



**Dr. V. S. Krishna Govt. Degree College
Visakhapatnam**

DEPARTMENT OF ZOOLOGY

**PROPOSED SYLLABUS FOR
ZOOLOGY**

IN UNDERGRADUATE DEGREE PROGRAMME

UNDER AUTONOMY

2022 - 2023

BOARD OF STUDIES COMMITTEE FOR ZOOLOGY
IN
UNDERGRADUATE DEGREE PROGRAMMES

Chairman

Dr.P. Jaya
Head of the Dept. of ZOOLOGY

Members:

Teaching faculty in the Department of Zoology

- 1 Dr.T. Samuel David Raj**
- 2. Dr. V. Ratna Bharati**
- 3. Dr. P. R. Vani**
- 4. Dr. Y. Shanti Prabha**
- 5. Dr. K. Ramarao**

Dr. V. S. KRISHNA GOVT. DEGREE AND PG COLLEGE (A), VISAKHAPATNAM

DEPARTMENT OF ZOOLOGY

BOARD OF STUDIES MEETING 2022 – 2023

(MINUTES OF THE MEETING)

The Board of Studies of the Department of ZOOLOGY met on 30.09.2022 at 10.30AM under the Chairmanship of Dr. P. Jaya and resolved the following:

1) **Syllabus Pattern:-**

To adopt Choice Based Credit System as per the Staff Council's proceedings commencing from the academic year 2022 – 2023 for the admitted 1st Year Degree batch of 2022 – 2023.

2) **Core Course Syllabus:-**

To approve and introduce the newly framed syllabus (modified and approved by the BoS) for the 1st Year B.Sc. Degree course in ZOOLOGY. The newly framed syllabus is oriented in such a fashion that it caters the needs of the students and to meet the present-day job employability and to develop professionalism in the field of ZOOLOGY.

3) **Academic Years:-**

To approve and ratify the 1st, 2nd and 3rd Year ZOOLOGY syllabus for the batch admitted in 2022 - 2023.

4) **Semester Patten:-**

To ratify and introduce the semester mode pattern of examinations for the 1st Year students (ZOOLOGY, Botany and Chemistry & Microbiology, ZOOLOGY and Chemistry groups).

5) **Model Question Papers & Blue Prints:-**

To approve and ratify the model question papers and blue prints for theory and practical examinations submitted by the concerned faculty members for 1st, 2nd, 3rd, 4th, 5th and 6th semesters.

6) **Assessment:-**

To approve and ratify the external assessment for semester-end theory and practical examinations and internal assessment for mid-semester examinations. Out of 100 marks in each semester, 75 marks are for theory external examination and 25 marks are for internal assessment, of which 20 marks are provided for evaluation of conducting and taking average of two mid semester examinations and 5 marks are given as per the SoP on Continuous Internal Assessment issued by the

Commissionerate of Collegiate Education, Government of Andhra Pradesh, Vijayawada. Practical examinations will be conducted by the external examiners, at the end of each academic year for 100 marks.

7) **Life Skill Courses –**

To offer, approve and ratify four life skill courses – One in Semester-1 i.e., Human Values and Professional Ethics, One in Semester – 2 (Information and Communication Technology) and Two courses in Semester – 3 (Health & Hygiene, a mandatory Environmental Education course) for the students admitted during 2022- 23.

Semester	No. of LSCs	Name of the LSC
1	1	HVPE – Human Values and Professional ethics
2	1	ICT – Information and Communication Technology
3	2	Health & Hygiene
		Environmental Education (Mandatory course across all streams)

8) **Skill Development Courses –**

To offer, approve and ratify four Skill Development Courses – One in Semester-1 i.e., Plant Nursery, Two in Semester – 2 (Dairy Technology and Solar Energy) and One course in Semester – 3 (Poultry Farming) for the students admitted during 2022-23.

Semester	No. of SDCs	Name of the SDC
1	1	Plant Nursery
2	2	Dairy Technology Solar Energy
3	1	Poultry Farming

9) **Skill Enhancement Courses –**

To offer, approve and ratify the syllabus, model papers, blue-print of the question papers for Four pairs of Skill Enhancement Courses 6A (Sustainable Aquaculture Management) and 7A (Post Harvest Technology for Fish and Fisheries), 6B (livestock management – I Biology of dairy animals) and 7B (Live stock management II Dairy production and management), 6C (Poultry management I Poultry farming) and 7C (Poultry management II Poultry production and management), 6D (Sericulture I) and 7D (Sericulture II) for the students admitted during 2022-23.

10) **Value-added Courses –**

To approve and ratify the syllabus, model paper and blue-print of the Value-added course on “Ornamental Fisheries” introduced as a self-employment course for students.

