

GOVERNMENT ARTS COLLEGE

(AUTONOMOUS)

SALEM – 636 007

NAAC Re-accredited with B⁺⁺ Status

AFFILIATED TO PERIYAR UNIVERSITY



SYLLABUS FOR B.Sc., ZOOLOGY

CHOICE BASED CREDIT SYSTEM

(FOR THE STUDENTS ADMITTED FROM THE

ACADEMIC YEAR 2017-2018 ONWARDS)

REGULATIONS

1. OBJECTIVES OF THE COURSE

Vision and Mission of the Department

- Zoology Degree programme aims to uplift the poor and rural area students in pursuing higher education in Zoology.
- Guiding the students in right direction to choose their career to achieve our mission “**knowledge is power**”.

Employment, Innovation and Research

- Syllabus is constantly updated according to requirements of employment and research opportunity.
- Provides an opportunity to familiarize with the topics included in different units of various papers, which would enable the students to develop technical skills in biology branches.
- To explore the knowledge across different areas of animal science. The importance of animals in the biosphere and to reveal the secrets of healthy living along with animals from molecular to macro level.
- Skill based subjects were introduced to ensure self confidence and motivate students themselves to get self employment.
- Recent techniques in laboratory practical make the students to get the hands - on experience and skills needed by the industries and research establishments.
- Value added course YOGA makes the student to realize human values.

2. ELIGIBILITY FOR ADMISSION

A candidate who has passed higher secondary examination in academic stream under board of higher secondary examination, Tamil Nadu or as per norms set by the Government of Tamil Nadu are eligible to enroll and qualify for the B.Sc. Zoology degree of this Autonomous College.

3. DURATION OF THE COURSE

The course for the degree of Bachelor of Science shall consist of **three academic years divided into six semesters.**

4. COURSE OF STUDY

The course of study shall comprise of instruction in the following subjects according to the syllabus and books prescribed from time to time.

5. EXAMINATION

The theory examination shall be of **Three hours** duration to each paper at the end of each semester. The candidate failed in any subject will be permitted to re appear for each failed subject or subjects in the subsequent examination. The Practical examination for U.G. Courses shall be conducted at the end of **Even semester**. The examinations consist of **Internal assessment (I.A) and Semester examinations (S.E).**

INTERNAL ASSESSMENT MARKS FOR THEORY PAPERS ARE AS FOLLOWS:

ATTENDANCE	ASSIGNMENT	TEST	TOTAL
5	10	10	25

INTERNAL ASSESSMENT MARKS FOR PRACTICAL PAPERS ARE AS FOLLOWS:

ATTENDANCE	PRACTICAL OBSERVATION	TEST	TOTAL
10	15	15	40

INTERNAL ASSESSMENT [For Attendance = 5 Marks]

75-80%	81-85%	86-90%	91-95%	96 – 100%
1 Mark	2 Marks	3 Marks	4 Marks	5 Marks

For Assignment = 10 Marks

For Test = 10 Marks

Minimum of **Three Assignments** and **Three tests** to be conducted.

Best two Tests and Assignments average score is taken into account.

6. SCHEME OF EXAMINATIONS

The scheme of Examinations for theory and Practical papers shall be as follows.

7. QUESTION PATTERN

THEORY PAPER

CORE COURSE, ALLIED COURSE, SKILL BASED ELECTIVE, MAJOR BASED ELECTIVE AND NON-MAJOR ELECTIVE COURSES

Time: 3 Hrs

Maximum: 75 marks

PART-A

10X2= 20 Marks

Answer all the questions.

Each answer should not exceed 50 words.

PART - B

5x5=25 Marks

Answer all the questions with internal choice.

Answer should not exceed 300 words.

PART- C

3x10=30 Marks

Answer any three questions Out of five questions.

Answer should not exceed 1200 words.

8. CORE PRACTICAL

Time: 3 Hrs

Maximum: 60 Marks

I. Major Practical

25 Marks.

(Procedure -15 marks & Result -10marks)

II. Minor Practical

15 Marks.

(Procedure -10 marks & Result -5marks)

III. Spotters

10 Marks.

(Two spotters A&B each carries 5 marks)

IV. Record

10 Marks.

(submission of record notebook -10 marks)

9. PASSING MINIMUM

As declared by G.O, no passing minimum required for internal marks however passing minimum is 40 % compartmentally in semester examinations. For practical courses, the distribution of marks will be IA 40, Practical 60 (Practical 50 + Record 10). The submission of record notebooks is a must in the practical examinations.

10. CLASSIFICATION OF SUCCESSFUL CANDIDATES

The performance of the student is indicated by letter Grades and the corresponding Grade Point (GP), Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA).

Letter Grade	Cumulative Grade Points Average (CGPA)	Grade Description	Range of Marks*
S	10	Outstanding	90-100
A	9	Excellent	80-89
B	8	Very Good	70-79
C	7	Good	60-69
D	6	Average	50-59
E	5	Satisfactory	40-49
RA	0	Re-Appear	0-39

A student is deemed to have completed a course successfully and earned the appropriate credit, only if, the candidate earned a grade of E and above. RA denotes the candidate should reappear the course again.

$$\text{GP} = (\text{Marks obtained in a course} \times \text{credit}) / 10$$

$$\text{GPA} = \frac{\text{Total Grade points earned in a semester}}{\text{Total Credits registered in a Semester}}$$

$$\text{CGPA} = \frac{\text{Sum of Grade Points earned}}{\text{Sum of credits registered}}$$

CLASSIFICATION

CGPA	9 and above	I Class with distinction
CGPA	Between 7 and 8.9	I Class
CGPA	Between 5 and 6.9	II Class

NOTE

The above classification shall be given for overall performance including Major, Allied and Elective Courses .

11. MAXIMUM DURATION FOR THE COMPLETION OF THE U.G. PROGRAMME.

The maximum duration for completion of U.G Programme shall not exceed Six Semesters.

12. COMMENCEMENT OF THIS REGULATION

These regulations shall take effect from the **Academic year 2017-2018** and thereafter.

TRANSITORY PROVISION

Candidates who are admitted to the UG course of study are permitted to appear for the examinations under this regulation for a period of **5 years from their year of admission to the course. Arrear candidates will be permitted to appear for the examination under this regulation up to two consecutive years or four consecutive semesters from their final or third year of their course.** Thereafter they will be permitted to appear for examination only under the regulations then in force.

FIRST YEAR

SEMESTER I

1. Language Course Tamil----- Tamil – I
2. Language Course English -----English -I
3. Core Course – I – Invertebrata.
4. Allied Course I – Allied Botany-I
5. Value Based Education (Common Paper) - Yoga

SEMESTER II

6. . Language Course Tamil -----Tamil - II
7. Language Course English ----- English – II
8. Core Course – II - Chordata
9. Core Practical I - Invertebrata and Chordata
10. Allied Course I – Allied Botany II
11. Allied Practical I – Botany
12. Compulsory Paper - Environmental Studies

SECOND YEAR

SEMESTER III

13. Language Course Tamil -----Tamil- III
14. Language Course English -----English - III
15. Core Course III – Cell Biology.
16. Allied Course II – Chemistry -I
17. Skill Based Elective Course I– Aquaculture
18. Non-Major Elective course I – Public health & Hygiene

SEMESTER IV

19. Language Course Tamil ----- Tamil - IV
20. Language Course English----- English - IV
21. Core Course IV – Genetics
22. Core Practical II – Cell Biology and Genetics.
23. Allied Course II –Chemistry II
24. Allied Practical II- Chemistry
25. Skill Based Elective Course II- Poultry Science.
26. Non-Major Elective Course II – Nutrition and Dietetics.
27. Extension Activities.

THIRD YEAR

SEMESTER V

28. Core Course V – Animal Physiology
29. Core Course VI – Developmental Biology.
30. Core Course VII – Microbiology.
31. Major Based Elective course I –Medical Laboratory Techniques.
32. Skill Based Elective Course III – Biostatistics and Computer Applications.
33. Skill Based Elective Course IV- Vermitechnology.

