member of International Society for Zoological Sciences (ISZS), Beijing, China since 2009 was started on **21st June 1971** to teach biology for pre-university students. **B.Sc. Zoology Degree course** was started during the academic year 1973 – 74 and **M.Sc. Zoology** Post-graduate course in the year 1987 – 1988 and **M.Phil. Course** in 2007 – 2008. In the year 2009 the Madurai Kamaraj University recognized the Department as **Research Center in Zoology** for pursuing PhD. B.Sc. Zoology and M.Sc. Zoology are renamed and the syllabus is modified in tune with the syllabus proposed by the Tamil Nadu State Higher Education during the year 2008-2009. The change in name was approved by the committee formed by Madurai Kamaraj University. Now the Department has collaborations and academic interactions with industries, national and international universities/institutes. The Department had the unique distinction of having eminent teachers ever since its inception. Prof. A. Mani, Dr. R. Sugumaran, Prof K. Chandran and Prof. S. Srinivasan have served as the Heads of the Department from 1974-2012. In tune with the legacy, at present the Department has an exceptional feature of having well experienced teachers with high teaching potential. Now there are nine faculty members headed by Dr.P.Rajendran, among whom five have obtained their doctoral titles and others are pursuing their research work for their doctoral degree.

Vision

- Unravel hidden research potentials & Entrepreneurial avenues in Zoology
- Bring a behavioral change in subject knowledge, scientific aptitude and instrumental skills to attract students with best caliber
- Raise students to international standards

Mission

- Strategic plans for translating goals and objectives by curriculum design, good teaching methods and evaluation
- Academic and research collaborations
- Bio track-A forum to update knowledge
- Hands on training at Bio industries

Objectives

- Motivate scientific aptitude and skill development to pursue higher studies with excellence in research
- Bio-based industrial hands on training to develop entrepreneurial skills for self-employment
- Dissemination of research findings and cater the needs of the society

Department Highlights

- ❖ Academic and research collaborations with **International Universities**
- ❖ HOD of Zoology **Dr.P,Rajendran** - Joint Secretary of **International Shalihotra Committe** affiliated and recognized by International Bourgelat Committee, **France-2014**

- ❖ Department accreditation - **VetAgro Sup Campus Vétérinaire**, 1, avenue Bourgelat , 69280 Marcy l'Etoile, France for the World Veterinary Year Celebrations 2011
- ❖ Corporate member-**International Society of Zoological Sciences (ISZS), China-2009**
- ❖ Research project with **Ryukyus University, Okinawa, Japan- 2006-07**
- ❖ The **Department of Biotechnology**, New Delhi and **Tamil Nadu State Council for Science and Technology** have recognized the department to conduct Research Projects
- ❖ **The Indian Academy of Sciences**, Bangalore, **Indian National Science Academy**, New Delhi and the **National Academy of Sciences**, Allahabad, had conducted **Lecture- workshop** for Academicians, Students and Research Scholars.-2008
- ❖ **UGC** sponsored **Refresher course on Rural Biotechnology** besides organizing many Symposia/ Workshop at the regional level every year.
- ❖ The Madurai Kamaraj, Karpagam, Bharathiar, Mother Theresa and the Manonmaniam Sundaranar Universities have recognized the department to conduct **Research programmes** under the guidance of the faculties.
- ❖ The principal areas of research- Sericulture, Vermiculture, Microbial bioremediation, Biodiversity, Toxicology and Bio-control of Insect pests.
- ❖ More than **50 Research Papers** in reputed National and International journals.Written books in Microbiology, Microbial bioremediation, Biophysics, Biochemistry and Research Methodology in leading National publishing companies.
- ❖ International Science organization **Science Advisory Board**, Wilson Boulevard, Suite 250. Arlington, VA 22201 and National organization, **ENVIS**, Madras University has recognized our faculties as their members.
- ❖ Our faculties are recognized as International and National **resource persons** in their respective fields.
- ❖ **The Tamil Nadu State Government** has recognized the faculties of the Department by conferring **State Government Award**.
- ❖ **Under Graduate and Post Graduate students** of the Department have received **Best Paper Presentation Award** for Scientific Paper presentations in National Seminars.
- ❖ Faculties have received **several awards** from recognized scientific bodies and organizations

SCHEME OF EXAMINATION
(For those who join in June 2015 and After)

FIRST SEMESTER

Part	Study Component	Subject Code	Title of The Paper	Hours	Credit	Sessional Marks	Summative Marks	Total
I	Tamil	P1LT11	Tamil: Ikkalak Kavithaiyum Urainadaium	6	3	25	75	100
	Sanskrit	P1LS11	Fundamental Grammar & History of Sanskrit Literature – I					
II	English	P2LE11	Communicative English Spoken English – I	5 1	2	25	75	100
III	Core	09CT11	Invertebrates – I	4	4	25	75	100
	Core	09CT12	Invertebrates – II	4	4	25	75	100
	Core		Practical –I	2	-	-	-	-
	Allied	07AT01	Allied Paper Inorganic, Organic and Physical Chemistry-I	4	4	25	75	100
	Allied		Allied: Practical-I: Volumetric Estimation	2	-	-	-	-
IV	Non Major	09NE11	Human Anatomy	2	2	25	75	100
			TOTAL	30	19			

SECOND SEMESTER

Part	Study Component	Subject Code	Title Of The Paper	Hours	Credit	Sessional Marks	Summative Marks	Total
I	Tamil	P1LT21	Tamil: Ikala Ilakkiyamum Makkal Thagavaliyalum.	6	3	25	75	100
	Sanskrit	P1LS21	Poetry, Grammar & History of Sanskrit Literature – II					
II	English	P2LE21	Functional English	5	2	25	75	100
	English	P2LE22	Spoken English-I	1	1	100	--	100
III	Core	09CT21	Chordates-I	4	4	25	75	100
	Core	09CT22	Chordates-II	4	4	25	75	100
	Core	09CP23	Practical – I	2	4	40	60	100
	Allied	07AT02	Allied paper-II Inorganic, Organic and Physical Chemistry-II	4	4	25	75	100
	Allied	07APO3	Allied :Practical –I	2	1	40	60	100
IV	Non Major	09NE21	Food and Nutrition	2	2	25	75	100
			TOTAL	30	25			

THIRD SEMESTER

Part	Study Component	Subject Code	Title Of The Paper	Hours	Credit	Sessional Marks	Summative Marks	Total
I	Tamil	P1LT31	Kappiyamum Pakthi Ilakiyamum Nadakamum	6	3	25	75	100
	Sanskrit	P1LS31	Prose, Poetics & History of Sanskrit Literature-II					
II	English	P2LE31	English through Drama & Poetry Spoken English – II	4 1	2	25	75	100
III	Core	09CT31	Cell Biology	4	4	25	75	100
	Core	09CT32	Genetics	5	5	25	75	100
	Core		Practical-II	2	-	-	-	-
	Allied	08AT01	Allied paper-I : Plant Diversity	4	4	25	75	100
	Allied		Allied: Practical	2	-	-	-	-
IV	Skill Based	09SB31	Public Health and Hygiene	2	2	25	75	100
			TOTAL	30	20			

FOURTH SEMESTER

Part	Study Component	Subject Code	Title Of The Paper	Hours	Credit	Sessional Marks	Summative Marks	Total
I	Tamil	P1LT41	Sanga Ilakkiyamum Neethi Ilakkiyamum	6	3	25	75	100
	Sanskrit	P1LS41	Drama and History of Sanskrit Literature – IV					
II	English	P2LE41	English through classiscs	4	2	25	75	100
	English	P2LE42	Spoken English – II	1	1	100	--	100
III	Core	09CT41	Developmental Biology	4	4	25	75	100
	Core	09CT42	Physiology	5	5	25	75	100
	Core	09CP43	Practical II	2	4	40	60	100
	Allied	08AT02	Taxonomy of Angiosperms & Plant Physiology	4	4	25	75	100
	Allied	08CP03	Allied : Practical-II	2	2	40	60	100
IV	Skill Based	09SB41	Clinical Lab Technology	2	2	25	75	100
			TOTAL	30	27			

FIFTH SEMESTER

Part	Study Component	Subject Code	Title Of The Paper	Hours	Credit	Sessional Marks	Summative Marks	Total
II	English	P2LE51	English for Career Development	1	1	100	--	100
III	Core	09CT51	Biochemistry & Biophysics	6	5	25	75	100
	Core	09CT52	Biotechnology	6	5	25	75	100
	Core		Practical III	7	-	-	-	-
	Elective	09EP51	Biostatistics, Computer Appl & Bioinformatics	6	5	25	75	100
IV	Skill Based	09SB51	Sericulture	2	2	25	75	100
	ES	ESUG51	Environmental Studies	2	2	25	75	100
			TOTAL	30	20			

SIXTH SEMESTER

Part	Study Component	Subject Code	Title Of The Paper	Hours	Credit	Sessional Marks	Summative Marks	Total
II	English	P2LE61	English For Professional Excellence	1	1	100	--	100
III	Core	09CT61	Evolution	4	4	25	75	100
	Core	09CT62	Microbiology and Immunity	5	5	25	75	100
	Core	09CP63	Practical III	2+2	6	40	60	100
	Elective	09EP61	Dairy Farming	4	2	25	75	100
	Elective	09EP62	Environmental Biology	4	2	25	75	100
	IV	Skill Based	09SB61	Fish culture	2	2	25	75
Skill Based		09SB62	Vermitechnology	2	2	25	75	100
Skill Based		09SB63	Zoology for Competitive Examination	2	2	25	75	100
VE		VEUG61	Value Education	2	2	25	75	100
V	EA	EAUG61	Extension Activities		1	--	100	100
			TOTAL	30	29			

Total Number of Hours : 180

Total Number of Credits : 140

FACULTY MEMBERS

Dr. P. RAJENDRAN, M.Sc., M.Phil., Ph.D.,
Head, Associate Professor of Zoology

Dr. M. SHUNMUGAVELU, M.Sc., M.Phil., Ph.D., FAZ., FZSI., FRES(London)
Associate Professor of Zoology

Dr. E. JAYAKUMAR, M.Sc., Ph.D.,
Associate Professor of Zoology

Sri V. PARTHASARATHY, M.Sc., M.Phil., M.A., B.L.,
Associate Professor of Zoology

Dr. G. PONRAJ, M.Sc., M.Phil., Ph.D.,
Associate Professor of Zoology

Sri R. MUTHUPPANDI, M.Sc., M.Phil., (Ph.D. Under FDP)
Assistant Professor of Zoology

Dr. K. RAMESH KUMAR, M.Sc., M.Phil., B.Ed., Ph.D.,
Assistant professor of Zoology

Dr. M. PAVUNRAJ, M.Sc., M.Sc., (Med.Sociol), Ph.D.,
Assistant professor of Zoology

Dr. T. RAMESH, M.Sc., M.Phil., B.Ed., Ph.D.,
Assistant professor of Zoology

Sri K. KAMATCHI, M.Sc., M.Phil.,
Assistant professor of Zoology

SEMESTER – I
(For those who Join in June 2015 and after)

Part – III : Core Subject Theory		
Subject Title : Invertebrates-I		
Sub Code: 09CT11	Hours per week: 4	Credit: 4
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

To enable the students

- ❖ *Acquire knowledge on general characteristics and classification of Invertebrates*
- ❖ *Study organization of various organs and organ systems*

UNIT I: Phylum Protozoa

General characters of the phylum and classification up to class level

Type study : Paramecium

General topics : a) Locomotion in protozoa b) Nutrition in protozoa
c) Etiology and life cycle of protozoan parasites of man (*Entamoeba, Plasmodium and Trypanosoma*)

UNIT II: Phylum Porifera

General characters of the phylum and classification up to class level

Type study : Ascon sponge

General topics : a) Canal system in sponges b) Spicules of sponges.
c) Reproduction in sponges

UNIT III: Phylum -Coelenterata

General characters of the phylum and classification up to class level

Type study : *Obelia*

General topics : a) Polymorphism in hydrozoa b) Coral reefs
c) Ctenophora structure and affinities

UNIT IV: Phylum Platyhelminthes

General characters of the phylum and classification upto class level.

Type study : *Fasciola hepatica*

General topics : a) Origin of metazoa b) Origin of bilateria

UNIT V: Phylum Aschelminthes

General characters of the phylum and classification up to class level

Type study : *Ascaris*

General Topics : a) Helminthes parasites - *Enterobius* and *Wucheraria* - Disease and control
b) Parasites adaptations in Helminthes.

Text Book

Jordan, E.I. and Verma, P.S. 2014, Invertebrate Zoology, Chand & Co Limited, New Delhi.

References:

- Pechenik, Jan A 2014 – Biology of the Invertebrates, Tata Mcgraw – Hill Pub. Company Ltd., New Delhi
- Vasantika Kashyap, 2013, Life of Invertebrates, Second Revised Edition, Vikas Pub. House Pvt. Ltd., New Delhi
- Kotpal, R.L. 2012. Modern Text Book of Zoology, Invertebrates (Animal diversity – I), Rastogi Publications, Meerut
- Barnes, R.D. 2006, Invertebrate Zoology, IV Edition, Holf Saunders International edition
- Ekambaranatha Ayyar and Ananthakrishnan, T.N. 2005, A manual of Zoology, volume I, Invertebrate, Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai.

SEMESTER – I
(For those who Join in June 2015 and After)

Part – III : Core Subject Theory		
Subject Title : Invertebrates-II		
Sub Code: 09CT12	Hours per week: 4	Credit: 4
Sessional Marks: 25	Summative Marks: 75	Total Marks:100

Objectives

To enable the students

- ❖ *Understand basic aspects of invertebrate biology with their salient features*
- ❖ *Study of animal organization, comparative anatomy and functional morphology*

UNIT I: Phylum Annelida

General characters and classification up to class level with examples.

Type study : *Nereis*

General topics : a) Origin of coelom and metamerism
b) Adaptive radiation in polychaetes

UNIT II: Phylum Arthropoda

General characters and classification up to class level with examples.

Type study : Prawn

General topics : a) Peripatus - structure and affinities
b) Larval forms of crustacea.

UNIT III

External characters of Scorpion, Centipedes and Millipedes

General topics : a) Social Life of Insects
: b) Economic Importance of Insects

UNIT IV: Phylum Mollusca

General characters and classification upto class level with examples

Type study : *Pila*

General topics : a) Torsion in gastropods
b) Cephalopods as advanced Molluscs

UNIT V Phylum Echinodermata

General characters and classification up to class level with examples.

Type of study : Star fish

General topic : a) Larval forms of echinoderm b) Affinities of echinoderm.

Text Book

- Jordan, E.I. & Verma, P.S. 2011, Invertebrate Zoology, Chand & Company Ltd, New Delhi.

Reference

- Kotpal, R.L, 2011. Invertebrates, Rastogi Publications
- Kotpal, R.L. 2004. Modern Text Book of Zoology, Invertebrates (Animal diversity – I), Rastogi Publications, Meerut.
- Pechenik, Jan. A 2000, Biology of the Invertebrates, Tata Mcgraw – Hill Pub. Co. Ltd., New Delhi.
- Meglitsch Paul. A 1972. Invertebrate Zoology, Second Edition, Oxford University Press, London.
- Barrington, E.J.W. 1967 – Invertebrate Structure and Function. The English Language Book, Society, London.

SEMESTER – I
(For those who join in June 2015 and after)

PART III – Allied Course Theory		
Subject Title : Inorganic, Organic and Physical Chemistry		
Subject Code:07AT01	Hours per week:4	Credit:4
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives:

To enable the students

- ❖ *To become familiar in to the basic Principles Of Titrimetry*
- ❖ *To gain basic knowledge about Organic basic principles*
- ❖ *To have gain the basic concept of intermediates*
- ❖ *To be familiar with catalysis*

UNIT I: GENERAL PRINCIPLES OF TITRIMETRY 12 Hrs

Concept of Molecular weight, Formula weight, Equivalent weight – Concentrations of solutions – Molarity, Normality, Weight percentage. Principle of Titrimetry – Primary and secondary standards – Preparing standard solutions – Standardising the secondary standard solutions.