11) **Internships & Apprenticeships –**

To approve the implementation of first internship i.e. “Community Service Project” during the interim period (summer holidays) between first and second years, a second

internship for 8 weeks during the interim period between second and third year and the third internship i.e. apprenticeship during the final year where students have to get trained in job skills related to the skill enhancement course they have chosen and submit a project. It is further resolved that for the 3rd internship, only 50% of the students shall be sent to industries while the remaining 50% shall be in the college being taught by the teachers and vice versa.

12) Faculty & Student Development Programmes -

To conduct seminars, workshops, symposia, field visits and organising exhibitions etc., to inculcate and create new ideology among the faculty and students.

13) Student Research Projects -

To encourage students to take up independent research projects at their level by providing facilities.

14) Quality Circles -

To adopt NAAC norms by introducing quality circles among student community.

15) Infrastructure Facilities -

To improve the infrastructure facilities in the department, and to implement guidelines of the Academic Council.

16) Pedagogy -

To take up innovative pedagogical teaching methodologies in vogue including ICT mode of teaching and evolve techniques that are easily understood by the students.

17) Remedial Coaching -

To identify slow learners and medium learners and conduct remedial coaching to improve their performance.

18) Labs & Class Rooms -

Resolved to maintain laboratory and class rooms as per the ISO norms.

19) Extra- and Co-curricular activities –

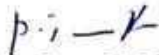
To arrange for co-curricular activities like field-trips, Visits to industries etc., and to bring out their creative skills by making charts and models of animals and letting them participate in incubation and start-up centres of the college. It is further resolved to make students participate in extra-curricular activities like quizzes, elocution and essay writing competitions, dance and singing competitions etc.


20) Holistic Development of Students -

To arrange classes on personality development, soft skills, employability skills and research aptitude periodically for the holistic development of the students, with the support from Jawahar Knowledge Centre and English Department of the college and to encourage students to participate in the community development activities such as

NCC, NSS, RRC, Haritha Krishna Eco Club and add-on courses like Music, Dance and Self-Defence for girl students.


Signed and approved by



Prof. P. Janaki Ram
Subject Expert Zoology
Head of the Department, Zoology
(University Nominee)
HEAD
Department of Zoology
Andhra University
Visakhapatnam


Dr. R. Ramachandra Rao
Subject Expert
(from Non-Affiliated College)


Dr. P. Latha
Academic Coordinator


Dr. P. Jaya
BOS Chairman
HOD Zoology


Dr. P. John Kiran
Subject Expert
(from Non-Affiliated College)


M. Purushottam,
Conservation Biologist,
IGNZP
Alumni



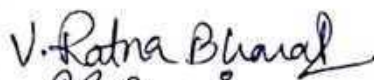
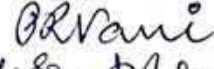
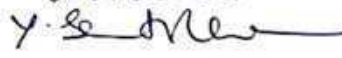
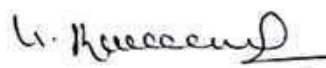
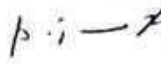
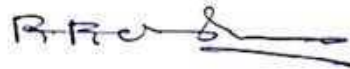
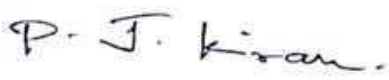
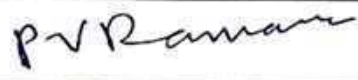
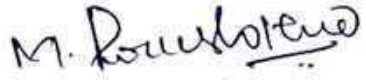


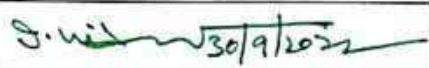
Dr. I. Vijay Babu
Principal & Chairperson, Academic Council.

Dr.V.S. Krishna Govt. Degree College (Autonomous), Visakhapatnam
8th Board of Studies Meeting 2022

DEPARTMENT OF ZOOLOGY
BOS COMMITTEE 2022

Subject:

In pursuance of conferment of Autonomous status to Dr.V.S.Krishna Govt. Degree College(A), Visakhapatnam by the UGC vide letter No.F22-1/2011(AC) dated 20.07.2011 from Dr. Manju Singh, Joint Secretary, UGC, New Delhi and Proceedings No. C-II (1) /Dr.V.S.Krishna College(A)/2022 dt.03.08.2022 of The Vice-Chancellor, Andhra University, Visakhapatnam, the **8th Board of Studies in Zoology** Subject is conducted on 30-09-2022 at 10 AM with the following members. The changes in the syllabus will be implemented from 2022-23 academic year onwards.