SEMESTER VI

34. Core Course VIII - Environmental Biology.
35. Core Course IX - Evolution.
36. Major Based Elective course II – Immunology.
37. Major Based Elective course III – Biotechnology
38. Skill Based Elective Course V - Sericulture.
39. Skill Based Elective Course VI – Health and Hygiene.
40. Core Practical III – Animal Physiology, Developmental Biology and Microbiology.
41. Core Practical IV - Environmental Biology and Evolution

COURSE STRUCTURE (2017 – 2018 ONWARDS)

B.Sc ZOOLOGY - COURSE STRUCTURE UNDER CBCS PATTERN									
SEM	PART	COURSE CODE	TITLE OF THE COURSE	HOURS		CREDITS	MARKS		
				THEORY	PRACTICAL		IA 25	SE 75	TOTAL 100
I	I	17 FTL01	Tamil Language Course – I	6	-	3	25	75	100
	II	17 FEL01	English Language Course – I	6	-	3	25	75	100
	III	17 UZL01	Core course – I Invertebrata	5	-	5	25	75	100
		17 UZL P1	Core Practical – I Invertebrata and chordata	-	2	-	-	-	-
		17 ABY01	Allied Botany Course – I	7	-	3	25	75	100
		17 ABYP1	Allied Botany Practical	-	2	-	-	-	-
	IV	17 UVABE	Common Course - Value Based Education	2	-	2	25	75	100
II	I	17 FTL 02	Tamil Language Course – II	6	-	3	25	75	100
	II	17 FEL 02	English Language Course- II	6	-	3	25	75	100
	III	17 UZL 02	Core course – II Chordata	5	-	5	25	75	100
		17 UZL P1	Core Practical – I Invertebrata and chordata	-	2	3	40	60	100
		17 ABY02	Allied Botany Course – II	7	-	3	25	75	100
		17 ABY P1	Allied Botany Practical	-	2	4	40	60	100
	IV	17 UENST	Common Course - Environmental Studies	2	-	2	25	75	100
III	I	17 FTL 03	Tamil Language Course – III	6	-	3	25	75	100
	II	17 FEL 03	English Language Course – III	6	-	3	25	75	100
	III	17 UZL 03	Core Course – III Cell Biology	4	-	5	25	75	100
		17 UZL P2	Core Practical – II Cell Biology and Genetics	-	2	-	-	-	-
		17 ACH01	Allied Chemistry Course – I	7	-	3	25	75	100
		17 ACH P1	Allied Chemistry Practical	-	2	-	-	-	-
	IV	17 UZL S1	Skill Based Elective Course-I Aquaculture	2	-	2	25	75	100
		17 UNME1	Non Major Elective Course - I Public health & Hygiene	1	-	2	25	75	100
IV	I	17 FTL 04	Tamil Language Course – IV	6	-	3	25	75	100
	II	17 FEL 04	English Language Course – IV	6	-	3	25	75	100
	III	17 UZL04	Core Course – IV Genetics	4	-	5	25	75	100
		17 UZLP2	Core Practical - II Cell Biology and Genetics	-	2	4	40	60	100
		17 ACH 02	Allied Chemistry Course – II	7	-	3	25	75	100
		17 ACHP1	Allied Chemistry Practical	-	2	4	40	60	100
	IV	17 UZLS2	Skill Based Elective Course -II Poultry Science	2	-	2	25	75	100
IV	17 UNME2	Non Major Elective Course II	1	-	2	25	75	100	

V			Nutrition and dietetics							
		17 UEXAT	Extension Activities	-	-	1				
	III	17 UZL05	Core Course – V Animal Physiology	5	-	5	25	75	100	
		17 UZL06	Core Course –VI Developmental Biology	5	-	5	25	75	100	
		17 UZL07	Core Course – VII Microbiology	5	-	5	25	75	100	
		17 UZLP3	Core Practical - III Animal Physiology, Developmental Biology and Microbiology	-	3	-	-	-	-	
		17 UZLP4	Core Practical - IV Environmental Biology and Evolution.	-	3	-	-	-	-	
		17 UZL E1	Major Based Elective course -I Medical Laboratory Techniques	4	-	5	25	75	100	
	IV	17 UZLS3	Skill Based Elective Course III Biostatistics & Computer Application	3	-	2	25	75	100	
		17 UZLS4	Skill Based Elective Course IV Vermitechnology	2	-	2	25	75	100	
VI	III	17 UZL08	Core - VIII Environmental Biology	5	-	5	25	75	100	
		17 UZL09	Core - IX Evolution	5	-	5	25	75	100	
		17 UZLP3	Core Practical III Animal Physiology, Developmental Biology and Microbiology	-	3	4	40	60	100	
		17 UZLP4	Core Practical - IV Environmental Biology and Evolution	-	3	4	40	60	100	
		17 UZLE2	Major Based Elective course II Immunology	4	-	5	25	75	100	
		17 UZLE3	Major Based Elective Course III Biotechnology	4	-	5	25	75	100	
	IV	17UZL S5	Skill Based Elective Course– V Sericulture	3	-	2	25	75	100	
		17 UZLS6	Skill Based Elective Course VI Health and Hygiene	3	-	2	25	75	100	
				Total	152	28	140			4000

SEMRSTER – 1
INVERTEBRATA
PAPER CODE: 17UZLO1

OBJECTIVES

- ❖ Structural and physiology of the types included with special emphasis on the adaptation to their mode of life and environment.
- ❖ General characters, classification up to class level with examples, phylogenetic affinities of the invertebrate phyla included in the syllabus.

UNIT-I

Taxonomy - need of classification, significance of classification, brief history of classification. Nomenclature of organisms. Groups in classification. Modern classifications of animal kingdom. Modern molecular methods in taxonomy. Outline classification of animal kingdom.

UNIT-II

Protozoa - General characters. Type study – *Paramecium caudatum* - structure, reproduction and development. General topic – Pathogenic protozoa of humans.

Porifera – General characters. Type study – *Leucosolenia* – External morphology, physiology and development. General topic – Canal system in sponges.

UNIT – III

Coelenterata – General characters. Type study – *Obelia* – external morphology, polyp, blastostyle and medusa. Reproduction and development. General topic – Corals and coral reefs.

Helminthes – General characters. Type study – *Taenia solium* – External morphology and lifecycle. General topic – Human helminth parasites.

UNIT – IV

Annelida – General characters. Type study – *Megascolex maruti* – external morphology, digestive system, reproduction and development. General topic – Excretion in Annelids.

Arthropoda- General characters. Type study – *Panurginus* – external morphology and reproduction. General topic – Economic importance of insects.

UNIT – V

Mollusca – General characters, Type study – *Pila globosa* – Morphology, respiratory system, locomotion, excretory system and reproduction. General topic – Torsion in gastropods.

Echinodermata – General characters. Type study – *Asterias rubens* – external morphology and water vascular system. General topic – Larval forms of echinoderms.

TEXT BOOKS

1. Manual of Zoology Vol - I & II. Ekambaranatha Ayyer.
2. Invertebrate Zoology. Barnes. R.D.
3. Text book of Invertebrates, Nair, N.C, Leelavathy, S, Sundarapandiyan, N. Murugan, T. and Arumugam. N. (1992). Saras Publications.

REFERENCE BOOKS

1. Modern text book of Zoology. Kotpal. R.L.
2. Invertebrate Zoology. Agarwal. V.K.

SEMESTER – I
VALUE BASED EDUCATION
PAPER CODE: 17 UVABE

OBJECTIVES

- ❖ Inculcation of good manners and of responsible and co-operative citizenship.
- ❖ Full development of students' personality in its physical, mental, emotional and spiritual aspects
- ❖ Developing tolerance towards and understanding of different religious faiths

UNIT I

Concept of Human Values, Value Education towards Personal Development. Aim of education and value education; Evolution of Value-oriented education; Concept of Human value; types of values; Components of value education. Personal Development: Self-analysis and introspection; sensitization towards gender equality, physically challenged, intellectually challenged. Respect to age, experience, maturity, family members, neighbors, co-workers. Character Formation towards Positive Personality Truthfulness, Constructivity, Sacrifice, Sincerity, Self-Control, Altruism, Tolerance, Scientific Vision.

UNIT II

Value Education towards National and Global Development National and International Values. Constitutional or national values – Democracy, socialism, secularism, equality, justice, liberty, freedom and fraternity. Social Values – Pity and probity, self-control, universal brotherhood. Professional values – Knowledge thirst, sincerity in profession, regularity, punctuality and faith.

UNIT – III

Religious Values – Tolerance, wisdom, character. Aesthetic values – Love and appreciation of literature and fine arts and respect for the same. National Integration and International understanding.

UNIT - IV

Impact of Global Development on Ethics and Values. Conflict of cross-cultural influences, mass media, cross-border education, materialistic values, professional challenges and compromise. Modern Challenges of Adolescent Emotions and behavior, Sex and spirituality, Comparison and competition; positive and negative thoughts. Adolescent Emotions, arrogance, anger, sexual instability, selfishness, defiance.