UNIT II: ORGANIC BASIC PRINCIPLES I 12 Hrs

Empirical formula – molecular formula – structural formula – Calculation of Empirical Formula and Molecular Formula from percentage composition. Isomerism – Structural isomerism – Chain isomerism – Position isomerism – Functional isomerism – Metamerism – Stereoisomerism.

UNIT III: ORGANIC BASIC PRINCIPLES II 12 Hrs

Nucleophiles – Electrophiles: Definition, types and examples. Types of reactions: Substitution – Addition – Elimination – Rearrangement and Polymerization – illustration with examples. Resonance and tautomerism.

UNIT IV: ORGANIC INTERMEDIATES 12 Hrs

Nature of valency of carbon in organic compounds – Tetrahedral arrangement of valency of carbon – bond breaking and bond forming in organic reactions – Homolytic cleavage – Heterolytic cleavage – Definition, types and examples of carbocation, carbanion and free radical.

UNIT V: CATALYSIS AND PHOTOCHEMISTRY 12 Hrs

Definition – different types of catalysis – acid base catalysis – surface catalytic reactions – definition and examples – auto catalyst –catalytic poisoning – promoters.

Definition of photochemical reactions – comparison of thermal and photochemical reactions – Chemiluminescence – Bioluminescence – Photosynthesis – Radioactivity – Applications of radioactive isotopes in biology and medicine.

TEXT BOOK

- Ancillary chemistry Dr. K.Ratinamuthu (Study material will be provided) Semester – I & II.

REFERENCE

- Advanced Organic Chemistry by Bahl & Arun Bahl, S.Chand & Company Ltd, NewDelhi, 2012 Edition.
- Text book of Inorganic Chemistry by P.L.Soni, Mohan Katyal, Sultan Chand & Sons, NewDelhi, 2010 Edition.
- Essentials of Physical chemistry Arun Bahl, B.S.Bhal & G.D.Tuli, S.Chand Publishing Company, New Delhi, 2010 Edition.

SEMESTER – I
(For those who Join in June 2015 and After)

Part – IV : Non-Major Elective		
Subject Title : HUMAN ANATOMY		
Subject Code: 09NE11	Hours per week: 2	Credit: 2
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

2hrs/week-30 hrs

Objectives

To enable the students

- ❖ *Study of various human tissues and skeletal systems*
- ❖ *Understand structure and functions of selected organs and organ systems*

Unit –I

Types of Tissues, Exoskeleton – Skin and hair
Endoskeleton- Skull, fore limb and hind limb

Unit –II

Structure of Tooth and alimentary canal
Structure of Kidney and Nephron

Unit-III

Structure of lungs
Structure of heart, blood and blood groups

Unit-IV

Structure of brain
Structure of eye and ear

Unit-V

Endocrine glands and their secretions
Male and female reproductive system

Text book

Best and Taylor – 1965. The living body – Chapman & Hall, London

Reference Book:

1. Marieb, M. 2006. Human Anatomy & Physiology, Dorling Kindersley (India) Pvt. Ltd., Delhi.
2. P.S. Verma and V. K. Agarwal 1985. Animal physiology, S. Chand & Company, New Delhi.

SEMESTER – II
(For those who join in June 2015 and After)

Part – III : Core Subject Theory		
Subject Title : Chordates-I		
Sub Code: 09CT21	Hours per week: 4	Credit: 4
Sessional Marks: 25	Summative Marks: 75	Total Marks:100

Objectives:

To enable the students

- ❖ *Acquire knowledge on general features, classification and evolution of chordates.*
- ❖ *Study of organs and organ systems to understand their functional aspects*

Unit I: Protochordata

General characters and classification with examples – *Amphioxus* - Detailed study, General characters of *Balanoglossus* and Ascidian. Affinities of *Balanoglossus*, Retrogressive Metamorphosis in Ascidian

Unit II: Vertebrata

General characters and classification upto classes with examples Agnatha – salient features of *Petromyzon*. External characters of *Scoliodon*, Frog, Calotes, Pigeon and Rabbit

Unit III:

Comparative anatomy in Vertebrates - Integumentary system, Digestive system and Respiratory system

UNIT IV

Comparative anatomy in Vertebrates - Circulatory system, Nervous system and Receptor organs

Unit V

Endoskeleton (Frog only) and Endocrine glands
Comparative anatomy of Urinogenital system

Text Book

- Ekambaranatha Ayyar, M. and Ananthakrishnan, T.N. 1995 – A Manual of Zoology Part II (Chordata) S. Viswanathan (Printers and Publishers) Pvt. Ltd., Chennai.

References

- Gupta R.C and Girish Chopra, 2003 - Comparative Anatomy of Chordates – R.Chand & Co, New Delhi
- Jordan E.L, 2003 – Chordate Zoology – S. Chand & Co, Chennai
- Kotpal, R.L. 2004 – Modern Text Book of Zoology Vertebrates, Second Edition, Rastogi Publications, Meerut.
- Harvey Pough F., Heifer, J.B. and McFarland, W.N. 1985 Vertebrate life,

Macmillan Pub. Co. New York.

SEMESTER – II
(For those who join in June 2015 and After)

Part – III : Core Subject Theory		
Subject Title : Chordates -II		
Sub Code: 09CT22	Hours per week: 4	Credit: 4
Sessional Marks: 25	Summative Marks: 75	Total Marks:100

Objectives

To enable the students

- ❖ *Basic understanding and the study of salient features*
- ❖ *Origin, organization, comparative anatomy and trace the evolution*

UNIT I

Origin and Phylogeny of Vertebrates, Amphibia, Reptilia and Birds

UNIT II

Parental care in fishes, Migration in fishes and Accessory respiratory organs in fishes

UNIT III

Parental care in Amphibia, Neoteny in Amphibia and Poisonous and non-poisonous snakes of South India

UNIT-IV

Flight adaptation and mechanism of flight in birds, Migration in birds and Flightless birds

UNIT V

Prototherians, Metatherians and Eutherians, Dentition in mammals, Aquatic mammals and Origin of mammals.

Text Book

- Jordan, E.L. and Verma, P.S. 2011, Chordate Zoology, S.Chand & Co Ltd

Reference books

- Kotpal, R.L. 2011, Vertebrates, Rastogi Publications
- Gupta R.C and Girish Chopra, 2003, Comparative Anatomy of Chordates – R.Chand & Co, New Delhi
- Newmann, 1981, The Phylum chordata, Biology of vertebrates and their kin, Satish Book Enterprises, Agra.

SEMESTER – II
(For those who join in June 2015 and After)

Part – III : Core Subject Practical -I		
Subject Title : Invertebrates & Chordates		
Sub Code: 09CP23	Hours per week: 2	Credit: 4
Sessional Marks: 40	Summative Marks: 60	Total Marks:100

SEMESTER– I - INVERTEBRATES

Objectives

To enable the students

- *Visualize and assimilate morphological and anatomical features by dissection demonstration, preserved specimens, charts and models*
- *Observe animals at their habitat & understand their biodiversity*

A. Demonstration

Cockroach- Dissection - Digestive system, Nervous systems & Reproductive system

Mounting - Mouth parts and Salivary glands

Earthworm-Dissection - Digestive and Nervous systems

Mounting - Body setae and Penial setae

House fly- Mounting - Mouthparts

B. Chart/Models

Pila - Digestive system and Nervous system

Freshwater mussel - Digestive system

C. Spotters

Protozoa *Amoeba, Plasmodium, Paramecium* – Entire and conjugation.

Porifera Gemmules and Spicules.

Coelenterata *Obelia* – Colony, Medusa, *Physalia*, Any One Coral, Sea Anemone.

Helminthes Liverfluke – Entire, *Taenia* – Entire and Scolex.

Nematoda *Ascaris* – Male and Female.

Annelida *Nereis*, Leech.

Arthropoda *Zoea, Nauplius*, Millipede and Centipede

Mollusca *Chiton, Sepia, Nautilus*, Octopus.

Echinodermata Starfish, Sea urchin, Sea cucumber.

D. Field Visit: Observation and identification of insect pests of agricultural crops.

Vist to Vermifarm and observación of Earthworm species Visit to

Apiary

**SEMESTE
R – II - CHORDATES**

Objectives

To enable the students

- *Visualize and assimilate morphological and anatomical features by dissection demonstration, preserved specimens, charts and models*
- *Field trip to observe animals at their habitat & understand their biodiversity*

A. Dissection and mounting

Fish – Dissection and observation of visceral organs

Shark- Mounting of Placoid scales

B. Chart/Models

Frog - Arterial system and Venous system, brain and spinal nerves

C. Spotters

Amphioxus, Balanoglossus, Ascidian, Petromyzon

Narcine, Anabas, Echines, Hippocampus, Eel

Rhacophorus and Alytes

Krait, Cobra, Viper, *Typhlops, Enhydrina, Draco* and Chaemeleon

Beaks and feet in birds, Ant eater and Bat

Osteology of Rabbit – Skull, Typical Vertebra, Pectoral and pelvic girdle – Fore limb and Hind limb

D. Field visit: Rameshwaram, Kurusadai Island & Mandapam - Biodiversity study of marine animals.

I YEAR UG SUMMATIVE PRACTICAL EXAMINATION

QUESTION PAPER PATTERN

Practical – 1 Invertebrates & Chordates (09CP23)

Time: 4 hrs

Maximum Marks: 60

- | | |
|------------------------|-------------|
| 1. Major Practical – 1 | 15 |
| 2. Minor Practical – 2 | (10 x 2) 20 |
| 3. Spotters | (5 x 3) 15 |
| 4. Record | 10 |

SEMESTER – II
(For those who join in June 2015 and after)

PART III – Allied Course Theory – II		
Subject Title : Inorganic, Organic and Physical Chemistry – I		
Subject Code:07AT02	Hours per week: 4	Credit: 4
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives:**To enable the students**

- ❖ *To learn the basic Principles Of Titrimetry*
- ❖ *To gain basic knowledge about pesticides*
- ❖ *To have gain the basic concept of amino acids*
- ❖ *To be basic concept of chemical bonding*
- ❖ *To know about the pollution and the effect.*

UNIT I: ACIDS AND BASES

12 Hrs

Definition of acids and bases- Arrhenius concept -Lowry-Bronsted and Lewis concept – Cady – Eley concept – Lux Flood concept – Usinovich concept of acids and bases- p^H concept.

UNITII: PESTIDCIDES, ANDFUNGICIDES

12 Hrs

Pesticides: Definition – Classification – Organic and inorganic pesticides – Mechanism of action – Characteristics – Safe handling of pesticides – Impact of pesticides on soil, plants and environment –Fungicides: Definition – classification – mechanism of action – sulfur, copper and mercury compounds.

UNITIII: AMINOACIDS, PROTEINS AND VITAMINS

12 Hrs

1. Classification – (Gabriel Phthalimide synthesis) – properties of amino acids – polypeptides – proteins – classification.
2. Vitamins Classification and biological functions of vitamins A, B₆, B₁₂, C, D, E and K(Structural elucidation not required).

UNIT IV: CHEMICAL BONDING

12 Hrs

Ionic Bond – Lattice Energy – Born-Haber Cycle – Properties of Ionic Compounds - Covalent bond – polar covalent bond – characteristics of covalent bond – hydrogen bond – Metallic bond – Fajan's Rule.

UNIT V: POLLUTIONS

12 Hrs

Air pollution: Definition – Composition of air – Chemical reactions occurring in air due to sunlight– Sources of air pollution – Classification and effects of air pollutants – Effects of CFC – Ozone layer- Green house effect.

Water pollution: Types – sources –water – sewage – industrial effluents – inorganic pollutants- water pollution control – water treatment.

TEXT BOOK:

- Ancillary chemistry K.Ratinamuthu (Study material will be provided)

REFERENCE

- Advanced Organic Chemistry by Bahl & Arun Bahl, S.Chand & Company Ltd, NewDelhi, 2012 Edition.
- Text book of Inorganic Chemistry by P.L.Soni, Mohan Katyal, Sultan Chand & Sons, NewDelhi, 2010 Edition.
- Essentials of Physical chemistry Arun Bahl, B.S.Bhal & G.D.Tuli, S.Chand Publishing Company, New Delhi, 2010 Edition.

SEMESTER – II
(For those who join in June 2015 and after)

Part – IV : Non-Major Elective		
Subject Title : FOOD AND NUTRITION		
Subject Code: 09NE21	Hours per week: 2	Credit: 2
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

2hrs/week- 30 hrs

Objectives

To enable the students

- *Reveal the types, source and importance of nutrients*
- *Expose disorders of malnutrition and food born diseases*

Unit-I Food as a source of nutrients

Definition- functions of food- recommended daily allowances for nutrients- nutritive value of foods- Balanced diet.

Unit-II Nutrients

Carbohydrates, Proteins Fats, Minerals and Vitamins.

Unit-III Disorders of Malnutrition

Kwashiorkor – Marasmus – Obesity – Anaemia -Epidemic dropsy and Deficiency diseases.

Unit-IV Food sanitation and Hygiene

Water- Food- food spoilage- Preservation- Control of Insects and Rodents

Unit-V Food Borne Diseases

Food poisoning-Poisoning organisms – Bacteria, Mold and Yeast.

Text book

- Mudambi R. and Rajagopal V. 2001. Fundamentals of Foods and Nutrition– Wiley Eastern Limited – New Delhi.

SEMESTER – III
(For those who join in June 2015 and after)

Part – III : Core Subject Theory		
Subject Title : Cell Biology		
Subject Code: 09CT31	Hours per week: 4	Credit: 4
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

To enable the students

- *Basic idea about animal cell, composition, organelles and their functions*
- *Introduction of microscopy and cytological methods*

Unit – I

Microscopy: Principles of light and electron microscope. Cell as the basic unit of living organism – Cell theory – isolation of cellular components – Homogenisation – fractionation – Centrifugation – Fundamentals of fixation – Staining methods

Unit- II

Plasma Membrane: Ultra structure – Chemical composition and functions, Endoplasmic reticulum: Structure, types and functions Golgi complex: Structure, Composition and functions Lysosome: Structure, forms, functions and origin.

Unit- III

Mitochondria: Structure, Chemical composition – Functions – Krebs's cycle – Oxidative phosphorylation, Ribosome: Structure – Chemical composition – Functions and origin.

Unit- IV

Nucleus & Nucleolus: Structure and functions, Chromosome: Structure of Giant Chromosomes Cell Cycle: Cell division – Mitosis & Meiosis - Cancer Cells – Cell aging.

Unit- V

Nucleic Acids: Molecular Structure of DNA & RNA – Types of RNA & DNA replication, Role of RNA and ribosome in protein synthesis, Regulation of protein synthesis (Lac Operon).

Text book

- Verma P.S. & Agarwal V.K. (2008) .Cytology, S.Chand & Co. New Delhi

Reference Books

- De Robertis E.D.P. & De Robertis E.M.F. (2001). Cell and Molecular Biology, CELLS

- David M.Prescott (1988). Principles of Molecular Structure and Functions, Jones and Bartlett Publications
- Gerald Karp (1985). Cell Biology, McGraw Hill Book Co.