MEMBER	NAME & DESIGNATION	SIGNATURE
Head of the Department (Chairman)	Dr. P. Jaya	
Faculty Members	1. Dr. T. Samuel David Raj 2. Dr. V. Ratna Bharati 3. Dr. P. R. Vani 4. Dr. Y. Shanti Prabha 5. Dr. K. Rama Rao	    
Subject Expert (University Nominee)	Prof. P. Janaki Ram HOD, Dept. of Zoology	 HEAD Department of Zoology Andhra University Visakhapatnam
Subject Experts (from outside the parent university)	Dr. R. Ramachandra Rao Lecturer in Zoology, GDC Rajam.	
	Dr. P. John Kiran Lecturer in Zoology, GDC Perumalapuram	
Member from Industry	Dr. P. V. Ramana Associate Prof, AMC, Visakhapatnam	
Member from Alumni	M. Puvvashotham Conservation Biologist IGNZP	
Coordinator, IQAC	Dr. Ch. Lalitha	
Academic Coordinator & Member Secretary, Academic Council	Dr. P. Latha	
Principal & Chairperson, Academic Council	Dr. I. Vijaya Babu	

**REVISED SYLLABUS OF B.Sc. (ZOOLOGY)
UNDER CBCS FRAMEWORK WITH EFFECT FROM 2020-21**

PROGRAMME: FOUR-YEAR UG HONOURS PROGRAMME

ZOOLOGY

*(With Learning Outcomes, Unit-wise Syllabus, References, Co-curricular Activities &
Model Q.P.)*

(To be Implemented from 2022-23 Academic Year)

PROGRAMME: FOUR-YEAR B.Sc. Hons.
(With Chemistry, Botany and Zoology Disciplines)

As per the National Education Policy, 2020 the outcomes of Higher Education include increased critical thinking abilities, higher order thinking and deeper learning, mastery of content, problem solving, team work and communication skills besides general engagement and enjoyment of learning including systematic research in India.

The overall objectives of the learning outcomes-based curriculum framework are to:

- ❖ Help formulate graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes that are expected to be demonstrated by the holder of a qualification;
- ❖ Enable prospective students, parents, employers and others to understand the nature and level of learning outcomes (knowledge, skills, attitudes and values) or attributes a graduate of a programme should be capable of demonstrating on successful completion of the programme of study.

Programme Educational Objectives (PEOs):

PEO1 Higher Education: Empower students to pursue higher studies in various fields of Biology and Chemistry.

PEO2 Career: Enable students to pursue careers in Chemical, Biological and related fields as demonstrated by professional success at positions within industry, government, or academia.

PEO3 Social responsibility: Enable students to exhibit professionalism, ethical attitude, communication skills and team work in their profession.

Program Outcomes (POs):

The Learning Outcomes of the programme could be in consonance with the Bloom's Taxonomy, which includes –

1. Remember (Lower order)
2. Understand (Lower Order)
3. Apply (Lower Order)
4. Analyze (Higher Order)

5. Evaluate & Problem Solving (Higher Order)
6. Create (Higher Order)

PO1 Critical thinking: Able to understand and utilize the principles of scientific enquiry, think analytically, clearly and evaluate critically while solving problems and making decisions during biological study.

PO2 Effective communication: Able to formally communicate Scientific ideas and investigations of the biology discipline to others using both oral and written communication skills.

PO3 Social interaction: Able to develop individual behaviour and influence society and social structure.

PO4 Effective citizenship: Able to work with a sense of responsibility towards social awareness and follow the ethical standards in the society.

PO5 Ethics: Ability to demonstrate and discuss ethical conduct in scientific activities.

PO6 Environment and Sustainability: Able to understand the impact of biological science in societal and environmental contexts and demonstrate the knowledge for sustainable development.

PO7 Self-directed and life-long learning: Able to recognize the need of life-long learning and engage in research and self-education.

Domain Subject: ZOOLOGY

*(Syllabus with Outcomes, Co-curricular Activities, References & Model Q.P
for Five Courses of 1, 2, 3, 4 & 5 Semesters)*

“The domain subject “Zoology”, embracing the fields of Animal diversity, Cell biology, Genetics, evolution, Animal physiology, Biochemistry, Embryology, Immunology, Molecular biology and Ecology gives the student a broad understanding of faunal diversity, various life processes involved in the development of an animal, its functioning, its response to environmental stimuli, molecular basis of life, new technological approach towards life, an insight for the lecturer into research and responsibility of the student towards environment”.