UNIT – V

Therapeutic Measures

Control of the mind through

- a. Simplified physical exercise,
- b. Meditation – OBJECTIVES, types, effect on body, mind and soul
- c. Yoga-Objective, Types, Asanas
- d. Activities

- d. Activities
 - i. Moralization of Desires
 - ii. Neutralization of Anger
 - iii. Eradication of worries
 - iv. Benefits of Blessings

TEXT BOOKS

1. Value Education for Health, Happiness and Harmony, The World Community Service Centre Vethari Publications.

REFERENCE BOOKS

1. Philosophy of Universal Magnetism (Bio-magnetism, Universal Magnetism) The World Community Service Vethari Publication.
2. Thirukkural with English Translation of Rev. Dr. G. U. Pope, Uma Publication.

SEMESTER - II
CORE PAPER II - CHORDATA
PAPER CODE: 17 UZL02

OBJECTIVES

- ❖ To understand the life and diversity of Chordates. To understand the various anatomical structures in Chordates.

UNIT I

Chordates – General Characters, Diversity, Classification, Origin, Ancestry. Protochordata - General Characters and Classification, Structure, Morphology – *Amphioxus*. Pisces - General Characters and Classification up to order. Detailed study of *Scoliodon* – morphology, digestive system, respiratory system, circulatory system, nervous system and urinogenital system.

GENERAL TOPIC : Dipnoi – salient features.

UNIT II

Amphibia – General Characters and Classification up to orders. Detailed study of frog *Rana hexadactyla* – external structure, digestive system, respiratory system, circulatory system, nervous system and reproductive system.

GENERAL TOPIC : Parental care and Neoteny in Amphibians.

UNIT III

Reptilia – General Characters and Classification up to order. Detailed study of *Calotes versicolor* – external features, digestive system, respiratory system, nervous system and urinogenital system.

GENERAL TOPIC : Identification of Poisonous and Non – Poisonous Snakes. Decline of Mesozoic Reptiles.

UNIT IV

Aves - General Characters, Classification up to order. Detailed study of *Columba Livia domestica*– external features, feathers, digestive system, respiratory system and urinogenital system

GENERAL TOPIC : Flight adaptations in birds.

UNIT V

Mammalia - General Characters and Classification up to order. Detailed study of *Oryctolagus Cunicules* – external features, digestive system, respiratory system, nervous system, urinogenital system.

GENERAL TOPIC : Dentition in mammals.

TEXT BOOKS

1. Modern text book of Zoology : Vertebrates - R.L. Kotpal, Rastogi Publications.
2. A Text book of Chordates – A. Thangamani, S. Prasanna Kumar, L.M. Narayanan, N. Arumugam, Saras Publications.

REFERNCE BOOKS

- 1.Chordate Zoology – Jordon, E.L and Verma, P.S.
2. Zoology of Chordates – Nigam, H.C
- 3.Phylum Chordata – Newman, H .H
- 4.Biology of Vertebrates – Walter and Sayler
- 5.Life of mammals – Young, J.N.

PRACTICAL – I
CORE PRACTICAL I - INVERTEBRATA & CHORDATA
PAPER CODE: 17 UZL P1

Total 60 Marks

I. MAJOR PRACTICALS

25 Marks

(VIRTUAL DISSECTION SHALL BE FOLLOWED FOR SCHEDULED ANIMALS)

1. Cockroach – Digestive system
2. Cockroach – Nervous system
3. Prawn - Nervous system
4. Fish - Digestive system

II. MINOR PRACTICALS

15 Marks

1. Earthworm – Body setae and Pineal setae.
2. Mouth parts – Honeybee, Mosquito and Cockroach
3. Prawn – Appendages.

III. SPOTTERS

10 Marks

1. Classify and giving reasons of the following

Amoeba, Paramoecium, Taenia solium, Ascaris, Aurelia, Chaetopterus, Holothuria, Amphioxus, Salpa, Bufo, Penaeus, Asterias, Fasciola, Hirudinea, Shark, Pigeon, Bat, Herdmania, Petromyzon Torpedo, Notopterus, Exocoetus, Clarias, Ophiocephalus, Chameleon, Varanus, Phrynosoma, Draco, Tortoise, Cobra, Krait, Russel's Viper, Sea Snake, Wood Pecker, Duck, Parrot, Squirrel, Mongoose, Loris And Rabbit.

2. Draw and labelled sketch of the following

Ephyra larva, T.S. of Tapeworm, T.S. of Ascaris, T.S. of Fasciola, T.S. of Amphioxus, Quill feathers, Pigeon – pectoral girdle, Pigeon-pelvic girdle, fish scales – Placoid, Ctenoid, T.S. of Testis and ovary of frog.

3. Biological significance of the following

Sponge - gemmule, Physalia, Leech, Bipinnaria larva, Ascidian tadpole, Ichthyophis, Limulus.

4. Relate structure and function of the following

Spicules (Sponges), Starfish – tube feet, Nereis -parapodium, Prawn- appendages, Taenia-scolex.

5. Comment on skeletal structure / Dentition of the following

Synsacrum, Dentition of Rabbit and Man.

VIII. SUBMISSION OF RECORD

10 Marks

(Common Course for B.A/B.Sc/B.Com./B.B.A./B.C.A Degree Examinations)
SEMESTER – II
ENVIRONMENTAL STUDIES
COURSE CODE: 17UENST

OBJECTIVES

- ❖ To create the awareness about environmental problems among the students
- ❖ To motivate the student to participate in environment protection and environment improvement
- ❖ To acquire skills to help the student in identifying and solving environmental problems
- ❖ Striving to attain harmony with nature

UNIT I - Natural Resources

Definition, scope, importance and public awareness.

Forest resources: Deforestation, mining, dams and their effects on forest.

Water resources: Utilization of surface and ground water, floods, benefits and problems.

Mineral resources: Environmental effects of extracting and using mineral resources.

UNIT II - Ecosystems

Concept, structure and functions of ecosystem.

Producers, consumers and decomposers.

Energy flow in the ecosystem.

Ecological succession.

Food chain, food webs and ecological pyramids.

Outline of importance of ecosystem.

UNIT III - Biodiversity and Pollution

Threats to Biodiversity: Habitat loss poaching of wildlife, man wild life conflicts.

Endangered and endemic species of India.

Environmental Pollution: Causes, effects and control measures. Role of an individual in the prevention of pollution of Air, water and soil.

Solid waste management: causes, effects and control measures of urban and industrial wastes.

Disaster management: Floods, earthquake, cyclone and landslides.

UNIT IV - Social issues and the Environment

From unsustainable to sustainable development.

Environmental ethics: Issues and problem – solutions.

Climate change global warming, acid rain, Ozone layer depletion.

UNIT V - Population issues and Legislation

An Outline of Environmental Pollution Act.

Population explosion and problems.

Environment and human health.

TEXT BOOKS

1. Text book for Environmental studies for under graduates course by Erach Bharucha(UGC)

REFERNCE BOOKS

1. Environmental Science, Miller T.G., Jr.Wadsworth Publishing Co,(TB).
2. A Text book of Environmental studies – P. Arul- Environmental Agency.
3. Environmental Science – P.D.Sharma.

SEMESTER III
CORE PAPER III CELL BIOLOGY
PAPER CODE 17UZL03

OBJECTIVES

- ❖ To enable the learners to
- ❖ understand the ultrastructure and functions of cell and organelles,
- ❖ get an exposure to various cytological techniques,
- ❖ know the components of the nucleus.
- ❖ learn the mechanism of cell division, protein synthesis and become familiar with the biochemistry of the cell,

UNIT I

Discovery of cell Cell theory, Microscopy - Principle and application of compound microscope and electron microscope (SEM and TEM); Phase contrast microscopy. Microtechniques - Fixation, embedding, sectioning and staining.

UNIT II

Ultra structure of Prokaryotic cell - Bacteria and Eukaryotic cell. Protoplasm : physical properties & chemical nature ultra structure of plasma membrane and functions.

UNIT III

Golgi complex - Ultrastructure and functions. Endoplasmic reticulum – Ultrastructure, types and functions. Mitochondria – Ultrastructure and functions.

UNIT IV

Lysosome - Ultrastructure, polymorphism and functions. Ribosome- Ultrastructure, types and functions. Protein Synthesis. Role of RNA in transcription and translation.

UNIT V

Nucleus –Ultrastructure. Nucleolus- Ultrastructure and function. Chromosome- structure and types. Cell division - Mitosis and Meiosis.