SEMESTER – III
(For those who join in June 2015 and after)

Part – III : Core Subject Theory		
Subject Title : Genetics		
Subject Code: 09CT32	Hours per week: 5	Credit: 5
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

To enable the students

- *Mendelian concepts, application and modes of inheritance*
- *Interaction of genes and molecular events for chromosomal mapping*

UNIT-I

- a) Historical ideas- Mendel’s work- Mendel’s laws of inheritance- Mendelian ratio- Test cross- Back cross- Pleiotropism- Penetrance and expressivity.
- b) Non-allelic interactions- Complementary genes and Epistasis
- c) Supplementary genes, Duplicate genes, Collaborator genes and Lethal genes.

UNIT- II

- a) Definition- Mode of inheritance of Kernel colour in Wheat and Skin colour in Man- Difference between Polygenic and Mendelian inheritance; Multiple allele
- b) Definition- Mode of inheritance of Coat colour in Rabbit and ABO- blood groups in Man- Problems relating to inheritance of ABO- blood groups - Genetics of M-N blood group and Problems.
- c) Genetic basis of Rh- Blood groups and their significance

UNIT-III

- a) Definition- Linkage- Linkage groups- Kinds of Linkage- Detection of linkage- Significance.
- b) Crossing- over- Significance and evidences of Crossing-over.
- c) Chromosomal Mapping.

UNIT- IV

- a) Mechanism of Sex determination- various theories- Role of hormone and environment in sex determination.
- b) Sex linked inheritance in Man- Colour blindness, Haemophilia and Eye colour in *Drosophila*

- c) Inheritance of sex limited, sex influenced genes and holandric genes.

UNIT-V

- a) Extra chromosomal inheritance-Inheritance of Shell coiling in Snail, Kappa particles in *Paramecium* and Sigma particles in *Drosophila*.
b) Inborn errors of Metabolism.
c) Human Genetics- Role of Pedigree analysis, Twin study, Syndromes, Genetic counselling, Eugenics, euthenics and euphenics

TEXT BOOK

- Verma P.S. & VK Agarwal (2013). Genetics. S. Chand & Co, New Delhi.

REFERENCE BOOKS

- Sinnott, Dunn and Dobzhansky (1958). Principles of Genetics. Mc.GrawHill Pub. Co.
- E.J. Gardner et al (1991).Principles of Genetics. Wiley Eastern & Co
- E.A. Carlson, (1985). Human Genetics. Mc.Graw Hill Pub. Co.
- S. Sambamurthy (2005). Genetics.Narosa Publications, New Delhi.
- Williams S. Klug and Michael R. Cummings (2007). Concepts of genetics. Dorling Kindersley (India) Pvt. Ltd.

SEMESTER – III
(For those who join in June 2015 and after)

PART – III : Allied Subject Theory		
Subject Title: Plant Diversity		
Subject Code: 08AT01	Hours per week: 4	Credit: 4
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

- ❖ *To understand the life history of cryptogams*
- ❖ *To understand the evolution of plants*
- ❖ *To learn to identify the different groups studied*

UNIT I: ALGAE

General characters – Structure and reproduction of the following.

- a) Cyanophyceae - *Nostoc*
- b) Chlorophyceae – *Oedogonium*
- c) Phaeophyceae – *Sargassum*

UNIT II: FUNGI

General characters – Structure and reproduction of the following.

- a) Ascomycetes – *Penicillium*
- b) Basidiomycetes – *Puccinia*
- c) Lichens – Nature of association – habit and habitat - classification and morphology of lichen thallus. (Reproduction need not be discussed)

UNIT III: BRYOPHYTES

General characters – structure and life cycle of *Funaria*.

UNIT IV: PTERIDOPHYTES

General characters – structure and life cycle of *Lycopodium*.

UNIT V: GYMNOSPERMS

General characters – structure and life cycle of *Cycas*.

Text Books:

- An introduction to Embryophyta –Pteridophytes - N.S. Parihar, Surjeet Publications, Delhi, 2012 Ed.
- Introduction to Mycology - C.J.Alexopoulos, Willey Eastern Pvt. Ltd, 2013 Ed.
- Botany for Degree Students Gymnosperms - P.C. Vashishta, S.Chand & Company Ltd, Delhi, 2014 Ed.

Reference Books:

- Morphology of Gymnosperms – Coulter, M. Jhon, Surjeet Publications, Delhi, 2014 Ed.

- Botany for Degree Students Algae – P.C. Vashishta, S.Chand & Company Ltd, Delhi, 2014 Ed.
- An introduction to Embryophyta –Bryophytes - N.S. Parihar, Surjeet Publications, Delhi, 2013 Ed.

SEMESTER – III
(For those who join in June 2015 and after)

Part – IV : Skill Based Subject		
Subject Title : Public Health and Hygiene		
Subject Code: 09SB31	Hours per week: 2	Credit: 2
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives:

To enable the students

- *Inculcate the importance of public health and hygiene*
- *Consciousness on importance, source and quality of water*

UNIT I:

Scope of Public Health and Hygiene – Concepts of Health and Disease – Nutrition and Health: Classification of foods – Nutritional deficiencies – Vitamin deficiencies – Balanced diet – Nutritional requirements of special groups.

UNIT II:

Environment and Health: Water-sources – Water quality standards – Solid waste and excreta disposal – Sewage treatment.

UNIT III:

Communicable diseases: Respiratory infections- Measles, Mumps and Diphtheria, Intestinal infections- Poliomyelitis, Typhoid and Amoebiasis, Arthropod infections- Filariasis and Dengue , Zoonosis- Rabies and Japanese encephalitis, Surface infections: Tetanus and AIDS.

UNIT IV:

Non-Communicable Diseases: Coronary Heart Disease – Hypertension – Diabetes – Obesity – Occupational Health Hazards: Physical, Chemical, Mechanical, Biological and Psychological. Mental health- Causes of mental ill-health-alcoholism and Drug dependence.

UNIT V:

Health Education: Health planning in India – Health programmes in India – WHO – Non-governmental Voluntary Health Organizations. First aid and Nursing: Methods – Dressing – care — Preparations.

Text books:

- Park and Park, 1995. Text Book of Preventive and Social Medicine, M/s. Banarsidas Bhanot Publishers, Jabalpur.

- Verma P.S. 1998. Medical Zoology, Rastogi Publications, New Delhi.

Reference Book:

- Gopalan, C. 1985, Nutritive values of Indian foods, ICMR, New Delhi
- Rajvir Bhawar, 2008. Text Book of Public Health and Community Medicines, Published by Armed Forces Medical College, Pune.

SEMESTER – IV
(For those who join in June 2015 and after)

Part – III : Core Subject Theory		
Subject Title : Developmental Biology		
Subject Code: 09CT41	Hours per week: 4	Credit: 4
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives:

To enable the students

- *Introduce basic aspects of animal and human development*
- *Understand certain important process involved in embryonic development*

Unit-I

- a) Historical reviews-Theory of preformation, Theory of Epigenesis, Baer's law and Biogenetic law
- b) Gametogenesis- spermatogenesis, Oogenesis
- c) Types of eggs -structure of spermatozoa and ovum in mammals.

Unit-II

- a) Fertilization: Acrosomal reaction, cortical reaction, Physiological and biochemical changes, significance-parthenogenesis.
- b) Planes and types of cleavage patterns.
- c) Fate maps in Amphioxus, Frog and Chick.

Unit-III

- a. Blastulation and Gastrulation in Amphioxus, Frog and Chick.
- b. Organogenesis: Derivatives of Ecto, Meso and Endoderm-Development of Brain, Eye, Heart and Kidney.
- c. Foetal membranes in Chick

Unit-IV

- a) Human reproduction; Menstrual cycle-Menopause, pregnancy-Parturition-lactation-hormonal control -Types and Functions of Placenta.
- b) Amphibian metamorphosis: Anatomical and Biochemical changes, role of hormones in metamorphosis, Insect metamorphosis.
- c) Regeneration: Definition –mechanism and types- factors controlling regeneration

Unit-V

- a. Gradient theory- Organizer- concept, Spemann's experiment,

- b) Mechanism of Induction- Nuclear transplantation experiments.
- c) Differentiation- Types, processes, competence- Nucleo cytoplasmic interaction
- d) Human welfare and Embryology- Birth control, Infertility, Test tube Baby and Teratogenesis.

TEXTBOOK

- Veer Bala Rastogi 2016, Chordate Embryology, Kedan Nath Ram Nath, Delhi.

REFERENCE BOOKS

- Balinsky, B.I, 2012, An Introduction to Embryology, Indian edition Cengage Learning, India Pvt. Delhi.
- Berrill, N.J, 1986, Developmental Biology, McGraw Hill, New Delhi.
- Inderbir Singh and Pal G.P. 2011. Human Embryology, Mac Millan India Ltd. Delhi.

SEMESTER – IV
(For those who join in June 2015 and after)

Part – III : Core Subject Theory		
Subject Title : Physiology		
Subject Code: 09CT42	Hours per week: 5	Credit: 5
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

To enable the students

- *Organization of various organ system and their functioning mechanisms*
- *Study of animal behaviour and introduction of Biological clocks*

UNIT- I

- a) Definition and brief history of Physiology - the fields and branches of physiology
- b) Nutrition and types-Food- composition, classification - the physiological role of major nutrient and minerals; Vitamins-chemical nature of vitamins, classification and their role in animal life.
- c) Digestion and absorption of carbohydrate, protein and lipids in man.

UNIT- II

- a) Circulation- types of circulatory system, types of heart, Composition of blood, general functions of blood
- b) Origin and conduction of heart beat, blood clotting mechanisms,
- c) Respiration — Respiratory pigments, transport of respiratory gases-Oxygen dissociation curve, respiratory quotient.

UNIT- III

- a) Excretion- major excretory substances- classification of animals based on excretory products, excretion and water conservation
- b) Structure of human kidney, nephron and its ultra structure, mechanism of urine formation and excretion – hormonal control.
- c) Osmoregulation—definition, Osmoregulators, osmoconformers, stenohaline and euryhaline organisms, Osmoregulation in fishes and crustaceans - Thermoregulation – Suspended animation—Hibernation, Aestivation, Diapause.

UNIT- IV

- a) Nervous system- Ultra structure of a typical neuron, concept of synapse
- b) Nerve impulse conduction- neuro muscular junction- reflex action- reflex arc.
- c) Muscular system-ultrastructure of skeletal fibres-general properties of muscle fibre, muscle contraction.

UNIT- V

- a) Receptors- different types of receptors- structure and functioning of phonoreceptor (Human ear) and photoreceptor (Human eye)
- b) Endocrine system- structure, hormones and role of pituitary gland, thyroid gland, Para-thyroid gland, adrenal gland and Islets of Langerhans
- c) Chronobiology- biological rhythms and biological clock.

TEXT BOOKS

- Rastogi S.C. 2002.Essentials of Animal Physiology, Wiley Easernt Ltd. New Delhi.

REFERENCE BOOKS

- William S. Hoar 2004. General & comparative Animal physiology, Prentice-Hall
- Kunt Schmidt, 2000. Animal physiology, Eastern Economy Ed.
- C.L Prosser and F.A.Brown 1965. Comparative Animal physiology, W.B.Saunders's Co
- Dalela Verma. R.C. 1995. Animal physiology and related Biochemistry, Jai Prakash Nath and Co.

SEMESTER – IV
(For those who join in June 2015 and after)

Part III : Core Subject Practical II		
Subject Title : Cell Biology, Genetics, Developmental biology & Physiology		
Subject Code: 09CP43	Hours per week: 2	Credit: 4
Sessional Marks: 40	Summative Marks: 60	Total Marks: 100

SEMESTER –III – CELL BIOLOGY & GENETICS

Cell biology

Objectives

To enable the students

- Observation of different cell types and cell division
 - Histological techniques for the preparation of permanent slides
1. Study of Cell types – Observation of prepared slides
 2. Study of oral epithelium in human and Onion peeling
 3. Mitosis – Study of stages in Onion root tip meristem
 4. Meiosis – Study of stages of spermatogenesis in grass hopper testis –squash
 5. Micro technique- Preparation of permanent slides (Demonstration only).
 6. Identification of the genetic material(chromosome)by simple staining – Giant chromosome in *Chironomous* larva
 7. Spotters- Watson and Crick model of DNA, DNA Replication, Lac Operon, Clover leaf model of RNA and Coding dictionary

Genetics

Objectives

To enable the students

- Understand the Mendelian principles using colour beads
 - Understand Human genetics and *Drosophila* culture
1. A survey of simple Mendelian traits in man (Class population)
 2. Use of beads and models to illustrate Monohybrid , Dihybrid and Test cross
 3. Distribution of tasters and non tasters in the class population (PTC tasting)
 4. Polygenic inheritance of quantitative traits – observations and graphical representations may be made using height and weight of the students.
 5. ABO Blood grouping

6. Genetic basis and significance of Gynandromorphism, Shell coiling in *Limnaea*, Klinefelters, Down and Turner's Syndromes and Colour blindness and Hypertrichosis.
7. Fraternal, Identical and Siamese twins
8. *Drosophila* culture and identification of various stages.

SEMESTER –IV
DEVELOPMENTAL BIOLOGY & PHYSIOLOGY

Developmental Biology

Objectives

To enable the students

- Observation of embryonic and developmental stages of animals
 - Train the students to mount embryonic stages
1. Study of structure of egg of an insect, frog and Chick.
 2. Temporary mounting of Chick blastoderm.
 3. Effect of Thyroxin in tadpoles of Frog (Group study)
 4. **Spotters** a) Observation of Cleavage, Blastula and Gastrula of Frog (Slides), Whole mount of 24 hours and 48 hours chick embryo (Slides)
 5. Placental types – Observation

Physiology

Objectives

To enable the students

- Observe the physiological activities of animals
 - Test the products of physiological activities of animals
1. Effect of temperature on the opercular movement of fish.
 2. Study of oxygen consumption by a fish
 3. Test for the detection of excretory products (Ammonia, Urea and Uric acid).
 4. Study of blood corpuscles- Preparation of blood smear and counting of blood corpuscles using haemocytometer.
 5. A study on ECG strip and report
 6. Effect of activities on blood pressure in Man.

II YEAR UG SUMMATIVE PRACTICAL EXAMINATION
QUESTION PAPER PATTERN

Practical – II Cell Biology, Genetics, Developmental biology & Physiology
(09CP43)

Time: 5 hrs

Maximum Marks: 60

1. Major Practical – 2

(14 x 2) 28

2. Minor Practical – 1	10
3. Spotters	(4 x 3) 12
4. Record	10
Total	60

SEMESTER – IV
(For those who join in June 2015 and after)

PART – III : Allied Subject Theory		
Subject Title: TAXONOMY OF ANGIOSPERMS & PLANT PHYSIOLOGY		
Subject Code: 08AT02	Hours per week: 4	Credit: 4
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

- ❖ *To understand the life history of angiosperms*
- ❖ *To understand the mechanism of water movement in plants*
- ❖ *To know the various kinds of hormones involved in plants growth*

UNIT I:

Natural classification – Bentham and Hooker's classification.

UNIT II: Studying the following families:

Annonaceae, Caesalpiniaceae, Asclepiadaceae, Lamiaceae, Euphorbiaceae, Poaceae.

UNIT III: Plants and water relations

Osmosis – water potential concept – Plasmolysis – Mechanism of Absorption of water and transpiration Guttation.

UNIT IV: Photosynthesis

Structure of chloroplast – Light reaction – Dark reaction – C₃ and C₄ cycles only.

UNIT V: Growth and development

- a. Growth hormones – Auxins, Gibberellins and cytokinins.
- b. Physiology of flowering – Photoperiodism and Vernalization.

Text Books:

- Taxonomy of Angiosperms- B.P. Pandey, S.Chand & Company Ltd, Delhi, 2014 Ed.
- Plant Physiology – Ray Noggle .G, MJP Publishers, Chennai, 2010 Ed.
- Plant Taxonomy – OP. Sharma, McGraw Hill Education, India, Delhi 2010 Ed.