GENERAL CURRICULAR ACTIVITIES

➤ Lecturer-based:

- 1) **Class-room activities:** Organization of Group discussions, question-answer sessions, scientific observations, use of audio-visual aids, guidance programmes, examination and evaluation work (scheduled and surprise tests), quizzes, preparation of question banks, student study material, material for PG entrance examinations etc.
- 2) **Library activities:** Reading books and magazines taking notes from prescribed and reference books and preparation of notes on lessons as per the syllabus; Reading journals and periodicals pertaining to different subjects of study; Making files of news-paper cuttings etc.
- 3) **Lab activities:** Organization of practicals, maintenance of lab attendance registers/log registers, maintenance of glassware and chemicals
- 4) **Activities in the Seminars, workshops and conferences:** Organization of at least one seminar/workshop/conference per academic year either on academic/research aspects and inculcate research spirit among students
- 5) **Research activities:** Student study projects (General / RBPT model), Minor or Major research projects, Research guidance to research scholars, Publication of research articles/papers (at least one in 2 years) in UGC-recognized journals, Registration in Vidwan/Orcid/Scopus/Web of Science
- 6) **Smart Classroom Activities:** Organization of Departmental WhatsApp groups, Ed Modo groups/Google Class Rooms/Adobe Spark groups for quick delivery of the subject; Preparation of Moocs content & presentation tube lessons by trained lecturers; Using smart/digital/e- class rooms (mandarory) wherever present; Utilization of youtube videos (subject to copy rights) etc.

➤ Student-based:

- 1) **Class-room activities:** Power point presentations, seminars, assignments
- 2) **Library activities:** Visit to library during library hour and preparation of notes
- 3) **Lab activities:** Maintenance of observation note book and record, keeping lab clean and tidy
- 4) **Activities in the Seminars, workshops and conferences:**
Participation/presentation in seminar/workshop/conference

CO-CURRICULAR ACTIVITIES

OBJECTIVES:

The co-curricular activities are aimed at strengthening the theoretical knowledge with an activity related to the content taught in the class room. The aesthetic development, character building, spiritual growth, physical growth, moral values, creativity of the student.

The different types of co-curricular activities relevant to Zoology domain are listed below:

➤ Academic - based

- Preparation of Charts/Clay or Thermocol Models
- Debates, Essay Writing Competitions
- Group Discussions
- Departmental (Zoology) magazine
- Formation of Book clubs
- Animal album-making
- Viva-Voce

➤ Lab/Research –based

- Digital dissections
- Field Visit/Excursions/Zoological Tours and submission of report
- Training at research centres (aquaculture/apiculture/sericulture etc.)
- Exposure to scientific instruments and hands-on experience

➤ Value - based

- Organization of first-aid camp, swachhbharat, cleanliness week, girl-child importance, Nutrition and health awareness etc.

➤ Observation of Days of National/International Importance

World Cancer Day (February 4 th)	International Biological Diversity Day (May 22 nd)
Darwin Day (February 12 th)	World Turtle Day (May 23 rd)
National Science Day (Feb 28 th)	World blood Donor Day (June 14 th)
World Wildlife day (March 3 rd)	World Zoonoses Day (July 6 th)
National Vaccination Day (March 16 th)	World Mosquito Day (August 20 th)
World Health Day (April 7 th)	World Turtle Day (May 23 rd)
Earth Day (April 22 nd)	World Mosquito Day (August 20 th)
Malaria Day (April 25 th)	World Animal day (October 4 th)
World Hepatitis Day (May 19 th)	World Immunization Day (November 10 th)

**Dr. V.S. KRISHNA GOVERNMENT DEGREE COLLEGE (A),
VISAKHAPATNAM**

(w.e.f. 2022-23)

ZOOLOGY – SEMESTER I

PAPER – I: ANIMAL DIVERSITY – BIOLOGY OF NONCHORDATES

HOURS: 60 (5X12)

Max. Marks: 100

Course Outcomes: By the completion of the course the graduate should able to –

- CO1** Describe general taxonomic rules on animal classification
- CO2** Classify Protozoa to Coelenterata with taxonomic keys
- CO3** Classify Phylum Platyhelminthes to Annelida phylum using examples from parasitic adaptation and vermicomposting
- CO4** Describe Phylum Arthropoda to Mollusca using examples and importance of insects and Molluscs
- CO5** Describe Echinodermata to Hemichordata with suitable examples and larval stages in relation to the phylogeny

Learning objectives

1. To understand the taxonomic position of protozoa to helminthes.
2. To understand the general characteristics of animals belonging to protozoa to hemichordata.
3. To understand the structural organization of animals phylum from protozoa to hemichordata.
4. To understand the origin and evolutionary relationship of different phyla from protozoa to hemichordata.
5. To understand the origin and evolutionary relationship of different phylum from annelids to hemichordates.

ZOOLOGY SYLLABUS FOR I SEMESTER

PAPER – I: ANIMAL DIVERSITY – BIOLOGY OF NONCHORDATES

HOURS: 60

(5X12)

Max. Marks: 100

UNIT I

Taxonomy

- 1.1 Principles of Taxonomy – Binomial nomenclature – Rules of nomenclature
- 1.2 Whittaker's five kingdom concept and classification of Animal Kingdom.