TEXT BOOK

1. Gupta,P.K.1999. Cell and Molecular Biology, Rastogi publications, Meerut.
2. Power, C.B. 2002. Cell Biology, Himalaya Publishing House, Mumbai.
3. Verma, P.S. and V.K. Agarwal, 1999. Cytology, S.Chand and Company Pvt. Ltd., New Delhi.

REFERENCE BOOKS

1. Alberts, Brue, et al., 2003, Essential Cell Biology, Garland Publishing, New York
2. Avinash, U., Kakoli, U., 2005, Fundamentals of Molecular Biology, Himalaya Publishing House, Mumbai.
3. Cooper, G.M., 2000. The Cell- A Molecular Biological Approach, ASM Press, Washington.
4. De Robertis, E.D.P. and De Robertis, E.M.F. 2001. Cell and Molecular Biology, Lea and Fabiger International Edition, Philadelphia.

5. Karp, G., 1996, Cell Biology, Mc Graw Hill Book Company, New York.
6. Roy, S.C. and K.K. Dey.1997.Cell Biology. New Central book Agency (P) Ltd., Calcutta.
7. Sheeler, P. and D.E. Bianchi, 2002. Cell and Molecular Biology, John Wiley & Sons Inc., New York.
8. Thorpe, N.O., 2000, Cell Biology, John Wiley and Sons, New York.

SEMESTER – III
SKILL BASED ELECTIVE – I
AQUACULTURE
PAPER CODE: 17 UZL S1

OBJECTIVES

- ❖ To study about the socio-economic sustainability of urban and rural communities to improving nutrition, generating supplementary income and protecting the environment.

UNIT I

Scope of Aquaculture in India. Types of aquaculture - Extensive, Intensive and Semi intensive. Culture - Monoculture, Poly culture, Integrated farming, Pond culture, Pen and Cage culture.

UNIT II

Cultivable species- carp, crustaceans and molluscs. Pond preparation Basic fish farm design, selection of site, water and soil, Nursery ponds.

UNIT III

Pearl oyster culture. pearl formation. Fresh water and marine Prawn culture. Ornamental fish culture –construction of home aquarium

UNIT – IV

Water quality maintenance. Importance and composition of feeds, types of feed. Formulation of artificial diets. Live feeds

UNIT – V

Harvesting - methods of fishing - electric fishing. Transportation and Marketing the fish to local markets and for export. Methods of preservation –Curing, drying, monacuring, smoking, icing, freezing and Canning.

TEXT BOOKS

1. Fish and Fisheries in India – Jhingran, V.G.
2. Arumugam.N. 2008. Aquaculture Saras Publications, Nagercoil.

REFERNCE BOOKS

1. Encyclopeida of Aquarium Fishes in colour – Coffey, D.J.
2. Fish Pathology – Roberts R.

SEMESTER - III
NON MAJOR ELECTIVE COURSE - I
PUBLIC HEALTH & HYGIENE
PAPER CODE: 17UNM E1

OBJECTIVES

This course will enable the student to

- ❖ Understand the Science of Public Health and hygiene and understand its importance.
- ❖ Acquire knowledge about Public Health and hygiene and its problems.

UNIT I

Public Health - Definition – Objectives – Concepts of health and well being- quality of life index. Nutrition and health.- Food hygiene-food intoxicants -Birth rate- Death rate- Population explosion–Birthcontrolmeasures.

UNIT II

Definition - Epidemiology - Environment and Health - Occupational Health - Industrial Hygiene and Occupational Diseases – Water - basic health needs – water borne diseases – Cholera – Jaundice.

UNIT III

General atmosphere of hospital - Features of General hospitals – Speciality hospitals - Disposal of Refuse - Sanitary measures during fairs, festivals, famines and floods ,First aid with reference to accident. Public health organisations - PHCs – Public health schemes of India and WHO.

UNIT IV

House hygiene - communicable diseases – Bacterial diseases – Tuberculosis, Typhoid – viral diseases – Hepatitis-B, AIDS – Protozoan diseases- Amoebiasis – Helminth diseases- Filariasis.

UNIT V

Personal hygiene - Sun bathing, Hand wash, Health destroying habits and addictions – Drugs (Pan, Supari, Ganja), Alcohol, Smoking, Tea and Coffee. Mental hygiene.

TEXT BOOK:

1. Public Health and hygiene – N.Arumugam, Saras Publications, Nagercoil.

REFERNCE BOOKS:

1. Dunn, C. L. and Pandya, D. D. Indian Hygiene and Public Health - Elsevier Publications.
2. Jaising Prabhudas Modi. Elements of Hygiene and Public Health: For the Use of Medical Students, Vikas Publisheres, New Delhi.
3. William Hallock Park. Public Health and Hygiene: In Contributions by Eminent Authorities, Forgotton Books, New York.

SEMESTER – IV
CORE PAPER IV - GENETICS
PAPER CODE: 17 UZL 04

OBJECTIVES

- ❖ To impart broad knowledge of Hereditary mechanisms and variations.
- ❖ To understand the genes and its experiments at molecular levels for the exploration of knowledge in genetics.

UNIT I

Introduction – Laws of Mendel. Interaction of Genes. Epistatic gene, Complementary gene and Lethal genes. Atavism. Multiple Allelic Inheritance of ABO Blood group and Rh factor in Man.

UNIT II

Mechanism of Linkage and Crossing over – Types and theories. Chromosomal mapping. Sex linked Inheritance (Haemophilia & Colour blindness). Sex limited Inheritance and Sex influenced Inheritance.

UNIT III

Sex determination in Man, Drosophila and Bonellia. Mutations - types of mutagens. Point mutation and Chromosomal aberrations.

UNIT IV

DNA as genetic material –experimental evidences. Inbreeding and Outbreeding. Heterosis. Genetic disorders - Down's syndrome, Turner's syndrome and Klinefelter's syndrome.

UNIT V

Gene fine structure. Recombinant DNA and Gene cloning. Human Genome Project. Recombination - Conjugation, Transformation and Transduction.

TEXT BOOK

Concepts of Genetics – Verma P.S. and Agarwal V.K.

REFERNCE BOOKS

1. A Text book of Genetics – Rastogi. V. B.
2. Genetics – Sambamurthy.N.
3. A Text book of Biotechnology - Dubey, R.C.
4. Biotechnology - Sathyanarayana.U.

SEMESTER - IV
CORE PRACTICAL II
CELL BIOLOGY AND GENETICS
PAPER CODE: 17 UZL P2

Max marks: 60

I. MAJOR PRACTICALS

25 Marks

1. Total Counting of RBC using haemocytometer
2. Total Counting of WBC using haemocytometer
3. Blood Smear preparation and Differential count of WBC
4. Measurement of cell using micro meter
5. Study of meiosis in grasshopper testis – Squash technique.
6. Observation of Polytene chromosomes in *Chironomous* larva.

II. MINOR PRACTICALS

15 Marks

1. Study of mitotic division using onion root tips
2. Mounting of Buccal Epithelium and observing living cells using vital staining
3. Observation of common mutants of *Drosophila*

III. SPOTTERS

10 Marks

1. Compound Microscope
2. Stage and Ocular micrometer
3. Ciliated, Columnar, Glandular and Squamous epithelium .
4. Nerve and Bone
5. Straited ,Non –striated , Cardiac muscles.
6. DNA and RNA structure
7. Down's syndrome
8. Turner's syndrome
9. Klinifelter's syndrome
10. Homogenizer
11. Centrifuge
12. Microtome

IV. SUBMISSION OF RECORD

10 Marks

SEMESTER – IV
SKILL BASED ELECTIVE COURSE II
SEMESTER IV
POULTRY SCIENCE
PAPER CODE: 17UZL S2

OBJECTIVES

- To enable the learners to
- ❖ understand the grower housings.
 - ❖ get an exposure to various breeding techniques.
 - ❖ become familiar with the various bench marks.

UNIT I

Poultry farming: Classes of poultry - Desi: Aseel, Gagus, Exotic: leghorn. Rhode Island.
Housing of chicken: deep litter system, cage system, brooder housings & grower housings.
Poultry equipments - feeder, waterer, brooder, cages.

UNIT II

Farm size-resources and product combinations, class, breed, variety and strains of chickens, ducks, geese, turkeys and other species of poultry. Diseases - Ranikhet, Bird flu and Fowl Pox.

UNIT III

Quantitative traits - Inheritance of egg number, egg weight, growth rate, livability, fertility, hatchability, egg quality and other economic traits. Heritability and their estimates.