Reference Books:

- Plant Physiology – Suraj Mandal, Campus Books, New Delhi, 2014 Ed.

- Practical Taxonomy of Angiosperms – R.K. Singha, Inter. Publishing House, Delhi, 2013 Ed.
- Plant Physiology - Jain, V.K, S.Chand & Company Ltd, Delhi, 2013 Ed.

SEMESTER – IV
(For those who join in June 2015 and after)

PART – III : Allied Subject Practical		
Subject Title: Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms, Taxonomy And Plant Physiology		
Subject Code: 08CP03	Hours per week: 2	Credit: 2
Sessional Marks: 40	Summative Marks: 60	Total Marks: 100

1. Make suitable micropreparations of types prescribed in Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperm.
2. Identifying, observing and sketching the floral parts of the plants belonging to the families prescribed in the syllabus.
3. Demonstrating the following physiology experiments
 - I. Four leaf experiment
 - II. Foliar Transpiration
 - III. Ganong's Light screen
 - IV. Ganong's Potometer
 - V. Mohl's half leaf experiment
 - VI. Evolution of O₂ during photosynthesis
 - VII. Arc Auxanometer
 - VIII. Clinostat
 - IX. Phototropism
 - X. Kuhne's fermentation vessel

SEMESTER – IV
(For those who join in June 2015 and after)

Part – IV : Skill Based Subject		
Subject Title : Clinical Lab Technology		
Subject Code: 09SB41	Hours per week: 2	Credit: 2
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

To enable the students

- *Principles, applications and working mechanisms of biomedical instruments*
- *Haematological techniques*

UNIT I BIOMEDICAL DIAGNOSTIC LABORATORY-1:

Laboratory bio safety – general plan and organization –biomedical waste management, Applications of autoclave, centrifuge, microscope.

UNIT II BIOMEDICAL DIAGNOSTIC LABORATORY -2

Chromatography, Colorimetry and X-ray

UNIT III BIOMEDICAL DIAGNOSTIC LABORATORY -3

Ultra Sound scan, Doppler scan, CT scan and MRI

UNIT IV HEMATOLOGICAL TECHNIQUES

Haemoglobinometer, Haemocytometer, ECG and ESR

UNIT V BIOMEDICAL STANDARDS AND DISORDERS:

Lipid profile, urine profile, semen analysis, stool examination; anaemia, diabetes, jaundice, bleeding disorders, CHD and Arthritis.

Text Book

- Mukherjee, 1989. Medical Laboratory Technology - Volume I, II & III –L. McGraw Hill Publ. Co.

SEMESTER – V
(For those who join in June 2015 and after)

Part – III Core Subject Theory		
Subject Title : Biochemistry & Biophysics		
Subject Code: 09CT51	Hours per week: 6	Credit: 5
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

To enable the students in

- *Understanding the structure and functions of the biomolecules.*
- *To study effect of physical principles on the living system*

UNIT-I

- a. Acids, Bases, Dissociation constant, indicators, p^H, Buffers, Electrolytes, isotopes, isomerism.
- b. Biologically important chemical bonds and their importance.
- c. Classification, structure and properties of Carbohydrates, Lipids, Protein and Amino acids.

UNIT-II

- a. Structure and function of cholesterol, biosynthesis of cholesterol.
- b. Enzymes and Co enzymes: Classification and properties of enzymes-factors affecting enzyme action
- c. Theories of enzyme action-Mechanism of enzyme action- Role of Coenzymes and isoenzymes.

UNIT-III

- a. Metabolism of carbohydrates (Glycolysis, Glycogenesis, Glyconeogenesis and Glycogenolysis)
- b. Metabolism of Protein (deamination, transamination, transdeamination and urea synthesis)
- c. Metabolism of Lipid (β -oxidation, biosynthesis of glycerol)

UNIT-IV

- a. Biological oxidation: Definition- The respiratory chain-Oxidative phosphorylation
- b. Production of ATP and energy budget in the metabolism of major nutrients.

- c. High energy compounds-definition-biologically important high energy compounds.

UNIT-V

- a. Colloids –introduction. Types of colloidal solution-general properties of colloidal solution, Brownian movement, Osmotic pressure, dialysis, Donnan membrane equilibrium. Surface tension
- b. Adsorption, hydrotrophy, diffusion (passive and active), transport across the cell membrane- pinocytosis, transport of ions.
- c. Thermodynamics Laws-definitions of different terms, Free energy, heat energy, enthalpy, entropy, exothermic and endothermic reactions. Bioelectricity - definition and measurement-action potential-membrane potential, Redox potential.

TEXT BOOKS

- Deb A.C. 2003. Fundamentals of Biochemistry, New central book agency, Kolkatta
- Subramanian, M.A. 2005. Biophysics- Principles and Techniques, M.J.P. Publication, Chennai.

REFERENCE BOOKS

- Ambika Shanmugam 2003. Fundamentals of Biochemistry, Madras Medical College, Chennai
- Lehninger 2008. Biochemistry, Kalyani Publications, New Delhi
- R.N. Roy 2006. Biophysics, Kolkatta
- Salil Bose 1982. Elementary Biophysics, Jyothi books, Madurai.

SEMESTER – V
(For those who join in June 2015 and after)

Part – III : Core Subject Theory		
Subject Title : Biotechnology		
Subject Code: 09CT52	Hours per week: 6	Credit: 5
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

To enable the students to

- Know the concept of Biotechnology, tools and techniques.
- Understand the scope and application aspects of Biotechnology

Unit: I Introduction and Molecular Tools

- a. **Definition** – Scope and importance- Biotechnology as an interdisciplinary pursuit - Intellectual Property Rights (IPR) and Ethics in biotechnology
- b. **Enzymes** – Restriction endonucleases (Type I, II & III), DNA-ligase, Reverse transcriptase, DNA polymerase, Terminal transferase - Linkers and Adaptors
- c. **Vectors** – pBR322, Ti plasmid, SV40 - Basic ideas about Phagemid, Cosmid, Bacterial Artificial Chromosome (BAC), Yeast Artificial Chromosome (YAC), Transposons as vectors, Shuttle and Expression vectors.

Unit-II Recombinant DNA Technology

- a. Gene cloning in Prokaryotes - DNA-gene library, genomic library - cDNA library
- b. Integration of DNA fragments into vector - Transfer of rDNA into bacterial cell
- c. Screening of recombinants - Selection of recombinants - DNA-sequencing

Unit: III Techniques

- a. **Molecular techniques**- Agarose Gel Electrophoresis – RFLP, RAPD, Polymerase Chain Reaction (PCR) – Blotting Techniques- Molecular probes and Hybridization- DNA finger Printing- Microarray

- b. **Animal Cell culture techniques:** Basic aspects of Animal cell, tissue and organ culture - Immobilized cell culture - Insect cell culture-Whole embryo culture
- c. **Plant cell culture techniques:** *In vitro* culture technique – Introduction for plant cell, tissue and organ culture

Unit-IV Applied Biotechnology

- a. **Animal-**Transgenic animals-Sheep& Fish- Animal bioreactor and molecular farming - Products from animal cell culture - Tissue plasminogen activator (tPA), blood factor VIII, Erythropoietin (EPO)
- b. **Plant-**Disease resistant plant production-Production of stress resistant plants – Insect resistant transgenic plants
- c. **Microbes-**Biofertilizers, Biopesticides, Primary and secondary metabolites-Ethanol production- Single cell protein (SCP) - Biogas production- Biohydrogen- Mushroom culture

Unit - V Biotechnology in Medicine and Environment

- a. **Medicine:** Recombinant vaccines - Improved contraceptives & Vaccines to control fertility-Antibiotic production- Penicillin., Monoclonal antibody production and its applications
- b. DNA probes in diagnosis of diseases- Production of Human peptide hormones and insulin- Gene therapy
- c. **Environment:** Genetically Modified Organisms (GMOs) for the management of environmental wastes - Bioremediation – *in situ* and *ex situ* process- Microbial degradation of Xenobiotics – Biomining and Ore leaching.

Text Book

- Dubey R.C. 2012. A text book of Biotechnology, S .Chand and Company Ltd., New Delhi

Reference Books

- Das H.K. 2007. Text Books of Biotechnology, Wiley Precise text books.
- Channarayappa, 2006. Molecular Biotechnology Principles and practices, University Press.
- Satyanarayana U. 2008. Biotechnology, Books and Allied, Kolkatta
- Lohar S. 2005. Biotechnology Praksh MJP publications Chennai.

SEMESTER – V
(For those who join in June 2015 and after)

Part – III : Elective Subject Theory		
Subject Title : Biostatistics, Computer Application & Bioinformatics		
Subject Code: 09EP51	Hours per week: 6	Credit: 5
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

To enable the students to

- ❖ *Acquire knowledge on statistical applications in the study of biology, Applications of computers in biology & Bioinformatics tools*
- ❖ *Understand the application of statistical tools and problems solving*

UNIT- I

- a. Scope of Biostatistics- Types of Data- Importance of data collection
- b. Classification, tabulation and frequency distribution.
- c. Representation of data- Diagrammatic and graphical methods – Bar (Simple, Composite and Percentage) Pie, Histogram and Frequency curve.

UNIT – II

- a. Measures of Central tendency- calculation of Mean, (Arithmetic, Geometric, Harmonic) Median and Mode- Their merits and demerits.
- b. Measures of Dispersion – Calculation of range, Quartile deviation, mean deviation, standard deviation
- c. Variance and co-efficient of variation

UNIT-III

- a. Chi- square analysis- Calculation of gene frequency in a Mendelian population
- b. Probability- Theorem and calculation
- c. Students t- test and its significance

UNIT IV

- a. History, Classifications of computer-main frame, mini, micro and super computer

- b. Number systems -Decimal to binary. Popular software packages- MS word, power point, MS Excel
- c. Web and multimedia-Web browsers, E-mail-creating ID, management of mail.

UNIT V

- a. History and concepts of Bioinformatics, Biological databases; Types of databases.
- b. Basic and functional genomics - gene alignment, BLAST, Tools in BLAST. Multiple sequence alignment, CLUSTAL W
- c. Phylogenetic analysis, SwissProt- Expasy- Proteomic tools.

TEXT BOOKS

- Palanichamy S.and Manoharan. S. 2003, Statistical methods for Biologists, Paramount Pub, Palani
- Ignacimuthu, 2006, Basic Bioinformatics, Narosa Publishers, New Delhi

REFERENCE BOOKS

- S.Sundar Rao and J.Richard, 2004, An Introduction to Biostatistics, Prentice Hall of India Private Ltd, New Delhi
- B.N.Misra and Misra.,1983, Introductory Practical Biostatistics, Naya Prakash, Kolkatta
- D.R Westhead, J.H. Parish and R.M. Twyman 2003, Bioinformatics, Viva Books, Pvt.Ltd, New Delhi.
- Lohar,P.S 2009, Bioinformatics, MJP Publishers, Chennai
- Dan E. Krane & Michael L. Raymer, 2003, Fundamental concept of Bioinformatics, Pearson.Edu. New Delhi.
- IrfarA.Khan. Atiya Khanum, 2002, Recent advances in Bioinformatics, Ukaz. Pub. Hyderabad.
- Sanjay Saxena, Ms Office 2000 for everyone, Computer applications, Vikas Publishing house Pvt.Ltd, New Delhi.

SEMESTER – V
(For those who join in June 2015 and after)

Part – IV : Skilled Based Subject		
Subject Title : Sericulture		
Subject Code: 09SB51	Hours per week: 2	Credit: 2
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

To enable the students to

- *Understand sericulture as a cottage industry and exposure to silkworm rearing*
- *Mulberry cultivation and pathology*

UNIT I

History of Sericulture – Sericulture as cottage industry - Types of Silk worms – Mulberry and Non-mulberry– Economic importance of silk and its by products

UNIT II

Mulberry cultivation – Methods of propagation – Irrigation – Manuring - Diseases and Pests of Mulberry – Control measures.

UNIT III:

Life cycle of *Bombyx mori* – Voltinism - Silk gland – Rearing House and appliances – Rearing methods- Pathology of silk worm and control.

UNIT IV:

Characteristics of Cocoons – Stiffling – Process of Silk reeling

UNIT V:

Identification of silk worm larvae, pupa and Imago, Morphology of silk gland, DFL, Rearing appliances and Chandrika

Text Books

- G. Ganga of J. Sulochana Chetty, 2006. An Introduction to Sericulture, Oxford & IBH, Publishing Company, New Delhi

Reference books

- Aruga, H. 1996. Principles of Sericulture, Oxford & IBH, Publishing Company, New Delhi

SEMESTER – V (For those who join in June 2015 and after)

Part – IV : Common Subject Theory		
Subject Title : Environmental studies		
Subject Code: ESUG51	Hours per week: 2	Credit: 2
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

To enable students to

- *Disseminate information of Environment of national and international issues*
- *Environmental consciousness creation among the students*

Unit-I

Introduction – Nature, scope and importance of Environmental studies – Natural Resources and conservation – forest, water and energy.

Unit-II

Ecosystem – concept – structure and function, energy flow, food chain, food web and ecological pyramids

Unit-III

Biodiversity – definition, types – values – India, a mega diversity zone – Hotspots – Endangered and endemic species – threat to biodiversity and conservation

Unit-IV

Environmental pollution – Air pollution- causes and effect – Ozone depletion – Global warming – acid rain – Water pollution – Noise pollution – Solid waste management – Nuclear hazard

Unit-V

Human population and the environment – Population growth – variation among nations – effects of population explosion – family welfare programme – environment and human health.

Text books

- Murugesan, R. 2009. Environment studies Milleneum Pub. Madurai-16

SEMESTER – VI
(For those who join in June 2015 and after)

Part – III Core Subject Theory		
Subject Title : Evolution		
Subject Code: 09CT61	Hours per week: 4	Credit: 4
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

To enable students to

- *Understand the basic concepts of origin of life, Principles of evolution and evolutionary theories with evidences*
- *Focus on elemental forces of evolution*

Unit – I

- a) Origin of Life: Oparin-Haldane Theory,
- b) Evidences for Evolution from Morphology and comparative anatomy, Embryology, Physiology and Biochemistry.
- c) Lamarckism and Neo-Lamarckism

Unit – II

- a) Darwinism: Natural selection, Neo-Darwinism – Types of selection- Experimental evidences.
- b) Modern synthetic theory- Hardy-Weinberg's Law – Behaviour of genes in natural population
- c) Genetic Drift – Evolutionary Significance.

Unit - III

- a) Species Concept – Sub Species and Sibling Species, Allopatric and Sympatric Speciation, Isolating Mechanism – Types and Examples
- b) Distribution of Animals – Barriers – Continental Drift Hypothesis Extinction – Types and causes
- c) Mimicry and colouration.

Unit – IV

- a) The Geological Records – Geological time scale– Survey of Geological periods
- b) Fossils: methods of fossilisation –types

c) Methods of detection - Lead and Carbon Method.

Unit –V

- a) Adaptive Radiation in Mammals.
- b) Evolution of Man- Biological and cultural.
- c) Evolution of horse- Orthogenesis.

Text Book

- VeerBala Rastogi, 2005. Organic Evolution, Kedarnath Ramnath Pub.

Reference Books

- Strickberger, 1994. Evolution, ELBS Publishers.
- Moody P.A.1995. Introduction to evolution, Kalyani Pub, New Delhi.
- Dobzhansky, Th., Ayala, F. J., Stebbins, G. Ledyard & Valentine, J. W., 1977. Evolution W. H. Freeman and Company, San Francisco
- Chattopadhyay, 2002. Life – origin, Evolution and adaptation, Books and Allied P Ltd, Kolkata.