Phylum Protozoa

- 1.3 General Characters of phylum Protozoa
- 1.4 Locomotion, nutrition and reproduction in Protozoans
- 1.5 *Elphidium* (type study)

UNIT –II

Phylum Porifera

- 2.1 General characters and classification up to classes with suitable examples
- 2.2 Skelton in Sponges
- 2.3 Canal system in sponges

Phylum Coelenterata

- 2.4 General characters and classification up to classes with suitable examples
- 2.5 Metagenesis in *Obelia*
- 2.6 Polymorphism in coelenterates
- 2.7 Corals and coral reefs

Unit – III

Phylum Platyhelminthes

- 3.1 General characters of Phylum Platyhelminthes.
- 3.2 Life cycle and pathogenicity of *Fasciola hepatica*
- 3.3 Parasitic Adaptations in helminthes

Phylum Nematelminthes

- 3.4 General characters of phylum Nematelminthes
- 3.5 Life cycle and pathogenicity of *Ascaris lumbricoides*



Unit – IV

Phylum Annelida

- 4.1 General characters of Phylum Annelida
- 4.2 Evolution of Coelom and Coelomoducts
- 4.3 Vermiculture - Scope, significance, earthworm species, processing, Vermicompost, economic importance of vermicompost

Phylum Arthropoda

- 4.4 General characters of Phylum Arthropoda
- 4.5 Vision and respiration in Arthropoda
- 4.6 Metamorphosis in insects
- 4.7 *Peripatus* - Structure and affinities
- 4.8 Social Life in Bees

Unit – V

Phylum Mollusca

- 5.1 General characters of Phylum Mollusca
- 5.2 Pearl formation in Pelecypoda
- 5.3 Sense organs in Mollusca

Phylum Echinodermata

- 5.4 General characters and classification up to classes with suitable examples
- 5.5 Water vascular system in star fish
- 5.6 Larval forms of Echinodermata

Phylum Hemichordata

- 5.7 General characters of Phylum Hemichordata
- 5.8 *Balanoglossus* - Structure and affinities

Co-curricular activities (suggested)

- Preparation of chart/model of phylogenetic tree of life, 5-kingdom classification, *Elphidium* life cycle etc.
- Visit to Zoology museum or Coral island as part of Zoological tour
- Charts on life cycle of *Obelia*, polymorphism, sponge spicules
- Clay models of canal system in sponges
- Preparation of charts on life cycles of *Fasciola* and *Ascaris*
- Visit to adopted village and conducting awareness campaign on diseases, to people as part of Social Responsibility.
- Plaster-of-paris or Thermocol model of *Peripatus*
- Construction of a vermicompost in each college, manufacture of manure by students and donating to local farmers
- Models of compound eye, bee hive and termitarium (termitaria) by students
- Visit to apiculture centre and short-term training as part of apprenticeship programme of the govt. Of Andhra Pradesh
- Chart on pearl forming layers using clay or Thermocol
- Visit to a pearl culture rearing industry/institute
- Live model of water vascular system
- Phylogeny chart on echinoderm larvae and their evolutionary significance
- Preparation of charts depicting the feeding mechanism, 3 coeloms, tornaria larva etc., of *Balanoglossus*

REFERENCE BOOKS

- L.H. Hyman, *The Invertebrates' Vol I, II and V.* – M.C. Graw Hill Company Ltd.
- Kotpal, R.L. 1988 - 1992 Protozoa, Porifera, Coelenterata, Helminthes, Arthropoda, Mollusca, Echinodermata. Rastogi Publications, Meerut.
- E.L. Jordan and P.S. Verma, *Invertebrate Zoology'* S. Chand and Company.
- R.D. Barnes, *Invertebrate Zoology'* by: W.B. Saunders CO., 1986.
- Barrington. E.J.W., *Invertebrate structure and Function'* by ELBS.
- P.S. Dhama and J.K. Dhama. *Invertebrate Zoology.* S. Chand and Co. New Delhi.
- Parker, T.J. and Haswell, *A text book of Zoology'* by, W.A., Mac Millan Co. London.
- Barnes, R.D. (1982). *Invertebrate Zoology, V Edition"*

ZOOLOGY –SEMESTER II

PAPER – II: ANIMAL DIVERSITY – BIOLOGY OF NON-CHORDATES

TIME: 3 Hrs

Max. Marks: 75

MODULE NO. & NAME	SHORT ANSWER QUESTIONS 5 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT I (Taxonomy & Phylum Protozoa)	01	02	30
UNIT II (Porifera & Coelenterata)	02	02	30
UNIT III (Platyhelminthes & Nematelminthes)	01	02	30
UNIT IV (Annelida & Arthropoda)	02	02	25
UNIT V (Mollusca, Echnodermata & Hemichordata)	02	02	25
Total no. of Questions	08	10	
Total Marks including Choice			140

NOTE :

1. The Question paper setters are requested to kindly adhere to the format given in the above table.
2. The Question paper setters are also requested to set the questions in the following way:
 - a. 80% of questions – Memory and understanding based.
 - b. 20% of questions – Creativity, application and skill based.
3. Please avoid repetition of questions

ZOOLOGY –SEMESTER I

PAPER – II: ANIMAL DIVERSITY – BIOLOGY OF NON-CHORDATES

Time: 3 Hrs

Max. Marks: 75

PART - I

I. Answer any FIVE of the following: 5X5 = 25M

Draw labelled diagrams wherever necessary.