UNIT IV

Inbreeding and out-breeding. Pure-line breeding. Cross-breeding. Hybridization and hybrid vigour in improving economic traits. Various nutrients and their role in poultry.

UNIT V

Nutritive value of egg. Various measures of egg quality. Weight and quality grades of egg as per BIS, AGMARK and USDA standards. Egg processing and storage. Egg products and their uses. Processing, packing, preservation and grading of poultry meat.

TEXT BOOK

1. Gnanamani .M.R, 1978. Poultry Keeping, Deepana Publications.
2. Banerjee. C.C. 1992. Poultry III Edition.

REFERENCE BOOKS

1. Shukla G S and Upadhyay V B. 2004. Economic Zoology Rastogi Publication.
2. R.A. Sing. Poultry production .Kalyan publishers.

SEMESTER IV
NON MAJOR ELECTIVE COURSE - II
NUTRITION AND DIETETICS
PAPER CODE: 17UNM E2

OBJECTIVES

This course will enable the student to

- ❖ Understand the Science of food, characteristics of foods and their products.
- ❖ Acquire knowledge about functions and deficiencies of basic nutrition and gain knowledge about physiological and metabolic role of various nutrients.
- ❖ To describe the roles and responsibilities of a dietitian in a Hospital.

UNIT – I

Definition – food. Functions of food – Food groups (ICMR) Basic 7 and Basic 5. Cooking- Definition. Methods of cooking – Moist heat, Dry heat, Solar cooking, Microwave cooking. Cereal and Milk. Milk cookery. Egg- Egg cookery.

UNIT – II

Definitions - Nutrition, Health& Nutritional Status, Socio cultural factors influencing nutrition. Balanced diet. Energy- definition. BMR, factors affecting BMR.

UNIT – III

Carbohydrates- Definition. Dietary fibre. Role of dietary fibre in human nutrition. Definition, protein requirements (RDA) and Novel proteins. Minerals – sources and deficiency. Fats and diseases. Vitamins – sources, functions, deficiency and diseases.

UNIT – IV

Nutrition during pregnancy, Lactation and Infancy. Advantages of Breast feeding. Weaning and supplementary inculcation of food. Good food habits - Nutritional requirements of adolescence and old age.

UNIT – V

Diet therapy, Purpose and principles of therapeutic diets. Obesity and Underweight. Diet in Allergy, Food allergens. Dietary treatment for diabetes mellitus.

TEXT BOOKS

1. Chatwick, R et al. (2003). Functional Foods, Springer.
2. Guthrie, A.H. (1986). Introductory Nutrition, 6th ed, The C.V. Mosby Company.
3. Longree, K., (1973). Food Service Sanitation, John Wiley and Sons. New Delhi.

REFERNCE BOOKS

1. Mary K Schmidl & Theodore P.Labuza. (2000). Essential of functional Foods Culinary and Hospitality Industry Publications Services.
2. Robinson, C.H., (1998). Normal and the Therapeutic Nutrition, The Oxford and IBH Publishing Co., London.
3. Srilakshmi. (1998). Food Science, New Age International Ltd., Chennai.
4. Srilakshmi, B. (1977). Dietetics, New Age International (P) Ltd., Chennai.

SEMESTER – V
CORE PAPER V - ANIMAL PHYSIOLOGY
PAPER CODE: 17 UZL 05

OBJECTIVES

- ❖ To understand the various physiological systems and its structural and functional organization in animals

UNIT I

Nutrition – Types - Autotrophic, Heterotrophic. Feeding types - microphage, macrophage, liquid feeding. Food - Carbohydrate, Protein, Lipid and its role in nutrition. Vitamins - Types and its role, Deficiency symptoms and diseases. Minerals.

UNIT II

Balanced Diet. Digestion in man. Digestive glands. Digestive enzymes. Role of enzymes in digestion. Absorption of Carbohydrates, Proteins and Lipids.

UNIT III

Respiration – types. Respiratory organ - Integument, gills & lungs. Respiratory organ of man. Mechanism of Respiration in man. Respiratory pigments. Transports of gases - Oxygen transport, O₂ Dissociation curve, Bohr's effect, CO₂ transport. Respiratory Quotient.

UNIT IV

Circulation - Types of circulatory systems. Circulatory organs – heart types, Human heart. Blood and its composition. Blood coagulation. Electrocardiogram. Excretion - Excretory organs. Classification of animals on the basis of excretory products. Kidney of man. Urine formation.

UNIT V

Neuron types. Synapse - Neuro muscular junction, nerve impulse. Reflex action. Muscle types. Structure and chemical composition of skeletal muscle. Muscle contraction. Receptors – types. Endocrine glands and its role in man.

TEXT BOOKS

1. General and Comparative Physiology - Hoar, W.S.
2. Animal physiology – M.Mariakuttikan& N Arumugam. Saras publications.

REFERNCE BOOKS

1. Cell Physiology, Molecular Dynamics - Tedeschi, H. 2. Principles of Animal Physiology - Wilson, J.A.

SEMESTER – V
CORE PAPER VI - DEVELOPMENTAL BIOLOGY
PAPER CODE: 17 UZL 06

OBJECTIVES

- ❖ To acquire a wide knowledge of developmental stages of invertebrate and vertebrate organisms.

UNIT I

Gametogenesis. Electron microscopic structure of mammalian sperm. Types of sperm. Spermatogenesis. Structure of Ovum. Oogenesis. Fertilization – Physico chemical changes in fertilization and its significance. Parthenogenesis.

UNIT II

Types of Eggs. Egg membranes. cleavage – Planes and patterns of cleavage. Morulation. Blastulation in Frog and Chick. Gastrulation in Frog and Chick. Fate map.

UNIT III

Organogenesis – Brain and Eye formation in frog. Metamorphosis in Frog and insect, Hormonal Control of metamorphosis in insects. Foetal membranes in chick and Mammals. Placenta in Mammals.

UNIT IV

Gradient theory. Nuclear transplantation in Amphibians. Embryonic induction. Organizer - Types and experimental evidences. Regeneration in invertebrates and chordates.

UNIT V

Infertility, cause and treatment methods Embryo splitting and Test Tube Baby. Twins - identical and non-identical. Artificial insemination. Super Ovulation techniques, In vitro Fertilization. GIFT. ICSI. Birth Control.

TEXT BOOK

1. Chordate Embryology - Verma. P.S. and Agarwal. V.K.

REFERNCE BOOKS

1. Modern Embryology - Bodmer, Hold Rinefiar & Winston. N.Y.
2. Introduction to Embryology - Balinsky.

SEMESTER – V
CORE PAPER VII MICROBIOLOGY
PAPER CODE 17UZL07

OBJECTIVES

- To enable the learners to
- ❖ Understand the concept of microbiology and classification of microorganisms.
 - ❖ Understand the microbial culture, food spoilage and preservation methods.
 - ❖ To know the epidemiology of various disease and learn the waste water treatment and pollution control.
 - ❖ Learn the vaccine production technology and familiarize microbial products.

UNIT I

Microbiology– History and scope. Bacteria–Classification, Ultrastructure(E.coli),nutritional types and reproduction.Virus - Clasification, ultrastructure(T4phage),nutritional types, lytic and lysogenic cycle. Media preparation. Pure Culture techniques and staining(simple& gram).

UNIT II

Food –Contamination. Spoilage of milk and meat. Food preservation methods. Removal of microorganisms - preservation by low temperature, high temperature . Drying . Food additives.

UNIT III

Morphology, pathogenesis and laboratory diagnosis of *M.tuberculosis*, *Clostridium tetani*, *E.Coli*, *Salmonella* And *Vibrio cholerae*. Lab diagnosis of Smallpox, HBV, polio and HIV. Antibiotics. rDNA technology in Vaccine production.

UNIT IV

Role of microbes in soil– heavy metals bio-remediation.Solid waste – composition of solid waste and its conversion. Fuel (bio-gas) . Composting. Sewage treatment. Microbes in soil.

UNIT V

Role of Microbes in biofertilizer. Vaccines. Fermented food products – beer and wine. Industrial products production – enzymes (amylase), vitamin (B₁₂), organic acid (citric acid) and bioplastics. Probiotics-definition and uses.. Application of microbiology in enzyme production.

TEXT BOOKS

1. Pelczar Jr. J.J., Chan., E.C.S. and Kvieg. R., 2003. Microbiology, McGraw Hill, New York.
2. Frazier, W.C. and Westhoff, D.C., 1995. Food microbiology (Fourth Edition), Tata MC Graw Hill Publication co. Ltd, New Delhi.