SEMESTER – VI
(For those who join in June 2015 and after)

Part – III : Core Subject Theory		
Subject Title : Microbiology & Immunology		
Subject Code: 09CT62	Hours per week: 5	Credit: 5
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objective

To enable the students to

- ❖ *Understand the basic principles of microbiology and immunology*
- ❖ *Applications of microbiology and immunology*

Unit I

- a. History and scope of Microbiology: Classification of microorganisms- Structural features of Bacteria, Virus, *Actinomycetes* and Fungi: Reproduction of Viruses (T4 Phage and HIV)
- b. Bacterial growth and nutritional requirements: Culture of Microorganisms – Types of culture media, Cultural characteristics of bacteria
- c. Isolation and enumeration, methods and maintenance of culture; preservation of microbes. Reproduction in Bacteria – Conjugation, Transformation and Transduction

Unit II

- a. Food Microbiology: Fermented food, food spoilage, food poisoning, physical and chemical methods in food preservation.
- b. Soil Microbiology: Common soil microbes; symbiotic and asymbiotic organisms; physiology of nitrogen fixation.
- c. Water Microbiology: Coliform bacteria and MPN, Estimation of Total Plate Count, Index, Faecal *Streptococci*.

Unit III

- a. Study of common bacterial and viral diseases of man – Causative organisms, mode of transmission, pathogenicity, symptoms and their preventive measures

- b. Diseases of Gastro – enteric System – Cholera, Typhoid. Respiratory System – Diphtheria, Tuberculosis
- c. Nervous System – Leprosy, Polio and Rabies – Genital System – AIDS, Fungal Diseases

Unit IV

- a. Immune system – Types of Immunity – Innate and acquired immunity: Passive and active
- b. Lymphoid organs – Primary and secondary organs, GALT & BALT. Lymphocytes – Sub-Population of T&B Cells
- c. Immunoglobulin – Types, structure and functions-Antigen-Antibody reactions – Vaccination principles – Vaccines – Preparations and immunization

Unit V

- a. Immune Response – Acquired immune response – Humoral immunity and Cell Mediated Immunity – Complements – classical and alternate pathway – MHC and HLA – Structure and function.
- b. Immune techniques – principles of precipitation – VDRL slide test, Double immuno diffusion and Immuno-electrophoresis – ELISA and Radio Immuno Assay.
- c. Hypersensitivity, transplantation – grafting – immune deficiency-Types and diseases.

Text Books

- Michael J.Pelczar, J.R. Ecschan, Noel R Krieg 2010. Microbiology an Application Based Approach, Tata McGraw Hill Education Private Ltd, NewDelhi
- Ananthnarayanan & Jayaram Panicker, 2010. Text Book of Microbiology, Universities Press

Reference Books

- Gangal S. and Sontakke, S. 2013 Text Book of Basic and Clinical Immunology, University Press (India) Pvt, Ltd, Hyderabad
- Hannigan B.M., Moore, C.B.T. and Quinn, D.G. (2010). Immunology, Viva books, New Delhi
- Sharma, P.D. 1998. Microbiology, Rastogi Publications
- Meena Kumari S. 2005 Microbial Physiology, M.J.P. Publishers , Chennai
- Vijaya Ramesh, K. 2005, Environmental Microbiology, M.J.P. Publishers Chennai
- Kuby, T. 1994. Immunology, P.G. Publishing Pvt., Ltd., New Delhi
- Tizard I.R. 1995. Immunology – An Introduction IV ED. Saunders College Publications, Philadelphia

SEMESTER – VI
(For those who join in June 2015 and after)

Part – III : Core Subject Practical III		
Subject Title: Bio-Series, Environmental Biology, Evolution, Dairy Farming, Microbiology & Immunology		
Subject Code: 09CP63	Hours per week: 7	Credit: 6
Sessional Marks: 40	Summative Marks: 60	Total Marks: 100

SEMESTER – V
**Biochemistry & Biophysics, Biotechnology, Environmental Biology,
Biostatistics, Computer Applications and Bioinformatics**

Biochemistry & Biophysics

Objectives

To enable the students to

- Experiments to observe certain physiological aspects
 - Analysis of blood and water samples
1. Study of salivary amylase enzyme activity. Effect of temperature and p^H
 2. Tests for albumen, Sugar and Urea in Urine.
 3. Qualitative tests for carbohydrate, protein and lipid.
 4. Study of p^H meter and measurement of p^H of various water samples.
 5. Estimation of Ascorbic acid (Vitamin-C)
 6. Analysis of Slide Preparation: Haemin and Uric acid crystals.

Biotechnology

Objectives

To enable the students to

- Screen industrially important microbes
 - Isolation of genomic and plasmid DNA
1. Primary screening of industrially important microbes
 2. Isolation of Genomic DNA
 3. Isolation of Plasmid DNA
 4. Demonstration of Agarose gel Electrophoresis
 5. Immobilization of yeast cells

6. PCR demonstration
7. Spotters - Typical gene cloning experiment, Electrophoretic apparatus, Southern blotting, Northern blotting and DNA sequencing

Environmental biology

Objectives

To enable the students to

- Observation of eco system
- Estimation of ecological parameters
 1. Morphometric study of fresh water pond
 2. Food web and Food chain
 3. Identification of fresh water and marine plankton
 4. Animal association
 5. Estimation of dissolved oxygen in water samples
 6. Measurement of soil temperature, pH and moisture

Biostatistics, Computer Applications and Bioinformatics

Objectives

To enable the students to

- *Apply statistical Programmes in biological Studies*
- *Handle the various basic tools of bioinformatics*

Biostatistics

1. Collection of Data
2. Frequency Distribution (with number of Seed Pods)
3. Calculation of Mean, Median, Mode and Standard Deviation
4. Chi-Square analysis for Mendelian Cross (Monohybrid & Dihybrid)
5. Probability with tossing of coins.

Computer Applications

1. MS Word and its applications
2. Excel – Bar diagram, Pie diagram and Histogram
3. Powerpoint
4. Data base retrivel from internet
5. E.Mail creation and sending documents

Bioinformatics

1. Browsing the internet using websites
2. Browsing the internet using search Engines
3. Searching the data bases
 - a. in NCBI
 - b. in PDB
 - c. in Swiss – Prot
4. Getting gene sequences from data bank
 - a. Nucleotide sequences
 - b. Protein sequences
5. Analysing Protein sequences using ROSMOL and JMOL
 - a. Structure
 - b. Bond length between molecules
 - c. Bond angle between molecules

SEMESTER – VI

Evolution, Dairy Farming, Microbiology & Immunology

Evolution

Objectives

To enable the students to

- Finger print study and experiments with beads to understand evolutionary concepts
 - Principles of natural selection and genetic drift in large and small population
1. Variation in finger prints in Man.
 2. Experiment with beads to illustrate gene pool concept & production of genotypes
 3. Experiment to study natural selection in large population
 4. Experiment to study principles of genetic drift in small population.
 5. Spotters- Homologous and Analogous organs, Evolutionary importance of *Peripatus*, *Limulus* and *Nautilus*, Study of vestigial organs, Petrified fossils (Stone fossil)

Dairy Farming

Objectives

To enable the students to

- **Observation of Dairy Process, testing and identification of breeds**
- **Detect the quality of milk**

1. Identification of breeds of Coe, and exotic cows
2. Computation of Ration for calf and pregnant cow
3. Experiment to identify the specific gravity of milk using Lactmeter
4. Detection of adulteration using MBR test, alcohol test and H₂SO₄ tests
5. Visit to Dairy Processing Centre and Veterinary hospital

Microbiology and Immunology

Objectives

To enable the students to

- Introduction of basic techniques in microbiology
 - Principles and uses of microbiological instruments
 - Dissection & observation of lymphoid organs
 - Introduction of basic techniques in Immunology
1. Cleaning of glass wares – Sterilising media and equipments
 2. Preparation of media for Microbes.
 3. Distribution of microbes in Nature- Soil, Water and in Air.
 4. Cultural characterisation of Bacteria
 5. Simple staining of bacteria
 6. Differential staining of bacteria – Gram staining.
 7. Microscopic examination of live bacterial population. Hanging drop technique
 8. Spotters: Autoclave/ pressure cooker and Colony counter.
 9. Dissection to show lymphoid organs in Chick.
 10. Observation of spleen cells-Slide.
 11. Bleeding and serum separation.
 12. Demonstration of agglutination by blood group antigen.
 13. Demonstration of R.B.C. and W.B.C. count.
 14. Spotters : Various Lymphoid organs in chick and human

III YEAR UG SUMMATIVE PRACTICAL EXAMINATION QUESTION PAPER PATTERN

Practical – III Bio-Series, Environmental Biology, Evolution, Dairy Farming,
Microbiology & Immunology (09CP63)

Time: 5 hrs

Maximum Marks: 60

1. Major Practical – 3	(10 x 3) 30
2. Minor Practical – 2	(5 x 2) 10
3. Spotters	(4 x 2.5) 10
4. Record	10
Total	60

SEMESTER – VI
(For those who join in June 2015 and after)

Part – III : Elective Subject Theory		
Subject Title : Dairy Farming		
Subject Code: 09EP61	Hours per week: 4	Credit: 2
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

To enable students to

- ❖ *Knowledge on various dairy breeds of indigenous and exotic breeds.*
- ❖ *Skill development in milk processing and associated activities.*

UNIT I:

- a. Scope of Dairy farming, Dairy breeds of India- Cow and Buffalow
- b. Exotic breeds-Cow
- c. Systems of breeding – Hybrid vigour – grading up. Merits and demerits of inbreeding and outbreeding.

UNIT II:

- a. Digestive system of Cow and glands related to digestion
- b. Common cattle feed – their nutritive value – minerals. Feed additives and silage preparation.
- c. Feeding and management of pregnant cow and calf

UNIT III:

- a. Viral diseases – rinderpest, Foot and mouth disease
- b. Bacteiral diseases – Mastitis, Anthrax, Haemorrhagic – septicaemia
- c. Metabolic diseases – Milk fever and bloat.

UNIT IV:

- a. Anatomy of udder and physiology of milk production
- b. Milk – composition, Pasteurization and Nutritive value, Colostrum and their importance, Techniques to produce quality milk-Techniques to detect milk adulteration, Spoilage of milk
- c. Preparation of Dahi, Butter,Ghee, Gova, Flavored milk, butter milk, ice cream .

UNIT V:

- a. Housing and equipments for dairy cows- Records to be maintained in a Dairy

- b. Artificial insemination – Semen collection and storage - Techniques
- c. Role of co-operative societies in milk production and marketing.

Text Books

- G.C. Banerjee 2012 - A Text book of Animal Husbandry – Oxford & IBH Publication, New Delhi.

Reference Book

- Sukumar De, 2008. Outline of Dairy technology, Oxford University Press
- Handbook of Animal husbandry, 2000. Publication and information division- ICAR, New Delhi

SEMESTER – VI (For those who join in June 2015 and after)

Part – III : Elective Subject Theory		
Subject Title : Environmental Biology		
Subject Code: 09EP62	Hours per week: 4	Credit: 2
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

To enable the students to

- *Study of reciprocal relationships between organisms and their environment*
- *Significance of environmental degradation, biodiversity conservation, environmental legislation and education*

UNIT-I

- a. Introduction and scope - Soil profile and fauna: Water- properties, water problem in terrestrial habitat.
- b. Light- light in relation to aquatic habitat, effect on organisms
- c. Temperature-range, thermal stratification, tolerance, homeothermic, Poikilothermic animals, adaptations to extremes of temperature and effects on organisms.

UNIT-II

- a. Interspecific relationship- Symbiosis- Mutualism and Commensalism, Antibiosis, Parasitism, Predation and Competition- Intraspecific relationship- Colonisation, aggregation and social organization.
- b. Ecosystem- Definition, components, Pond and forest as an ecosystem- trophic levels, Food chain and Food web- Ecological pyramids, energy flow and productivity
- c. Biogeochemical cycles- Carbon, Nitrogen and Phosphorous.

UNIT-III

- a. Community- Definition, structure and characteristics- Ecotone, edge effect and ecological niche
- b. Community dynamics- ecological succession and climax community.

- c. Population ecology- characteristics- Natality, Mortality, Dispersal, age pyramid, population estimation- Regulation and dynamics of population.

UNIT-IV

- a. Characteristics, Zonation and fauna and adaptations of fresh water, marine and estuary habitats
- b. Terrestrial habitats- forests, deserts, caves, fauna and their adaptations
- c. Parasitic adaptations- Ecto and endo

UNIT-V

- a. Environmental pollutants- Types- Air pollution- Sources, Effects and control measure
- b. Water pollution- Sources, Effects and control measures- Radioactive and Noise pollution
- c. Natural Resources-Wild life - Conservation and management.

TEXT BOOKS

- Verma, P.S and Agarwal, V.K 2000. Environmental biology, S.Chand & Co, New Delhi.

REFERENCE BOOKS

- Arora, M.P. 2011. Ecology, Himalaya Publishing house, New Delhi
- Rana, S.V.S. 2009. Essentials of Ecology and Environmental science, Prentice- Hall of India, New Delhi.
- Odum, E.P 1983. Basic Ecology, Saunder's College Publishing, New York.
- Rastogi, V.B and Jayaraj, M.S, 1984. Animal Ecology and distribution of animals, Kedarnath, Ramnath, Meerut.

SEMESTER – VI
(For those who join in June 2015 and after)

Part – IV : Skill Based Subject		
Subject Title : Fish culture		
Subject Code: 09SB61	Hours per week: 2	Credit: 2
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

To enable the students to

- ❖ *Impart the knowledge on common food fishes and enhancement of fish productivity*
- ❖ *Management and maintenance of fish pond and various types of fish culture*

UNIT I:

Scope and importance of aquaculture – Physical and Chemical characteristic features of water bodies– Types of culture systems (Traditional, intensive, semi-intensive and extensive)

UNIT II:

Selection of cultivable species – Site selection for fish farming – construction of fish ponds – Types of fish ponds – Maintenance and management of ponds. Fish Feeds

UNIT III:

Types of culture – Monoculture, Monosex-culture and Poly culture – Integrated fish farming (paddy cum fish culture – Induced breeding

UNIT IV:

Common fish diseases - Prevention and treatment

UNIT V:

Identification of common edible fishes
Live fish feeds
Ornamental fish culture

Text Books

- G. Santhanakumar 1993. Fish Culture, JJ publications

Reference books

- Khanna, S. 2011. An introduction to fishes, Silver line publications
- Pandey & Shukla, 2010. Fish & Fisheries, Rastogi Publications
- Santhanam. R. 1997. A manual of Fresh water Aquaculture, Oxford and IBH Pub.

SEMESTER – VI (For those who join in June 2015 and after)

Part – IV : Skill Based Subject		
Subject Title : Vermiculture Technology		
Subject Code: 09SB62	Hours per week: 2	Credit: 2
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

To enable students to

- *Role of vermiculture technology for sustainable agriculture and environmental management*
- *Salient features of exotic and indigenous earthworm species*

Unit I

Features of exotic species and indigenous species for vermicomposting

Unit II

Rearing and culturing – Vermicompost Unit – vermibed preparation
Precomposting - composting by earthworms – methods – management – harvesting of vermicast.