1. Binomial Nomenclature
2. Spicules
3. Coral Reefs
4. General characters of Platyhelminthes
5. Coelom in Annelida
6. Holometabolous metamorphosis
7. Bipinnaria Larva
8. Structure of *Balanoglossus*

PART - II

II. Answer any FIVE Questions. 5X10= 50M

Draw labelled diagrams wherever necessary.

9. a) Write an essay on Whittaker's 5-kingdom classification.
OR
b) Give an account of locomotion in Protozoa.
10. a) Write about canal system in sponges.
OR
b) Explain metagenesis in *Obelia*.
11. a) Give a detailed account of parasitic adaptations in helminths.
OR
b) Explain life cycle and pathogenicity of *Ascaris lumbricoides*.
12. a) Write an essay on vermicomposting.
OR
b) Explain the structure and affinities of *Peripatus*.
13. a) Write an essay on sense organs in Phylum Mollusca.
OR
b) Write about any 4 larval forms of phylum Echinodermata.

ZOOLOGY – SEMESTER I – PRACTICAL SYLLABUS
PAPER – I: ANIMAL DIVERSITY – BIOLOGY OF NONCHORDATES

Periods: 24

Max. Marks: 50

Learning Outcomes:

- To understand the importance of preservation of museum specimens
- To identify animals based on special identifying characters
- To understand different organ systems through demo or virtual dissections
- To maintain a neat, labeled record of identified museum specimens

Syllabus:

1. Study of museum slides / specimens / models (Classification of animals up to orders)

Protozoa: *Amoeba*, *Paramecium*, *Paramecium* Binary fission and Conjugation, *Vorticella*, *Entamoeba histolytica*, *Plasmodium vivax*

Porifera: *Sycon*, *Spongilla*, *Euspongia*, *Sycon*- T.S & L.S, Spicules, Gemmule

Coelenterata: *Obelia* – Colony & Medusa, *Aurelia*, *Physalia*, *Velella*, *Corallium*, *Gorgonia*, *Pennatulula*.

Platyhelminthes: *Planaria*, *Fasciola hepatica*, Fasciolalarval forms – Miracidium, Redia, Cercaria, *Echinococcus granulosus*, *Taenia solium*, *Schistosoma haematobium*.

Nemathelminthes: *Ascaris* (Male & Female), *Ancylostoma*, *Wuchereria*

Annelida: *Nereis*, *Aphrodite*, *Chaetopterus*, *Hirudinaria*, Trochophore larva

Arthropoda: *Palaemon*, Scorpion, *Scolopendra*, *Limulus*, *Peripatus*, Larvae - Nauplius, Mysis, Zoea, Mouth parts of male & female *Anopheles* and *Culex*, Mouthparts of Housefly and Butterfly.

Mollusca: *Chiton*, *Pila*, *Unio*, *Pteredo*, *Murex*, *Sepia*, *Loligo*, *Octopus*, *Nautilus*, Glochidium larva

Echinodermata: *Asterias*, *Ophiothrix*, *Echinus*, *Clypeaster*, *Cucumaria*, *Antedon*, Bipinnaria larva

Hemichordata: *Balanoglossus*, Tornaria larva

2. Dissections:

- 1. Prawn:** Appendages, Mounting of Statocyst (cultured prawn should be used)
- 2. Insect:** Mouth Parts
- 3. Laboratory Record work shall be submitted at the time of practical examination**
- 4. An "Animal album"** containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different set of students for this purpose
- 5. Computer - aided techniques should be adopted or show virtual dissections**

REFERENCE MANUALS:

1. Practical Zoology- Invertebrates S.S. Lal
2. Practical Zoology - Invertebrates P.S. Verma
3. Practical Zoology - Invertebrates K.P. Kurl
4. Ruppert and Barnes (2006) Invertebrate Zoology, 8th Edition, Holt Saunders International Edition

B.Sc. ZOOLOGY PRACTICAL EXAMINATIONS 2022-23

BLUE PRINT

PAPER – I: ANIMAL DIVERSITY – BIOLOGY OF NONCHORDATES

Periods: 24

Max. Marks: 50

1. **Major Dissection:** Display the Cephalic appendages or Thoracic appendages or Abdominal appendages of prawn and draw labelled diagrams. 1 x 10 = 10
Marks