REFERENCE BOOKS

1. Ananthanarayan, R., Jayaram Panikar, C.K., 2004. Text Book of Microbiology. Orient Longman Limited, Chennai.
2. Prescott, L.M., Harley, J.P. and Klein. D.A., 2002. Microbiology, Fifth Edition, WCB McGraw Hill, USA.
3. Greenwood, D. Richard C.B. Salk, John F. Peutherer, 2003. Medical Microbiology (5th Edition), Churchill Livingstone, USA.
4. Tom Elliot, Hastings, M and Desselberger, U. 1997. Lecture Notes on Medical Microbiology (3rd Edition), Black Well Science, UK.
5. Mitchell, R. 1992, Environmental microbiology, Wiley – liss, ajhon Wiley & sons, Inc., Publication, New York.

SEMESTER – V
MAJOR ELECTIVE COURSE I
MEDICAL LABORATORY TECHNIQUES
PAPER CODE: 17 UZL E1

OBJECTIVES

- ❖ To acquire a basic knowledge on the laboratory techniques in general and to know the basics of sterilization and culture methods.

UNIT I

Principles and uses of laboratory instruments – Autoclave, Hot air oven, Incubators, Water bath, Centrifuge, Refrigerator, Colorimeter, Spectrophotometer, pH meter, Haemoglobinometer, Haemocytometer, Kymograph unit, Microtomes, Electrophoresis, Sphygmomanometer and ECG.

UNIT II

Cleaning, care and sterilization of glasswares. Preparation and uses of reagents – normal saline, Turkey's fluid, Leishman's stain, Wright's stain, Hayem's fluid, Acetocarmine Methylene blue and Saffranin. Antimicrobial susceptibility test- Kirby Baur method

UNIT III

Blood cell morphology in health and disease. knowledge and skill in collection of blood samples for blood bank. Analysis of faeces, Bone marrow smear and Immuno Electrophoresis.

UNIT IV

RBC count , WBC, Total count, WBC differential count. Haemoglobin estimation Haemocrit, Packed Cell Volume (PVC), and Erythrocyte Sedimentation rate (ESR), Fragility test, platelet count, clotting time, bleeding time.

UNIT V

Examination of urine –microscopic examination of organized and unorganized sediments. Examination of cerebrospinal fluid, Semen analysis, sperm motility- sperm count and morphology.

TEXT BOOK

1. Medical Laboratory Technology – Ramanik Sood – Jaypee Brother's Medical Publishers.

REFERENCE BOOK

1. Medical Laboratory Technology vol I, II, III –Kanai L. Mukherjee, Tata McGraw Hill Publishing Ltd.

SEMESTER – V
SKILL BASED ELECTIVE III
BIOSTATISTICS AND COMPUTER APPLICATIONS
PAPER CODE: 17 UZL S3

OBJECTIVES

- ❖ To expose the students to know about basic concept in collection of data, tabulation and analyse it .To acquire knowledge on the computer application

UNIT I

Scope of Biostatistics. Methods of collection of data- Primary and Secondary data. Tabulation of data – Types and parts of table. Diagrammatic and graphical presentation of data.

UNIT II

Measures of central tendency- Mean, Median and Mode for Individual, Discrete and Continuous series. Measures of dispersion - Standard deviation, Standard error and Variance.

UNIT III

Correlation and Regression analysis- Definition, kinds, types, methods and uses of studying correlation and regression. Chi – Square test and goodness of fit. Test of Significance. Application of Biostatistics in Biology.

UNIT IV

Fundamentals of computer. Classification of computers. Computer organization- Input, Output, Processing and storage devices. Internet and Email. Application of computers in biology.

UNIT V

Definition and scope of Bioinformatics. Search engines. Biological data bases. - NCBI, EMBL, DDBJ, SWISSPORT, PIR, PROSITE. Application of bioinformatics in biology.

TEXT BOOKS

1. Biostatistics., P. Ramakrishnan
2. Bioinformatics., Beginner's guide, claveries

REFERNCE BOOKS

1. Statistical methods for Biologists., S. Palanisamy and M. Manoharan
2. Biostatistics., P.N. Arora and P.K. Mathan
3. Statistical methods in biology., Bailey
4. Bioinformatics., Prakash. S. Lohar.

SEMESTER – V
SKILL BASED ELECTIVE COURSE IV
VERMITECHNOLOGY
PAPER CODE: 17 UZL S4

OBJECTIVES

- ❖ To ideal objective of vermitechnology are to upgrade the original value of the original waste materials and creating a clean hygienic environment. Free of garbage in the environment.

UNIT I

Vermiculture –scope and importance .Earthworm - Taxonomic position. Morphology and Anatomy. Biology of *Lampito mauritii* , *Eudrillus eugeniae* and *Pherionyx excavatus*. Need for earthworm culture.

UNIT II

Ecological groups of earthworms – Epigeic, Endogeic and Anecic species.. Common species for culture environmental requirements. Culture methods - wormery – breeding techniques.

UNIT III

Vermicompost –Vermicomposting materials and their classification. Methods - Small scale and large scale - pit methods, heap method, windrow method process. Factors affecting vermicomposting.

UNIT IV

Vermicomposting in Homes. Maintenance of vermicomposting beds. Harvesting the worms. Earthworm predators, parasites and pathogens.

UNIT V

Application of vermicompost in Agriculture and Horticultural practices. Advantages of vermicompost.

TEXT BOOK

The Earthworm Book, Second Revised edition - Sultan Ahmed Ismail.

REFERNCE BOOKS

1. Vermicomposting for sustainable agriculture. Gupta, P.K. Agrobios.
2. Vermitechnology - Mary Violet Christy A.
3. Vermitechnology from soil Health to human health - Ranganathan , L.S. Agrobios.

SEMESTER - VI
CORE COURSE - VIII
ENVIRONMENTAL BIOLOGY
PAPER CODE: 17 UZL 08

OBJECTIVES

- ❖ To realize the potential of natural resources and its contributory functions. To create and awareness of environmental pollutions issues.

UNIT I

Scope of ecology, Abiotic factors - Temperature and Light. Biotic factors – Animal association - Symbiosis, Commensalism, Mutualism, Competition, Antagonism, Parasitism and Predatism. Biogeochemical cycle – Carbon cycle, Nitrogen cycle and phosphorus cycle.

UNIT II

Fresh water habitat – characteristics and adaptation of Lentic and Lotic system. Marine habitat – Division, Pelagic and Benthic (Deep sea) adaptations, Intertidal – Rocky, Muddy and Sandy adaptations, Estuary and Mangroves adaptations. Terrestrial Biome – Forest, Grass land, Desert and Caves.

UNIT III

Community Ecology –Characteristics of community Ecological succession. Population – Density - Total count, sampling method, Natality, Mortality, Age distribution - Age Pyramids, Population interactions.

UNIT IV

Structure of ecosystem - Pond ecosystem, Types of ecosystem. Food chain, Food web with examples. Energy flow, Ecological pyramids - Numbers, Biomass and Energy and Inverted Pyramids.

UNIT V

Air pollution, Water pollution, Soil pollution, Noise pollution and Radioactive. Pollutants - ecological effects and Control measures. Wild life conservation in India, National parks and Sanctuaries and Acts.

TEXT BOOK

A Text book of Environmental studies – P. Arul.

REFERNCE BOOKS

1. Environmental Science – P.D.Sharma
2. Ecology – Odum.

SEMESTER - VI
CORE COURSE - IX
EVOLUTION
PAPER CODE: 17 UZL 09

OBJECTIVES

- ❖ To know the scientific concepts of animal evolution through an understanding of its evidence.
- ❖ To understand its mechanism, process and products.

UNIT I

History of evolutionary thoughts. Origin of life - Special creation, Cosmozoic, Abiogenesis, Biogenesis, Biochemical origin of life. Geological Time scale.

UNIT II

Evidences from organic evolution – Morphology, Comparative anatomy, Embryology, Palaeontology, Biogeography, Physiology, Cytology and genetic evidences.

UNIT III

Theories and concepts of evolution- Lamarckism, Neo-Lamarckism, Darwinism, Neo-Darwinism, Mutation theory of Devries and Modern synthetic theory.

UNIT IV

Isolation- Types of isolation. Origin of Species. Speciation- Sympatric, Allopatric and parapatric speciation. Natural and Artificial selection. Mimicry and Colouration.