Unit III

Vermicast – characteristics – qualitative analysis - Vermiwash – characteristics – vermiwash unit - preparation, collection and analysis

Unit IV

Application of vermicomposting in Agriculture and horticulture – Economics of vermiculture

Unit V

Earthworms in pollution control and waste land development. Earthworms as food and medicinal importance - Role of KVIC and NABARD

Text book:

- M.Seetha Lekshmy and R.Santhi 2012. Vermiculture, Saras Publication

Reference books

- Gupta B.K. (2003). Vermicomposting for sustainable agriculture, Agrobios (India), Jodhpur

SEMESTER – VI
(For those who join in June 2015 and after)

Part – IV : Skill Based Subject		
Subject Title : Zoology for Competitive Examination		
Subject Code: 09SB63	Hours per week: 2	Credit: 2
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

To enable students to

- Appear for competitive exams
- Have overall subject knowledge essential for employment

UNIT I

a) Non - Chordata:- General organisation - Classification with diagnostic features up to classes. Protozoa:- Structure, reproduction and life history of Amoeba Paramecium, Trypanosoma, Plasmodium, Monocystis, Leishmania - locomotion, nutrition, economic importance. Porifera: Sponges canal system, skeleton, reproduction and economic importance. Coelenterata: - Diploblastic organization - life history of obelia and Aurelia, Metagenesis - Polymorphism in Hydrozoa Corals and Croal formation - relationships of Cnidaria and Acnidaria. Helminthes:- Structure and life history of Planaria, Fasciola, Teania, Ascaris and Wucheraria - parasitic adaptations - Helminthes in relation to man. Annelida:- Neries, earthworm and leech - Coelom and metamerism - modes of life in polychactes. Onychophora:- Structure, affinities and distribution of Peripatus. Arthropoda:- Prawn, Scorpion and Cockroach - Larval forms and parasitism in Crustacea - Mouth parts, vision, respiration and excretion Metamosphosis and social life in insects. Mollusca:- Freshwater mussel, pila, sepia - oyster culture and pearl formation. Echinodermata:- General organisation - Water vascular system Larval forms and affinities.

- b) Prochordata:- Amphioxus, Balanoglossus - Ascidian retrogressive Metamorphosis, neoteny and affinities. Chordata:- General Organisation - Characters, Outline classification Up to class level. Pisces:- Locomotion, migration, respiration, economic importance structure and affinities of Dipnoi. Amphibia:- Origin of Amphibians - Parental care - South Indian amphibians. Reptiles:- Origin - Conquest of land - adaptations to live on land Adaptive radiation - Temporal Vacuities - identification of poisonous and non-poisonous snakes - poison apparatus - south Indian examples. Birds:- Origin - flight adaptations - mechanism of flight - double respiration - migration - Flightless birds, their structure and distribution. Mammals:- Dentition, skin derivatives - distribution - adaptive radiation - Prototheria and Metatheria, their Phylogenetic relationship - South Indian examples.

UNIT II

- a) Cell and Molecular Biology:- Cellular Organelles - Structure and function - Plasma membrane, mitochondria, golgi bodies, endoplasmic reticulum and ribosomes - Nucleolus and nucleus - Chloroplast - Cell division (Mitosis & meiosis) - Chromosomes - DNA structure and function, replication of DNA, Genetic code - RNA and protein synthesis. Gene expression - Recombinant DNA, Genetic cloning - Genetic engineering, its uses in agriculture, biology and medicine - Sex chromosomes and sex determination.
- b) Genetics:- Laws of inheritance - Linkage, principle of gene mapping multiple alleles, blood groups - mutation (Natural and induced) Sex Linked and Sex Limited inheritance - Chromosome number and form ploidy - cytoplasmic inheritance - Karyotypes - Normal and abnormal genetic disorder - Bio-chemical genetics - regulation of gene expression in prokaryotes and Eukaryotes - population genetics - Eugenics. Mean, Median and standard deviation.

UNIT III

- a) Bio Chemistry:- Structure of carbohydrates, amino acids, proteins lipids - Glycolysis and Krebs's cycle - oxidation, reduction - oxidative phosphorylation - energy conservation and release, cyclic AMP, ATP enzymes - mechanism. Hormones, their classification biosynthesis and function. Physiology:- with reference to mammals, digestion, nutrition, balanced diet in man - assimilation, intermediary/metabolism. Composition of blood - Coagulation, Transport of oxygen,

Carbondioxide, Blood pigments, Mechanism of respiration, Muscles, mechanism of muscle contraction, Temperature regulation, Acid base balance and homeostasis, Nerve impulses and conduction, neurotransmitters. Receptors, photo, phono and chemoreception. Nephron and urine formation, Endocrine glands, ovary and pituitary organs and their inter relationship, Physiology of reproduction in humans, Normal Zoology development in insects and pheromones. Bioluminescence, Biological rhythms, Physiology of immune response Antigens - Immunoglobulins, humoral and cell mediated immunity. T & B cells, mechanism of antibody formation - AIDS.

- b) Development Biology:- Gametogenesis - fertilization - type of eggs - blastulation and gastrulation in Amphioxus, frog and chick morphogenetic movements - organizer potency, organogenesis with reference to hear, eye kidney brain - Formation and fate of extra embryonic membranes in chick. Placenta, types, functions, Regeneration - Aging and senescence - metamorphosis in Frog - Cancerous growth.

UNIT IV

- a) Environmental Biology:- Biotic and abiotic factors, their role, Intra and interspecific association. Biogeochemical cycles. Ecosystem, concept and components - energy flow, food chain, food web, trophic levels. Ecological succession, Community structure - Stratification. Population and Population dynamic - Habitat, ecology, adaptations in marine fresh water and terrestrial habitats. Wild life, need for conservation management and methods of conservation. Sanctuaries with special reference to Tamil Nadu. Pollution - air, water and land - Perspective policy planning for the environment.
- b) Evolution:- Origin of life - Evolutionary thought - Contributions of Lamarck Darwin and De Varies - present status of Darwinism and Lamrkism - modern synthetic concept - Hardy Weinberg Law - Polymorphism and mimicry in evolution. Specification, species concept - Isolation mechanisms and their role, role of hybridization in evolution. Fossils and Fossilization Origin and evolution of man - Cultural evolution and Biochemical evolution.

UNIT V

- a) Animal distribution: Zoogeographical distribution - Continental and island fauna - Continental drift - Discontinuous distribution adaptive radiation. Natural resources and their conservation. Alternative sources of energy.

- b) Economic Zoology:- Parasitism and Commensalism - Protozoan Parasites and diseases, helminth parasites and diseases of man and domestic animals - Beneficial and destructive insects Insect pests on crops and stored products - Control methods. Sericulture, apiculture, poultry, pisciculture and induced breeding, Shell fisheries, Aquaculture practices in Tamil Nadu and their impact on the environment and on agriculture.

Question paper pattern

Time: 2hrs

Multiple Choice Questions

(75 x 1) = 75 marks

SEMESTER – VI
(For those who join in June 2015 and after)

PART – IV : Common Subject Theory		
Subject Title : Value Education		
Subject Code: VEUG61	Hours per week: 2	Credit: 2
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

UNIT I - The heart of Education:

Introduction – Eternal Value – Integrated approach to value education - one for all and all for one – Responsibilities of a citizen – Habit Vs wisdom – purifying mind pollution – Respect for all Religions – Parents, teachers and fellow students – The need and benefit of exercise and meditation for students.

UNIT II The Value of Body and Life Energy

Introduction – what are the causes for pain, Disease and death? Three Basic needs for all living Beings – Personal Hygiene Five Factors of Balance in Life – The need and benefits of physical Exercise – The value and Base of Life energy – The value and Base of Bio-magnetism - You are your own best caretaker.

The Marvelous nature of mind

Introduction- Bio-magnetism – The base of the mind – characterisation of the Genetic Centre – metal frequency – practice for a creative mind - benefits of meditation.

UNIT III Analysis of Thought

Introduction – An Exposition on the nature of thought– six roots for thoughts – Introspection for analysis of thoughts-practical techniques for analysis of thoughts.

Benefits of Blessings - Effects of good vibrations – Make Blessing a Daily Habit

UNIT IV: Moralisation of Desire

Introduction – moralization of desire - Analyse your desires – Summary of practice.

Neutralisation of Anger:

Introduction – meaning – characteristics of Anger – Anger is a Destructive emotion – Anger spoils our relationship with others – Some common misconception about anger – will power and method success through awareness – method of neutralisation of anger.

UNIT V: Eradication of Worries

Worry is a mental disease – Nature’s Law of cause and effect – factors beyond our control – How to deal with problems – analyse your problem and eradicate worry

Harmonious Relationships

Introduction – Three angles of life – The value of harmony in personal relations – Love and Compassion – pleasant face and loving words – appreciation and gratitude to parents and teachers – Bringing needed reforms in educational institutions – Why should we serve others? Brotherhood – A scientific Basis for Universal Brotherhood protection of the environment – non-violence and the five fold moral culture.

Text Book: Value Education for Health, Happiness and Harmony

(Based on the Philosophy and Teachings of Swami Vethanthiri Maharisi)

Published By: Brain Trust, Aliyar A Wing of World Community Service Centre

SEMESTER – VI

(For those who join in June 2015 and after)

PART – V : Common Subject Theory		
Subject Title : Extension Activities		
Subject Code: EAUG61	Hours per week:	Credit: 1
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

UNIT-I: Community Development-I

Definition – structure and composition – community based issues – need for awareness – Developmental Programmes.

UNIT – II: Community Development–II

Rural Scenario – need of the Community – need for the community service – role of youth in community building – communal harmony – literacy – Educational Recreation.

UNIT – III: Volunteer Empowerment

Women’s Emancipation – formation of Youth Clubs – Self-Help Groups – Youth and Development.

UNIT – IV: Social Analysis:

Social issues – cultural invasion – media infiltration – human rights Education/Consumer Awareness – Adolescents Reproductive – HIV/AIDS/STD – Social harmony/National integration – Blood Donation.

UNIT – V: Introduction to NSS:

Basic Concepts – profile – aims – objectives – symbol – Motto – structure – Regular activities – Special Camping Programme – Adventure Programme – National Days and Celebrations.(Applicable to NSS Students)

(OR)

NCC - Origin – Organisation – Ministry of Defence – Armed forces – commands – Defence establishments in Tamil Nadu Civil Defence – Aid to civil authorities – Disaster management – Leadership – Man management – Adventure activities – Social service

Reference: National Service Scheme Manual (Revised), Ministry of Human Resources Development, Government of India.

B.Sc. Chemistry and B.Sc. Botany (Ancillary Zoology)
(For those who join in June 2015 and after)

Part – III : Allied Subject Theory		
Subject Title : Animal Organisation		
Subject Code: 09AT01	Hours per week: 4	Credit: 3
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

To enable the students to

- *Fundamental course that provides basic understanding of biology of invertebrate and chordate.*
- *Study of salient features of invertebrates and chordates*

Unit-I

- a. Principles of taxonomy – Binomial nomenclature - Animal Organisation – body types – protozoa – metazoa – types of coelom – types of symmetry
- b. Outline classification of Invertebrates and the salient features of the Phyla with examples
- c. Outline classification of Chordates upto classes giving examples

Unit – II

- a. Feeding and digestion in Amoeba, Hydra and Frog.
- b. Respiration in Amoeba, Cockroach
- c. Gills in Fish and Lungs in bird.

Unit – III

- a. Circulatory system in *Paramecium*, Earthworm and *Calotes*.
- b. Locomotion in Amoeba, *Paramecium* and Earthworm
- c. Flight mechanism in Pigeon.

Unit – IV

- a. Nervous system of Earthworm
- b. Human brain and ear
- c. Receptors – photoreceptors of Euglena, insects and man

Unit – V

- a. Excretion in Amoeba and Earthworm

- b. Excretion in Man-Structure of kidney and urine formation.
- c. Reproductive system of Rabbit.

Text books

- Nair, Leelavathy, S., Soundrapandian, N., Murugan, T. 2014. A Text Book of Invertebrates, Saras Publications.

Reference Books

- Jordan & Verma, 2011. Chordate Zoology, S.Chand & Co Ltd
- Kotpal, R.L.2011. Invertebrates, Rastogi Publications
- Kotpal, R.L.2011. Vertebrates, Rastogi Publications
- Thangamani, A., Prasannakumar, S., Narayanan, L.M., Arumugam, N. 2014. A Text Book of Chordates, Saras Publications

B.Sc. Chemistry and B.Sc. Botany (Ancillary Zoology) (For those who join in June 2015 and after)

Part – III : Allied Subject Theory		
Subject Title : Biology and Human welfare		
Subject Code: 09AT02	Hours per week: 4	Credit: 3
Sessional Marks: 25	Summative Marks: 75	Total Marks: 100

Objectives

To enable the students to

- *Knowledge on viral, bacterial, fungal, protozoan and helminthes disease and their control.*
- *Entrepreneurial avenues in Sericulture, Fish culture, Vermiculture, Mushroom and Apiculture.*

Unit I

- a. Structure of a typical virus
- b. Brief account on Viral diseases
- c. Polio, Rabies and AIDS.

Unit-II

- a. Structure of typical Bacteria
- b. Brief account on Bacterial diseases
- c. Cholera, Tuberculosis and Tetanus.

Unit III

- a. Fungal diseases – Ringworm and Black piedra
- b. Protozoan diseases – Amoebic dysentery and Malaria
- c. Helminth parasites – *Ancylostoma* and *Wucheraria*

Unit IV

- a. Sericulture – Scope – Silkworm biology –Life cycle – common diseases and control- Silkworm rearing methods.

- b. Fish culture – Scope and Importance – Types of culture – Identification of common edible fishes - Induced breeding - common diseases and control – maintenance of fish pond.
- c. Vermiculture – Features of exotic and indigenous species – rearing and culturing – Characteristics of Vermicast and Vermiwash – Economics of vermiculture

Unit V

- a. Biogas production – characteristic features of biogas – production of biogas – uses
- b. Mushroom culture – nutritive and medicinal value – Morphology of Indian oyster mushroom – cultivation of paddy straw mushroom - Advantages
- c. Apiculture – biology of honey bees – bee hive – honey extraction – medicinal value – bee wax and bee venom

Text Book:

- Ananthanarayanan, 2004. Text Book of Microbiology, Orient Longman.

Reference Books

- Park and Park 2011. Text Book of Preventive and Social Medicines, M/s Banarsidas Bhanot Publications.
- Gupta 2003. Vermicomposting for sustainable agriculture, Agrobios (India), Jodhpur
- Nita Bahi 1988. Handbook on Mushrooms, Oxford and IBH.
- Ganga & Sulochana shetty 1997. An Introduction to Sericulture, Oxford and IBH.

B.Sc. Chemistry and B.Sc. Botany (Ancillary Zoology)
(For those who join in June 2015 and after)

Part – III : Allied Subject Practical		
Subject Title : PRACTICAL-I		
Subject Code: 09AP03	Hours per week: 2	Credit: 1
Sessional Marks: 40	Summative Marks: 60	Total Marks: 100

Objectives

To enable the students to

- *Identification of all classes of invertebrates and vertebrates.*
- *Unrevealing anatomical features of invertebrate and chordate*

1. Observation of the following -Spotters

- *Paramecium- conjugation*
- *Obelia (entire)*
- *Hydra (entire)*
- *Taenia (entire)*
- *Scolex of Taenia*
- *Ascaris male and female*
- *Neries (entire)*
- *Penaeus*
- *Pila (entire) and shell of Fresh water mussel)*
- *Starfish (entire)*
- *Amphioxus, Balanoglossus, Scoliodon*
- *Cobra, Viper, Pigeon*
- *Skull of Pigeon dorsal and ventral view*
- *Pectoral girdle of pigeon*
- *Fore and hind limb of Frog*
- *Synsacrum of bird*

2. Simple staining of Bacteria from milk and sewage water.

3. Mounting of mouth parts of Mosquito, Housefly and Honey bee.

4. Identification of Ascaris (male & female) and Tapeworm.

5. Identification of egg, larva, pupa and adult of silk moth.
6. Dissection to show silk glands.
7. Common appliances used in silkworm rearing and apiculture.
8. Visit to Biogas production, Mushroom culture and Fish culture centres.