2. **Minor Dissection:** Mounting of Statocyst in prawn or Mounting of Mouth parts of House Fly or Mounting of Mouth parts of Mosquito. 1 x 10 = 10
Marks

3. **Spotters:** Representative forms of different taxa 5 x 3 = 15 Marks
 - A. Slide – 1 (from Unit 1 / 2 / 3)
 - B. Slide – 2 (from Units 4 / 5)
 - C. Spotter 1 (from Units 1 / 2)
 - D. Spotter 2 (from Units 3 / 4)
 - E. Spotter 3 (from Unit 5)

4. **Record:** - 10 Marks

5. **Internal Evaluation:** (Attendance for practicals, Performance in practicals and Attendance for Mock Practical Examination) - 5 Marks

DR V.S. KRISHNA GOVERNMENT DEGREE & PG COLLEGE (A)

MADDILAPALEM, VISAKHAPATNAM -530013

ZOOLOGY –SEMESTER II

PAPER – II: ANIMAL DIVERSITY – BIOLOGY OF CHORDATES

HOURS :60 (5X12)

Max. Marks:100

Course Outcomes:

By the completion of the course the graduate should able to -

- CO1 Describe general taxonomic rules on animal classification of chordates
- CO2 Classify Protochordata to Mammalia with taxonomic keys
- CO3 Understand Mammals with specific structural adaptations
- CO4 Understand the significance of dentition and evolutionary significance
- CO5 Understand the origin and evolutionary relationship of different phyla from Prochordata to mammalia.

Learning objectives

1. To understand the animal kingdom .
 2. To understand the taxonomic position of Protochordata to Mammalia.
 3. To understand the general characteristics of animals belonging to Fishes to Reptilians.
 4. To understand the body organization of Chordata.
 5. To understand the taxonomic position of Protherian mammals
-

Unit - I

- 1.1 General characters and classification of Chordata upto classes
- 1.2 Protochordata- Salient features of Cephalochordata , Affinities of Cephalochordata.
- 1.3 Salient features of Urochordata
- 1.4 Structure and life history of *Herdmania*. Retrogressive metamorphosis
- 1.5 External features of *Amphioxus*

Unit - II

- 2.1 Cyclostomata, General characters, Comparison of *Petromyzon* and *Myxine*
- 2.2 Pisces : General characters of Fishes, Dipnoi fishes
- 2.3 *Scoliodon*: External features, Digestive system, Respiratory system, Structure and function of Heart, Structure and functions of the Brain.
- 2.4 Migration in Fishes
- 2.5 Types of Scales in fishes

Unit - III

- 3.1 General characters of Amphibia
- 3.2 Classification of Amphibia up to orders with examples.
- 3.3 *Rana hexadactyla*: External features, Digestive system, Respiratory system, Structure and function of Heart, structure and functions of the Brain ,
- 3.4 Reptilia: General characters of Reptilia, Classification of Reptilia up to orders with examples, Skull in Reptiles
- 3.5 *Calotes*: External features, Digestive system, Respiratory system, Structure and function of Heart, structure and function of Brain
- 3.6 Identification of Poisonous snakes

Unit - IV

- 4.1 Aves General characters of Aves, Difference between flight less and flying birds
 - 4.2 *Columba livia*: External features, Digestive system, Respiratory system, Structure and function of Heart, structure and function of Brain
 - 4.3 Migration in Birds
 - 4.4 Flight adaptation in birds

Unit - V

- 5.1 General characters of Mammalia
- 5.2 Classification of Mammalia up to sub - classes with examples
- 5.3 Comparison of Prototherians, Metatherians and Eutherians
- 5.4 Dentition in mammals
- 5.5 Placentation in mammals

Co-curricular activities (suggested)

- Preparation of charts on Chordate classification (with representative animal photos) and retrogressive metamorphosis
- Thermocol or Clay models of Herdmania and Amphioxus
- Visit to local fish market and identification of local cartilaginous and bony fishes
- Maintaining of aquarium by students
- Thermocol model of fish heart and brain
- Preparation of slides of scales of fishes
- Visit to local/nearby river to identify migratory fishes and prepare study notes
- Preparation of Charts on above topics by students (Eg: comparative account of vertebrate heart/brain/lungs, identification of snakes etc.)
- Collecting and preparation of Museum specimens with dead frogs/snakes/lizards etc., and/or their skeletons

- Additional input on types of snake poisons and their antidotes (student activity).
- Collection of bird feathers and submission of report on Plumology
- Taxidermic preparation of dead birds for Zoology museum
- Map pointing of prototherian and metatherian mammals
- Chart preparation for dentition in mammals