UNIT V

Patterns of evolution- Sequential, Divergent, Quantum and parallel evolution. Biological and Cultural evolution of man. Fossils-Types formation and significance.

TEXT BOOKS

1. Concept of Evolution. Verma. P.S. and Agarwal, V.L.
2. Evolution., Arumugam. N.

REFERNCE BOOKS

1. Organic Evolution. Rastogi.V.B.
2. Introduction to Evolution. Dodson
3. Introduction to Evolution. Moody.

SEMESTER – VI
MAJOR ELECTIVE COURSE II
IMMUNOLOGY
PAPER CODE: 17 UZL M2

Objective

- ❖ To understand the principles of immune system, its mechanism of action immunological techniques for preparation of immune molecules.

UNIT I

Historical perspectives of Immunology. Overview of Immune system, Innate and Acquired Immunity. Primary and Secondary lymphoid organs. Cells involved in immune system. Haematopoiesis.

UNIT II

Antigen – Properties and Classes. Haptens, Adjuvants. Humoral Immunity. Primary and Secondary Immune response. B-cell Activation and Proliferation. Cell mediated Immunity receptors and T Cell Activation.

UNIT III

Immunoglobulins – Types and Functions. Structure – IgG. Antigen- Antibody interaction, Monoclonal antibodies. Hypersensitive reactions.

UNIT IV

Complements – Salient features, Biosynthesis, Classical pathway and Alternative pathway. Biological function of complements. MHC.

UNIT V

Transplantation Immunology-Graft and its types, Rejection of Graft. Immunization schedule. Immune regulation and Suppression, Autoimmunity, Vaccines and Immune response to Infectious diseases. Auto immune diseases, AIDS and Transplantation.

TEXT BOOKS

- 1.Immunology –J.Kubey
- 2.Immunology –L.M.Roitt, J.Brestoff and D.K.Males.

REFERNCE BOOKS

1. Immuno-biology- Janeway CA and Paul Travers.
2. Monoclonal Antibodies: Principles and Practice- J.W. Goding.
3. Hybridoma Technology in the Biosciences and medicine- T.A. Springer.
4. Vaccines- New Approaches in immunization- F.Brown, R.M.Chanock, KA Lerner.

**SEMESTER – VI
BIOTECHNOLOGY
MAJOR BASED ELECTIVE III
PAPER CODE 17UZLM3**

OBJECTIVES

To enable the learners to

- ❖ Learn the scope and concepts of Biotechnology.
- ❖ Get skills in Biotechnology
- ❖ Study the importance of enzymes in rDNA technology,
- ❖ Understand the principles and significance of gene cloning.
- ❖ Become familiar with the gene transfer technology and transgenics.

UNIT I

Biotechnology – Definition – Scope and importance of biotechnology. Recombinant DNA technology. Restriction endonucleases, DNA ligases. Vectors – plasmid and cosmids.

UNIT II

Cloning– Steps involved in gene cloning method. Screening of recombinant DNA. Construction of genomic and cDNA libraries. Gene therapy- types and methods. Methods of immobilization.

UNIT III

Fractionation techniques - Ultracentrifuge, Chromatographic separation. Cryopreservation technique. Microinjection. Electroporation and particle bombardment technic. Blotting technique- southern and northern , Polymerase Chain Reaction (PCR).

UNIT IV

Basic design of the Fermentor system. Fermentation processes – Inoculum preservation, Production processes. Batch and continuous fermentation. Downstream process – Separation of cell biomass and insoluble ingredients.

UNIT V

Transgenic animals – Transgenic sheep, Human Genome Project and its perspectives. Biosafety - IPR–, copyrights, Trade secrets, Trademark – Patent – Conditions for patenting.

TEXT BOOKS

1. Singh, B.D., 2004, Biotechnology, Kalyani Publishers, New Delhi. Gupta, P.K. 2004.
2. Elements of Biotechnology, Rastogi Publications, Meerut, India.
3. Kumar, H.D. 2000. Modern Concepts of Biotechnology, UBS publishers Ltd, New York

REFERNCE BOOKS

1. Brown, T.A. 2006. Gene cloning , Chapman and Hall Publications, U.S.A.
2. Dubey, R.C. 2006, A Text Book of Biotechnology, S. Chand and Co. Ltd., New Delhi.

3. El-Mansi E.M.T and Bryce.C.F.A 2002. Fermentation Microbiology and Biotechnology, Taylor and Francis Group, Philadelphia, USA.
4. Flinger, M.C. and J.W. Draw. 1999. Encyclopedia of Bioprocess Technology, Fermentation, Biocatalysis, Bioseparation (Volume I – V), John Willey and Sons, New York.
5. Freifelder, D., 2004, Physical Biochemistry – Application to Biochemistry and Molecular Biology, W.H. Freeman & Co., San Francisco.

SEMESTER - VI
SKILL BASED ELECTIVE COURSE V
SERICULTURE
PAPER CODE: 13 UZL S5

OBJECTIVES

- ❖ To acquire sound knowledge on Sericulture and its Economics and entrepreneur opportunities in sericulture.

UNIT I

Global and domestic sericulture scenario. Mulberry cultivation of India . Mulberry varieties. Selection of land and cultivation of mulberry by different methods. Manuring. Pruning. Harvesting and preservation of leaves. Package of practices for mulberry cultivation(Planting,space,Green manure, Fym application,chemical application, spraying of insecticide ,usage of biocontrol units, irrigation and pruning).

UNIT II

Types of silkworms – Mulberry, Tasar, Muga and Eri . Oak Tasar life cycle of silkworm .Silkworm Rearing management –DFL Preservation ,incubation, disinfection, brushing,young silkworm rearing ,Maintanance of Temprature and RH,Late age rearing,mounting.Anatomy of silkworm larva. Rearing house and equipments. Disinfection of rearing house and equipments. Environmental condition fit for rearing.

UNIT III

Selection and preservation of seed cocoons. Preparation of layings (Egg sheets and Loose eggs) washing of silkworm eggs. Egg transportation .

UNIT IV

Integrated pest and disease management for mulberry and silkworm. Muiberry-Tukra,Papaya mealy bug, Root rot, Root knot,Thrips Silkworm . Pebrine, Flacherie, Muscardine, Grasserie and Uzifly.Rearing techniques – Chawki rearing and Late age rearing. Mounting of worms. Harvesting of cocoons. Pests of silkworm (Uzifly). Preventive measures.

UNIT V

Reeling methods – Charka – Cottage basin. Multiend and Automatic Re-reeling. Silk examination – cleaning. Lacing and Skeining.

Industrial visit to Salem and Hosur Germplasm station.

TEXT BOOK:

1. Introduction to Sericulture Ganga.G and Sulochana chetty J.

REFERNCE BOOKS

1. Hand Book of Sericulture Technologies - Dandin. S.B. Jayasural and Giridhar.K.
2. Manual on Sericulture - Krishnaswami.S.

SEMESTER - VI
SKILL BASED ELECTIVE COURSE VI
HEALTH & HYGIENE
PAPER CODE: 13 UZL S6

OBJECTIVES

- ❖ To provide information about health and hygiene and have positive attitude, correct and complete knowledge of health.

UNIT I

Spectrum of health. Determinants of health - mortality and morbidity. Indicators of health.

UNIT II

Malnutrition and its effects. Food toxicants and food additives. Brief account on major Indian diseases- cardio vascular diseases, diabetes, obesity and cancer.

UNIT III

Maternal and child health - MCH problems, indicators of MCH care, antenatal, intra natal and post natal care.

UNIT IV

Mental health- Types, causes and prevention of mental health. Crucial points in the life of human beings. Alcoholism, Smoking, drug addiction - deaddiction.

UNIT V

Health education: Definition- OBJECTIVES-principles- practices of health education. Sex education. AIDS. Methods of family welfare.

TEXT BOOK

Text book of Preventive and Social Medicine - Park, J.E & Park.K.

REFERNCE BOOKS

1. Hand book of food and Nutrition - Swaminathan .M.
2. Essentials of food and Nutrition. Vol.I and II - Swaminathan, M.

**SEMESTER VI
PRACTICAL - III
ANIMAL PHYSIOLOGY, DEVELOPMENT BIOLOGY AND
MICROBIOLOGY
PAPER CODE: 17 UZL P3**

Total 60 Marks

I. MAJOR PRACTICALS

25 Marks

1. Amylase activity in relation to pH in human saliva.
2. Identification of Nitrogenous excretory products.
3. Test for urea and sugar in urine samples.
4. Temporary mounting of Chick embryo 24, 48 and 72 hrs.
5. Simple and Gram staining.
6. Pure culture techniques : spread plate and pour plate methods
7. Isolation of micro organisms
8. Antimicrobial activity (Disc method)
9. Isolation of amylase producing microorganism.