ANCILLARY SUMMATIVE PRACTICAL EXAMINATIONS

QUESTION PAPER PATTERN

Practical – I Animal Organisation, Biology and Human Welfare (09AP03)

Time: 3 hrs	Maximum Marks: 60
1. Major Practical	20
2. Minor Practical	15
3. Spotters	(5 x 4) 20
4. Record	5
Total	60

DEPARTMENT OF ZOOLOGY

CERTIFICATE COURSE IN PHOTOGRAPHY

UNIT-I: HISTORY AND SCOPE OF PHOTOGRAPHY

- a) History of Photography-Conventional and Digital
- b) Scope of Photography
Photography as an art - Scope in commercial field - Social functions - Industrial field - Scientific field-Political field

UNIT-II: PRINCIPLE OF PHOTOGRAPHY

- a) Properties of light
Dispersion – Reflection – Transmission – Absorption
- b) Controlling of light
Pin hole – Lenses
- c) Image formation
Direct image – Inverted image
- d) Recording of an image.
- e) Studio lights

UNIT-III: FOCUS ON CAMERA

- a) Types of Camera
Box type, TLR, SLR, Professional, Miniature, Subminiature, Underwater, Space, Cine, Video and Digital SLR.
- b) Basic Components of a Camera:
Lens, Shutter, diaphragm, viewfinder, film chamber etc.
- c) Accessories of a Camera:
Lenshood, Lens cap, Tripod stand, Cable release, Lux meter, Flash unit, Camera case and Tripod Panoramic views.
- d) Working mechanism of TLR and SLR Cameras.

UNIT-IV: STUDY OF LENS FILMS AND FILTERS

- a) Lens:
Concept, focal length, Compound lens and Standard lens, Wide angle lens, Telephoto lens and Zoom lens and their application.
- b) Films:
Classification – Contrast, Resolving Power, Slow, Medium and Fast films.
- c) Filters:
Types and application.

UNIT-V: EXPOSURE TECHNIQUE

- a) Composition
- b) Exposure – Lighting Condition – aperture setting – Judging the distance – Shutter speed selection – Exposure on moving objects – Dept of field – use of flash – Silhouette.

UNIT-VI:

- a) Digital Photography
- b) Basic Principles & Parts of a Digital Camera
- c) Operation of Digital Camera
- d) Loading the pictures on to a computer-Memory Card and Reader.
- e) Copying the pictures on a CD
- f) Printing the pictures in different ways.

PRACTICALS:

1. Demonstration of various parts of a Camera.
2. Demonstration of various types of a Camera.
3. Demonstration of Inverted image formation.
4. Observation of various types of lenses.
5. Observation of accessories used for a camera.
6. Composing technique.
7. Demonstration of Photoshop an digital creative technique.

**DEPARTMENT OF ZOOLOGY
CERTIFICATE COURSE IN VIDEOGRAPHY**

UNIT-I:

History and Scope

UNIT-II:

Basic Techniques of Camera work – Camcorder functions – Aperture and exposure – Depth of field – Focusing – Framing – Panning – Tilting – the Zoom lens – handheld Camera work – using a tripod – recording sound – colour and contrast – basic lighting.

UNIT-III:

Controls and functions in a video camera – M3000 play back – playback via T.V.Set.

UNIT-IV:

Preparations: Using the Battery pack – setting the clock – setting the view finder – Inductions in the view finder – warning and alarm indicators – inserting the video tape – Using the on-screen display – others.

UNIT-V:

Shooting: Holding the Movie Camera for shooting – shooting steps – checking the recorded scene – camera search – shooting with clean edits – shooting a still picture – shooting with strobe effect – shooting with zoom function – shooting with fade function – Tracer function – shooting backlit scenes – iris adjustment – shooting in the dark – shooting with the macro function shooting fast moving subjects.

UNIT-VI:

Dubbing and editing: Dubbing – Insert editing – Audio dubbing.

UNIT-VII:

Mixing:

- a) Features of a mixing unit – precautions – Major operating controls and their function – system connections – operating procedure – mix/wipe effect – digital effect – super imposing effect and back colour – Fade control – Audio mixer.

- b) Character generator and pattern maker. Features and use.
- c) Chromo key functions.

UNIT-VIII:

Trouble shooting and service: symptoms – Cause – Action in power source, shooting and play back.

UNIT-IX:

Cautions: Video head clogging – condensation forms inside the video camera – cautions for use of video camera – cautions for surroundings – cautions for connections – cautions for storage and transportation – after use – cautions for the battery pack – cautions for storing the battery – cautions for the AC. Adaptor.

UNIT-X:

Standard and optional – Accessories of a video camera.

UNIT-XI:

Video Coverage: Children – informal parties – Family outings – special occasions – wedding and ceremonies – Travel videos – sports and action – nature – adventure activities.

UNIT-XII:

Making documentaries: Writing a commentary – Demonstration videos – promoting a cause – Business Videography – Advertisement movies – Science pictures – Drama and video film – production script.

UNIT-XIII:

Video Profession: Video Library – Video Theatre – Video studio – Editing Theatre – Video Tape industry – Video and Law.

PRACTICALS:

1. Study of controls and functions in video camera M 3000
2. Preparation for shooting
3. Shooting practice – Panning Tilting and Zooming
4. White Balance
5. Shooting with different functions – Mix/wipe effect, digital effect, superimposing and fade control.
6. Recording of Date and Time
7. Editing and Audio Dubbing
8. Trouble shooting and remedies
9. Character generation and pattern making (demonstration only)
10. Operation of mixing unit – demonstration only
11. Video coverage – Video making for an advertisement
12. Video coverage of a live programme – Each student is expected to produce a video coverage.
13. Script writing for a given subject.

DEPARTMENT OF ZOOLOGY
CERTIFICATE COURSE IN GANDHIAN THOUGHT
PART I-MAHATMA GANDHI'S LIFE

1. The Beginnings of a Mahatma: The Early Life of Gandhi: Settings and Tradition, Home, School, and Other Influences – Early Marriage – His London Life: The Light begins To Shine.
2. The South African Laboratory And The Making of the mahatma: A fateful journey and transmutation – From a barrister to a Peace maker-working for the oppressed and the victims – Religious guest – Discovery of sarvodayas – From family life to Community Life – Ashram experiments – Self-control – Living With Nature: Bread Labour Nature Cure And Simple Life – Beginning of Constructive work – discovery of satyagraha – experiments in education.
3. The Indian Phase I: Under Standing India – Shantiniketan to Sabarmathi – micro Level Satyagraha for the welfare of the peasants and workers: champaran, Ahmedabad and kheda satyagrahas – Birth of khadi – Rowlatt Bills – Khilafat Movement – Noncooperation movement.
4. The Indian phase II: Growth of constructive work civil disobedience, salt satyagraha, Round table conferences, Constructive work further evolved – Individual satyagraha & Quit India movement – Quenching the communal Fire and shanti esna experiments – The supreme sacrifice and beyond.

PART II – MAHATMA GANDHI'S AGE

5. The British expansion in India and the early Indian Resistance – 1857 Revolt – Birth of Indian National Congress-Moderate(Gopalakrishna Gokale) Extremists (Bank Gangadhar Tilak) and Violent fighters (Bhahavat singh,V,V,S,IYER)
6. Ruin of Indian Economy - Growth of poverty and famines In India – Alternative to British exploitation (Khadi & Village Industries) – colonial education policy and crisis in Indian education - National education movements.
7. Forerunners of ghandhi: Raja ram Mohan Roy, Dayanandha saraswadhi, Ramakrishna and Vivekananda, Ramalinga Vallalar, Raukin,Thoreau and Leo Tolstoy.

8. Contemporaries of Ghandah Tagore, Jawharlal Nehru, Subas Chandra Bose, B.R Ambedkar, E,V,Ramasamy, C.Raja Gopalachari, K.Kamaraj, Khan Abdul Kaffar Khan,Jinnah, C.F.Andrews, Roman Rolland, Kasthuribai Gandhi.
9. The Global Sense: Growth of Ideas of equality, Liberty, fraternity and democracy – Growth of War, Violence, colonialism. Imperialism, totalitarianism and fundamentalism and seeking alternatives – Gandhi evolves a new way.

Books Recommended:

M.K.gandhi : An autobiography or story to the story of my experiments with Truth. : Satyagrah in South Africa
 B.R.Nanda : Mahatma Gandhi-A Biography
 Louis Fisdler: Life of Mahatma Gandhi.

DEPARTMENT OF ZOOLOGY
CERTIFICATE COURSE IN GANDHIAN THOUGHT
PAPER II – SARVODAYA AND NONVIOLENCE – 40942

PART I – SARVODAYA

1. Sarvodaya: Its meaning and development significance of Antyodaya.
2. Economics Dimension: Removal of mass poverty and providing full and meaningful employment: Khadi and village industries – Appropriate Science and Technology – Self – reliance and self-sufficiency – bread labor – Simple living – Swadeshi – need based and not greed base – people oriented, Eco – friendly, Sustainable development – Decentralization – Nonviolent and Peace Economy.
3. Political Dimension: Nonviolent and good governance at all levels – Gram Swaraj: Autonomous community life and local self government – participatory and partyless and accountability – Rights, duties and responsibilities – means and ends – Towards a Global ethic and Community.
4. Social Dimension: Individual, family, community – Liberation of the weaker sections: Uplift of women, removal of untouchability and discriminations Communal unity and pluralism – prohibition, Sanitation and hygiene.
5. Sarvodaya in Practice: Concept of Dhana (Vinoba Bhave), Jeevan Dhani and Total Revolution (Jeyaprakash Narayan), Sarvaodaya sangh and other Gandhi Institution (K.Arunachalam and Ramachandran), ASEFA (S.Loganathan), Shanthi Sena Movement (m.Aram and N.Radhakrishnan), Gandhi Ashrams and Museums (G.Ramachandran, Soundaram, K.Muniyandi & S.Pandiyani), Environmental Movement (Sundarlal Babukuna and Metha Patkar), Struggle for Justice (S.Jaganathan & P.V.Rajagopal).

PART II – NONVIOLENCE

6. Meaning of nonviolence; Non Killing – Removing all forms of direct and indirect (Structural) violence, preventing accidents and calamities, disarmament and Nonkilling in the Non human context – Love enlightened

self interest, mercy, compassion, altruism, sacrifice, forgiving, sharing reverence for all life – Love of god: Bhakti Nonviolent Action: Nonviolent Life Style construction work to build up a Nonviolent order, peaceful resolution of conflicts Nonviolent Direct Action (sathyagraha) for peace and justice Nonviolent politics and economics, etc – Nonviolent ethics and values: truth: Quest for holistic Knowledge and awareness and implementing it.

7. Contributions to Nonviolence by Mahavira, Buddha, Upanishad and Gita, Socrates, Jesuschrist, Thiruvalluvar, Prophet Mohammad, Leo tolosty, Ramalinga Vallalar, Martin Luther King, Dalailama, Aung Sung Suki, Mairead Corregan, Desmand Tutu.
8. Peaceful resolution of Conflicts: Skills for Counselling, Negotiations, Meditation and arbitration reforming the Judicial System place of Therapies, Healing Techniques and Transformation Practices.
9. Nonviolence Direct Action: Methods and Dinamics of sathyagraha Alternative Defense policy: Civilian Defense and Shanthi Sena.

Book Recommended:

M.K.Gandhi	:	Sarvodaya (Edited by Bharata Kumarappa)
Gobinath Dhavan	:	Political Philosophy of Mahatma Gandhi
Viswanath Prasad	:	Political Philosophy of Mahatma Gandhi
Varma	:	Gandhi & Sarvodaya
Jhon	:	Unto this Last
Richard B.Gregg	:	Power of Nonviolence
P.R.Diwakar	:	Sage and Satyagraha
M.K.Gandhi	:	Non-Violence in War Peace

(For those who join in June 2016 and after)

Part –VI: Certificate course		
Subject Title : APICULTURE		
Subject Code:	Hours per week: 2	Total Marks: 100

Objectives:

- ❖ *Salient features of the different species of honey bees*
- ❖ *Flora of Apiculture*
- ❖ *Products of Apiculture*

Unit- I:

Introduction- Habit and Habitat- species of honey bees- *Apis dorsata*, *Apis indica*, *Apis florea*, *Apis mellifera*, Dammer bee (stingless bee).

Unit- II:

Social organization of honey bee- Queen- Worker- Drone- life history- hive of *Apis indica*.

Unit- III:

Flora for apiculture- selection of bees for apiculture- methods of bee keeping- indigenous method- Morden method of apiculture.

Unit- IV:

Appliances used in apiculture- typical moveable hive- Queen excluder- honey extractor uncapping knife- other equipments- bee vial, cloves, queen gate.

Unit- V:

Products of bee keeping- honey, bee wax, pollen, probolies, royal jelly, honey comb and its economic importance- bee venom- bee enemies- bee keeping industries- economics and marketing.

Field visit

Text book:

- Jayashree, K.V., Tharadevi, C.S., and Arumugam, N., (2014) Apiculture. Sara's publication. Nagercoil, India.

Reference books:

- Jayasurya, Nair, N.C., Soundra Pandin, N., Thangamani, A., Narayanan, L.M., Arumugam, N., Leelavathy, S., Murugan, T., Prasanakumar, S and Johnson Rajeshwar, J. (2013) Economic Zoology. Saras Publication. Nagercoil, India.
- Shukla, G.S., Mathur, R., Upadhaya, V.B and Prasad, S.G. (2003) Economic Zoology. Biostatistics and Animal behaviour, Rostogi publications. Mierut, India.

(For those who join in June 2016 and after)

Part –VI: Certificate course		
Subject Title : MUSHROOM CULTURE		
Subject Code:	Hours per week: 2	Total Marks: 100

Objectives:

- ❖ *Characteristic features of the different mushroom varieties*
- ❖ *Spawn preparation*
- ❖ *Food values and economic importance of mushroom*

Unit- I: Introduction

History of Mushroom cultivation- Biodiversity of mushrooms- Habit and Habitat- morphology of mushroom- Identification edible and non edible mushrooms.

Unit- II: Mushroom spawn preparation

Laboratory requirements- mushroom culture- conservation of mushroom culture- mother spawn and planting spawn.

Unit- III: Mushroom cultivation

Common edible mushroom- Button mushroom- Oyster mushroom- Milky mushroom, Paddy straw mushroom- influence of climatic factors. Management of diseases and pest- Diseases- fungal, bacterial and viral- Pest- Sciarid flies, Phorid flies, Spring tails and mites.

Unit- IV: Nutritive value of mushroom

Proteins - Vitamins - Minerals – Carbohydrate – Fat - Energy value of mushroom - medicinal value.

Unit- V: Preservation and economics of mushroom

Short and long term preservation- NABARD- NEH- Economics and marketing of mushroom.

Field visit

Text book:

- Biswas, S., Datta, M., and Ngachan, S.V., (2012) Mushrooms- A manual for cultivation. PHI learning Private Limited, New Delhi, India.

Reference books:

- Nita Bahl, (1988) Handbook on Mushrooms. Oxford and IBH publishing Co. Pvt. Ltd. New Delhi, India.
- Hard, M.E. (2013) The Mushroom Edible and otherwise its habitat and its time of growth. MJP publishers, Chennai, India.

(For those who join in June 2016 and after)

Part –VI: Certificate course		
Subject Title : AQUACULTURE		
Subject Code:	Hours per week: 2	Total Marks: 100

Objectives:

- ❖ *Impart the knowledge on common food fishes and aquatic organisms*
- ❖ *Management and maintenance of fish pond*
- ❖ *Common fish diseases, treatment and control measures*

Unit- I: Culture fisheries:

Fish farms –fish ponds- Types of fish culture- management- seed procurement- transport of seed and breeders- farm management- culture of fish feed organisms.

Unit- II: Freshwater culture

Major carps- common carp – Chinese carps - composite culture- paddy cum fish culture- induced breeding.

Unit- III: Prawn culture

Methods – seed collection – hatchery – Hormonal control –paddy and Pokkali fields.