II. MINOR PRACTICAL

15 Marks

1. Estimation of Haemoglobin (Hb) content.
2. Estimation of blood bleeding time and clotting time.
3. Preparation of media - liquid and solid.
4. Observation of fungal by lacto phenol cotton blue.
5. WIDAL Test -Demo
6. Enumeration of bacteria from soil, water sample.

III. SPOTTERS

10 marks

- | | |
|-------------------------|------------------------------|
| 1. Sphygmomanometer | 11. Frog - Blastula, |
| 2. Kymograph | 12. Frog - Gastrula |
| 3. Stethoscope | 13. Sperm and Ovum |
| 4. Human heart (entire) | 14. Frog- Tadpole |
| 5. Eye | 15. Metamorphosis - insect |
| 6. Ear | 16. Metamorphosis - Frog. |
| 7. Kidney | 17. Incubator |
| 8. Neuron synapse | 18. Autoclave |
| 9. Placenta - sheep | 19. Colony counter |
| 10. Chick –Egg stage | 20. Laminar air flow chamber |

IV. SUBMISSION OF RECORD

10 Marks

PRACTICAL – IV
ENVIRONMENTAL BIOLOGY AND EVOLUTION
PAPER CODE: 17 UZL P4

TOTAL MARKS=60

I. MAJOR PRACTICALS

25 MARKS

1. Estimation of dissolved oxygen content of water samples.
2. Estimation of dissolved CO₂ content of water samples.
3. Estimation of Salinity in water samples.
4. Estimation of Carbonates and Bicarbonates in water samples.

II. MINOR PRACTICALS

15 MARKS

1. Construction of ecological pyramid of a pond.
2. Qualitative analysis of Marine water planktons.
3. Determination of pH in water samples.

III. SPOTTERS

10 MARKS

- | | |
|-----------------------|--|
| 1. Rain gauge | 7. Food chain in pond ecosystems |
| 2. Hygrometer | 8. Analogous organs |
| 3. Thermometer | 9. Homologous organs |
| 4. Ecological pyramid | 10. Vestigial organ |
| 5. Barometer | 11. Connective link-Peripatus, Archaeopteryx |
| 6. Sacchi disk | |

IV. SUBMISSION OF RECORD

10 MARKS

SEMESTER - I
ALLIED ZOOLOGY
INVERTEBRATE AND CHORDATE ZOOLOGY
PAPER CODE: 17 AZL 01

OBJECTIVES

- ❖ To study the systemic and functional morphology of invertebrates and chordates.

UNIT –I

Taxonomy – History and nomenclature - Unit of classification. Classification of the kingdom up to class level with examples. Outline classification of invertebrates and vertebrates. Protozoa – *Entamoeba histolytica* - structure and life cycle. General topic: Pathogenic Protozoans.

UNIT –II

Porifera – *Leucosolenia* – cellular structure and reproduction .Coelenterata – *Obelia*- external morphology, reproduction and development. Helminthes: - Type study –*Taenia solium* – external morphology and life cycle. Annelida – Type study: Earthworm – external morphology – life cycle.

General topic :Helminthes parasites in humans.

UNIT –III

Arthropoda – Type study: Cockroach - External Morphology, Reproduction and development.Mollusca : Type study: Unio- External Morphology.Echinodermata : Type study – Star fish- External Morphology and Water vascular system.

General topic : Economic importance of insects.

UNIT –IV

Pisces: Type study – Shark- external morphology.Amphibia: Type study- Frog- external morphology- digestive system and respiratory system.Reptilia : Type study- Calotes - external morphology and digestive system.

General topic: Identification of Poisonous and Non- Poisonous Snakes.

UNIT –V

Aves: Type study: Pigeon - external morphology- digestive system and respiratory system.
mammals. Type study: Rabbit - external morphology- digestive system and excretory system.

General topic: Flight adaptation in birds.

TEXT BOOKS

1. Bernice Anandaraj – Allied Zoology in Tamil version.
2. Ekambaranatha Ayyar and Anantha Krishnan, T.N, 1993. Outlines of Zoology, Vol.I & II. Viswanathan and Co, Madras.

REFERNCE BOOKS

1. Invertebrate Zoology – Agarwal. V.K.
2. Modern text book of Zoology – Kotpal. R.L.
3. Invertebrate Zoology – Jordan and Verma

II SEMESTER
CELL BIOLOGY, GENETICS, DEVELOPMENTAL BIOLOGY, BIOCHEMISTRY,
ANIMAL PHYSIOLOGY, IMMUNOLOGY, ECOLOGY, EVOLUTION, AND
MEDICAL LABORATORY TECHNIQUES.

PAPER CODE: 17 AZL 02

OBJECTIVES

- ❖ To study the principles of Developmental biology, Physiology, Ecology, Biochemistry and MLT.

UNIT – I

Structure of Eukaryotic cell. Plasma membrane- structure and theories. Cell division – Mitosis and Meiosis. Laws of Mendel – Inheritance of Blood groups in Man. Genetic disorders –Turner’s Syndrome , Klinefelter’s Syndrome and Down Syndrome.

UNIT –II

Structure of Ovum and Sperm in Human. Mechanism of fertilization. Parthenogenesis, Cleavage - Types. Assisted Reproductive techniques in Human. Types of Immunity- Innate and Acquired. General structure of Immunoglobulin. Auto- immunity . Acquired immune deficiency diseases (AIDS).

UNIT –III Structure and Classification Proteins, Carbohydrates and Lipids. Enzymes- Structure and mechanism of action. Digestion and Respiration in Man, Human heart- Structure.

UNIT –IV

Units of ecosystem- Energy flow in ecosystem. Pollution- Air, Water, Land, Thermal and Radioactive. Origin of Life- Theories and Concepts of evolution- Lamarkism and Darwinism.

UNIT –V

Clinical Physiology Tests - Erythrocyte Sedimentation Rate (ESR). Platelet count. Clotting time. Bleeding time and Sperm count. Constituents of blood, ECG. Blood cell morphology in health and diseases.

TEXT BOOKS

1. Sombasiviah, I, Kamalakara Rao. A.P, Augustine Chellappa.S (1983). Text book of Animal Physiology, S.Chand & Co, New Delhi.
2. Verma, P.S & Agarwal, V.K (1983). Text book of Animal Ecology, S.Chand & Co, New Delhi.
3. Verma, P.S & Agarwal, V.K (2000). Cell biology, Genetics, Molecular biology, Evolution and Ecology, S.Chand & Co, New Delhi.
4. Verma, P.S & Agarwal, V.K and Tyagi (1991).Chordate Embryology, S.Chand & Co, New Delhi.

REFERNCE BOOKS

1. Environmental Science – P.D.Sharma
2. Organic Evolution. Rastogi.V.B.
3. Medical Laboratory Technology vol I, II, III –Kanai L. Mukherjee, Tata McGraw Hill Publishing Ltd.
4. Concepts of Genetics – Verma P.S. and Agarwal V.K.

SEMESTER - II
ALLIED PRACTICAL - I
PAPER CODE: 17 AZL P1

TOTAL MARKS: 60

MAJOR PRACTICAL

25 MARKS

1. Cockroach – Digestive system and Nervous system.
2. Earthworm – Digestive system and Nervous system.
3. Blood group in Man.

MINOR PRACTICAL

15 MARKS

1. Earthworm – Body setae
2. Cockroach – Mouth parts
3. Honey bee – Mouth parts
4. Blood- Clotting Time and Bleeding Time.

SPOTTERS

10 MARKS

Amoeba, Entamoeba, Paramecium, Trypanosoma, Leishmania, Obelia, Leucosolenia, Fasciola hepatica, Taenia solium, Taenia – scolex, Ascaris – Male, Female, Penaeus, Unio, Starfish-Entire, Star fish – Tube feet. Amphioxus, Shark, Frog- Tadpole ,Bufo, Ichthyophis, Calotes, Cobra, Viper, Krait,Pigeon, Quill feather, Bat, Dentition of Rabbit and Man. Human Sperm, Ovum. Two celled , Four celled and blastula of frog. Immunoglobulin- Structure.Ecological pyramid, Sacchi disc. Human – Lungs , Heart – structure. Sphygmometer.

SUBMISSION OF RECORD

10 MARKS