Unit- IV: Fish parasites and diseases

Diseases- Viral- Fungal- Bacterial- Protozoans- Helminthes and Arthropods- Causative organisms, symptoms, control and treatment.

Unit- V: Fish preservation

Rigor mortis- spoilage- preservation method- chilling- freezing- Canning- drying- salting- smoking- economics and marketing.

Field visit

Text book:

- Jayasurya, Nair, N.C., Soundra Pandian, N., Thangamani, A., Narayanan, L.M., Arumugam, N., Leelavathy, S., Murugan, T., Prasanakumar, S and Johnson Rajeshwar, J. (2013) Economic Zoology. Saras Publication. Nagercoil, India.

Reference books:

- Shanmugam, K., (1990) Fishery Biology and Aquaculture. Leo Pathippagam, Madras, India.
- Arumugam, N., Murugan, T., Johnson Rajeshwar, J. and Ram Prabhu, R., (2005) Applied Zoology. Saras publication. Nagercoil, India.

(For those who join in June 2016 and after)

Part –VI: Certificate course		
Subject Title : VERMITECHNOLOGY		
Subject Code:	Hours per week: 2	Total Marks: 100

Objectives:

- ❖ *Role of vermitechnology for sustainable agriculture and environmental management*
- ❖ *Salient features of the exotic and indigenous earthworm species*
- ❖ *Product from vermitechnology*

Unit I:

Salient features of the exotic and indigenous species for vermicomposting

Unit II:

Rearing and culturing – vermicompost unit- vermibed preparation- precomposting- composting of earthworms- methods- management- harvesting of vermicast.

Unit III:

Vermicast and vermiwash- its characteristics- vermiwash unit- preparation and collection.

Unit IV:

Application of vermicomposting in agriculture and horticulture- Applications of biofertilizers.

Unit V:

Earthworms in pollution control and waste land development- Role of KVIC and NABARD- economics and marketing.

Field visit

Text book:

- Seetha Lekshmy, M., and Santhi, R. (2012) Vermiculture. Saras Publication. Nagercoil, India.

Reference books:

- Gupta, B.K. (2005) Vermicomposting for sustainable agriculture. Agrobios. Jodhpur, India.
- Reddy, P.P. (2008) Organic farming for sustainable horticultures. Scientific Publishers, Jodhpur, India.

(For those who join in June 2014 and after)

Part – VI : Certificate course		
Subject Title : SERICULTURE		
Subject Code:	Hours per week: 2	Total Marks: 100

Objectives:

- *Understand sericulture as a cottage industry and exposure to silkworm rearing*
- *Mulberry cultivation and pathology*
- *Awareness creation to make them an entrepreneur*

UNIT I:

History of Sericulture – Sericulture as cottage industry - Types of Silk worms – Mulberry and Non-mulberry– Economic importance of silk and its by products

UNIT II:

Mulberry cultivation – Methods of propagation – Irrigation – Manuring - Diseases and Pests of Mulberry – Control measures.

UNIT III:

Life cycle of *Bombyx mori* – Voltinism - Silk gland – Rearing House and appliances - Rearing methods- Pathology of silk worm and control.

UNIT IV:

Characteristics of Cocoons – Stiffling – Process of Silk reeling.

UNIT V:

Identification of silk worm larvae, pupa and Imago, Morphology of silk gland, DFL, Rearing appliances and Chandrika.

Field visit.

Text book:

- Ganga, J., Sulochana Chetty (2006) An Introduction to Sericulture. Oxford & IBH, Publishing Company, New Delhi.

Reference book:

- Aruga, H., (1996) Principles of Sericulture. Oxford & IBH, Publishing Company, New Delhi.

(For those who join in June 2014 and after)

Part – VI : Certificate course		
Subject Title : Dairy Farming		
	Hours per week: 2	Total Marks: 100

Objectives

To enable students to

- ❖ *Knowledge on various dairy breeds of indigenous and exotic breeds.*
- ❖ *Skill development in milk processing and associated activities.*

UNIT I:

- a) Scope of Dairy farming, Dairy breeds of India- Cow and Buffalow
- b) Exotic breeds-Cow
- c) Systems of breeding – Hybrid vigour – grading up. Merits and demerits of inbreeding and outbreeding.

UNIT II:

- a) Digestive system of Cow and glands related to digestion
- b) Common cattle feed – their nutritive value – minerals- Feed additives and silage preparation.
- c) Feeding and management of pregnant cow and calf

UNIT III:

- a) Viral diseases – rinderpest, Foot and mouth disease
- b) Bacterial diseases – Mastitis, Anthrax, Haemorrhagic – septicaemia
- c) Metabolic diseases – Milk fever and bloat.

UNIT IV:

- a) Anatomy of udder and physiology of milk production
- b) Milk – composition, Pasteurization and Nutritive value, Colostrum and their importance, Techniques to produce quality milk-Techniques to detect milk adulteration, Spoilage of milk

- c) Preparation of Dahi, Butter, Ghee, Gova, Flavored milk, butter milk, ice cream.

UNIT V:

- a) Housing and equipments for dairy cows- Records to be maintained in a Dairy
 b) Artificial insemination – Semen collection and storage
 c) Role of co-operative societies in milk production and Marketing.

Text Books

- G.C. Banerjee 2012 - A Text book of Animal Husbandry – Oxford & IBH Publication, New Delhi.

Reference Book

- Sukumar De, 2008. Outline of Dairy technology, Oxford University Press
- Handbook of Animal husbandry, 2000. Publication and information division- ICAR, New Delhi

DIPLOMA COURSE IN SERICULTURE

Paper I:	Mulberry Farming and Silkworm Rearing	100 Marks
Paper II:	Breeding, Biotechnology, Grainage, Reeling, Marketing and Sericulture Extension.	100 Marks
Paper III:	Practical I on paper I	50 Marks
Paper IV:	Practical II on paper II	50 Marks
Paper V:	Farm Management Rearing and Production	50 Marks 50 Marks
Paper VI:	Project	50 Marks
	Field visit report	15 Marks
	Case study report	15 Marks
	Viva voce	20 Marks

	Total =	500 Marks

(For those who join in June 2016 and after)

Part – VI : Diploma course		
Subject Title : SERICULTURE		
Subject Code:	Hours per week: 2	Total Marks: 100

PAPER I: MULBERRY FARMING AND SILKWORM

REARING TECHNOLOGY

UNIT-I: Mulberry Biology and Farming Practice

Moriculture – Mulberry varieties – Meteorological and soil conditions for mulberry growth – propagation of mulberry – Planting – Fertilizer application – Irrigation types – Leaf harvest and leaf quality – Types of Pruning and its benefits – Management of Mulberry garden – Mineral deficiency symptoms in mulberry and reclamation.

UNIT-II: Diseases and Pests of Mulberry

Diseases of Muberry – Fungal – Bacterial – Viral – Nematode – Deficiency of Macro and Micro nutrients diseases – control measures. Pests of mulberry – leaf eating pests – sap feeders – Borer pests – control measures.

UNIT-III: Biology of Silkworm and Rearing Practice

Biology of silkworm – Taxonomy of mulberry and non – mulberry silkworms – Races of Bombyx mori – classification – voltinism – commercial races – Life cycle – Morphology and Anatomy of B.mori – Rearing of young leave – special rearing methods for chawki worm – box rearing and co-operative rearing – Rearing of mature larvae – self rearing. Floor rearing and shoot rearing – Environmental conditions, rearing house – appliances and disinfectants – feeding and bed cleaning – care taken during brushing, moulting and spacing.

UNIT-IV: Diseases and Pests of Silkworms

Diseases of silkworm – Protozoan – flacherie – grasserie and muscardine diseases – Methods of prevention – Pests of silkworm – Uzifly – Dermestid beetles – mites – ants – Nematode – Lizzards, Squirrels and birds – control measures.

UNIT-V: Non – Mulberry Silkworms

Eri, Tasar and Muga silkworms – Biology and rearing methods – food plants – Diseases and pests – control measures.

Text Books:

1. Dilip De Sarker, 1998, The Silkworm – Biology, Genetics and Breeding, Vilas Publishing, House Pvt.Ltd. New Delhi.
2. G.Ganga & J.Sulochana Chetty 1997, An Introduction to Sericulture, Oxford & IBH publishing Co., Ltd., New Delhi.

Reference Books:

1. Aruga, H., 1994, Principles of Sericulture, Oxford & IBH, New Delhi.
2. FAO agricultural services bulletins, 1987, Manuals on Sericulture, Vo. 1 to 4, CSB, Bangalore.
3. Ullal S.R. & M.N. Narasimhanna, Hand Book of Practical Sericulture, CSB, Bangalore.

(For those who join in June 2016 and after)

Part – VI : Diploma course		
Subject Title : SERICULTURE		
Subject Code:	Hours per week: 2	Total Marks: 100

PAPER II: BREEDING, BIOTECHNOLOGY, GRAINAGE, REELING, MARKETING AND SERICULTURE EXTENSION

UNIT-I: Genetics and breeding of silkworm and mulberry

Mendel’s laws – Quantitative Genetics and breeding – Linkage and Crossing Over – sex determination in silkworm (heterogametic – ZW & ZZ – mutation – molecular basis – E – alleles and pseudoalleles – mutant alleles of Bombyx mori – Marker genes in the linkage group of B.mori – Genetics of voltinism and moulting – voltine genes and moulting genes – genetics of cocoon colour – polyploidy behavior of autosomes and sex chromosomes in polyploids – silkworm breeding in India – Heterosis in silkworm.

UNIT-II: Biotechnology of Sericulture and Morigulture

Gene cloning – steps involved – PCR principle and uses – Microinjection and sperm mediated gene transfer in Bombyx mori. – Anti sense RNA Technology and disease resistance in silkworm – Methods of gene transfer in Mulberry – electroporation and biolistic methods – silkworm as a bio reactor – production of interferons.

Plant tissue culture – callus culture – production of artificial seeds – Apical meristem culture and production of virus free mulberry plants – protoplast culture – silkworm and mulberry germplasm conservation – cryopreservation – applications.

Waste management Technology – Vermicomposting – prospects of Genomics research in silkworm.

UNIT-III: Grainage Technology

Grainage – infrastructure – equipments – seed cocoon sorting and preservation – sex separation – synchronization of emergence – coupling and decoupling – ovi position – mother moth examination – role of Grainage in preparation of DFLs – characteristics of egg (colour size and weight) – preparation of egg cards, loose eggs – Artificial hatching – Acid treatment – Incubation methods – cold storage, hibernation.

UNIT-IV: Silk Reeling Technology

Processing of Cocoon – stifling – methods – sorting – separation of defective cocoons – methods of storing and preservation of stifled cocoon – cocoon boiling methods – cocoon brushing methods – reeling – reeling device – croissure types – raw silk size (denier) and its importance – Rereeling – skeining – book making and bunding.

Reeling units – Charka, Cottage basin, Filature automatic, semiautomatic and multiend silk reeling machines – Cocoon Commercial Characters – testing and grading of cocoons – Raw silk Testing and grading – methods – International and ISI standards – silk throwing and weaving – Twisting – types of fabrics – grading of silk fabrics – degumming – bleaching.

UNIT-V: Marketing (egg, cocoon and silk) and extension.

Sericulture extension – organization at various levels – sericulture net work – marketing management (cocoon and silk) Traditional and regulated markets – Role of Co-operative and credit agencies – subsidy and loan for sericulture farmers. Finance agencies in sericulture – NABARD, SIDBI, IDBI and banks – Assistance for sericulture IRDP, ITDP and special component schemes – Self employment potentials and employment generation in sericulture.

Text Books:

- Dilip De Sarker, 1998, The Silkworm – Biology, Genetics and Breeding, Vilas Publishing, House Pvt.Ltd. New Delhi.
- G.Ganga & J.Sulochana Chetty 1997, An Introduction to Sericulture, Oxford & IBH publishing Co., Ltd., New Delhi.

Reference Books:

- Aruga, H., 1994, Principles of Sericulture, Oxford & IBH, New Delhi.
- Biswas, S and Sengupta, K 1994, Genetic control of Disease Resistance in Mulberry, Sericologia, 34(1) 33-42
- FAO agricultural services bulletins, 1987, Manuals on Sericulture, Vo. 1 to 4, CSB, Bangalore.
- Ullal S.R. & M.N. Narasimhanna, Hand Book of Practical Sericulture, CSB. Bangalore.
- Dubey, RC, 2001, A Text Book of Biotechnology, S. Chand and Co., New Delhi.
- Nagaraju, J, 2000, Recent Advances in Molecular Genetics or Silkworm, Bombyx mori, Current Science 78(2):151-161
- Veeiah, T.M.2000, Strategy for silkworm seed Technology Research, Indian Silk (Millenium Special Issue)

PAPER III Practicals I on Paper I (10 hrs)

1. Soil testing for mulberry cultivation and land preparation.
2. Preparation for Row system planting, Irrigation and Mulching practices.
3. Morphology and sex separation of silkworm larva, Pupa and moth.
4. Study of cocoon.
5. Dissection of Silk glands.
6. Rearing house maintenance and its appliances
7. Mountages, Cocoon harvesting and maintenance of rearing records.
8. Collection, preservation and identification of pests of mulberry and silkworm.
9. Symptoms, identification and diseases in mulberry and silkworm.

PAPER IV Practicals II on Paper II (10 hrs)

1. Observation of mulberry races of breeding importance.
2. Observation of silkworm races of breeding importance
3. Vermicomposting with sericulture wastes
4. Grainage – Infrastructure (ground plan)
5. Grainage equipments
6. Preparation of disease free layings (demonstration)
7. Reeling equipments and demonstration of reeling.
8. Microscopic observation of pebrine spores by mothermoth examination.
9. Studies on cocoon characteristics.
10. Cocoon market – A case study.

PAPER V: Farm Management Rearing and Production

PAPER VI

- a) Project
- b) Field visit
 1. Visit to a model mulberry cultivation centre.
 2. Visit to a commercial grainage.
 3. Visit to a Seed Cocoon Market.
 4. Visit to a reeling centre.
 5. Visit to a sericulture institute.
- c) Case Study Report

d) Viva-Voce

(For those who join in June 2016 and after)

Part – VI : Diploma course		
Subject Title : DAIRY FARMING		
Subject Code:	Hours per week: 2	Total Marks: 100

Objectives:

- *Knowledge on various dairy breeds of indigenous and exotic breeds.*
- *Knowledge on various diseases of dairy animals.*
- *Prepare rural youth /self employment for accepting dairy farming as profit making.*

UNIT I:

Scope of Dairy farming- Dairy breeds of India – both cows and buffaloes – Exotic cow breeds.

Systems of breeding – Hybrid vigour – grading up – Merits and demerits of inbreeding and out breeding.

UNIT II:

Common cattle feed – their nutritive value – minerals, feed additives and silage preparation.

Feeding and management of pregnant cow and calf .

UNIT III:

Viral diseases – Rinderpest, Foot and mouth disease - Bacterial diseases – Mastitis, Anthrax, Haemorrhagic – septicaemia.

Metabolic diseases – Milk fever and bloat.

UNIT IV:

Milk– composition and nutritive value, Colostrum and their importance- Pasteurization of milk.

Techniques to detect milk adulteration, spoilage of milk

Preparation of Dahi, Butter and Ghee. Role of co-operative societies in milk production and marketing.

UNIT V:

Housing and equipments for dairy cows. Records to be maintain in a farm.

Artificial insemination – Semen collection, storage and application.

Field visit.

Text book:

1. Banerjee, G.C., (2012) A Text book of Animal Husbandry. Oxford and IBH Publication, New Delhi, India.

Reference book:

1. Sukumar, D., (2008) Outline of Dairy technology. Oxford University Press, India.