REFERENCE BOOKS

- J.Z. Young, 2006. The life of vertebrates. (The Oxford University Press, New Delhi). 646 pages. Reprinted
- Arumugam, N. Chordate Zoology, Vol. 2. SarasPublication. 278 pages. 200 figs.
- A.J. Marshall, 1995. Textbook of zoology, Vertebrates. (The McMillan Press Ltd., UK). 852 pages. (Revised edition of Parker & Haswell, 1961).
- M. EkambaranathaAyyar, 1973. A manual of zoology. Part II. (S. ViswanathanPvt. Ltd., Madras).
- P.S. Dhama & J.K. Dhama, 1981. Chordate zoology. (R. Chand & Co.). 550 pages.
- Gurdarshan Singh & H. Bhaskar, 2002. Advanced Chordate Zoology. Campus Books, 6 Vols., 1573 pp., tables, figs.
- A.K. Sinha, S. Adhikari & B.B. Ganguly, 1978. Biology of animals. Vol. II. Chordates. (New Central Book Agency, Calcutta). 560 pages.
- R.L. Kotpal, 2000. Modern textbook of zoology, Vertebrates. (Rastogi Publ., Meerut). 632 pages.
- E.L. Jordan & P.S. Verma, 1998. Chordate zoology. (S. Chand & Co.). 1092 pages.
- G.S. Sandhu, 2005. Objective Chordate Zoology. Campus Books, vii, 169 pp.
- Sandhu, G.S. & H. Bhaskar, H. 2004. Textbook of Chordate Zoology. Campus Books, 2 vols., xx, 964 p., figs.
- Veena, 2008. Lower Chordata. (Sonali Publ.), 374 p., tables, 117 figs.

ZOOLOGY PRACTICAL SYLLABUS FOR II SEMESTER

ZOOLOGY - PAPER - II

ANIMAL DIVERSITY - BIOLOGY OF CHORDATES

Periods: 24

Max. Marks: 50

Learning Outcomes:

- To understand the taxidermic and other methods of preservation of chordates
- To identify chordates based on special identifying characters
- To understand internal anatomy of animals through demo or virtual dissections, thus directing the student for “empathy towards the fellow living beings”
- To maintain a neat, labeled record of identified museum specimens

OBSERVATION OF THE FOLLOWING SLIDES / SPOTTERS / MODELS

- i. Protochordata : *Herdmania, Amphioxus, Amphioxus* T.S through pharynx.
- ii. Cyclostomata : *Petromyzon and Myxine*.
- iii. Pisces : *Pristis, Torpedo, Hippocoampus, Exocoetus, Echeneis, Labeo, Catla, Clarius, Channa, Anguilla*.
- iv. Amphibia : *Ichthyophis, Amblystoma, Axolotl larva, Hyla*,
- v. Reptilia: *Draco, Chamaeleon, Uromastix, Testudo, Trionyx, Russels viper, Naja, Krait, Hydrophis, Crocodile. Sphenodon*
- vi. Aves : *Psittacula, Eudynamis, Bubo, Alcedo*.
- vii. Mammalia: *Ornithorhynchus, Pteropus, Funambulus*.

Dissections-

1. *Scoliodon* IX and X, Cranial nerves
2. *Scoliodon* Brain
3. Mounting of fish scales

Note: 1. Dissections are to be demonstrated only by the faculty or virtual.

2. Laboratory Record work shall be submitted at the time of practical examination

REFERENCE BOOKS:

1. S.S.Lal, Practical Zoology – Vertebrata
2. P.S.Verma, A manual of Practical Zoology – Chordata

Dr V.S. Krishna Govt. Degree College and PG College (A)

Zoology Course Paper 2: Animal Diversity: Vertebrates

Blue print for question paper setter

Time : 3 hrs

Max Marks: 75

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 5 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT I CHORDATES AND PROCHORDATES	02	02	30
UNIT II PISCES	01	02	25
UNIT III AMPHIBIANS & REPTILES	02	02	30
UNIT IV AVES	01	02	25
UNIT V MAMMALS	02	02	30
TOTAL	08	10	140

NOTE: The question paper setters are requested to kindly adhere to the format given in the above table

The question paper setters are also requested to set the questions in the following way.

- 80% memory and understanding based
- 20% creativity, application, and skill based. Please avoid repetitions questions.

ZOOLOGY MODEL PAPER FOR II SEMESTER

ZOOLOGY - PAPER - II

ANIMAL DIVERSITY – BIOLOGY OF CHORDATES

Time: 3 hrs

Max. Marks: 75

I. Answer any FIVE of the following:

5x5=25

Draw labeled diagrams wherever necessary

1. *Amphioxus*
2. Placoid scale
3. Quill feather
4. Prototheria
5. Anadromous migration
6. *Draco*
7. Emu
8. Apoda

II. Answer any FIVE of the following:

5x10=50

Draw labeled diagrams wherever necessary

9 a) Explain the life history of *Herdmania*

OR

b) Explain the origin and general characters of chordates

10. a) Compare the characters of *Petromyzon* and *Myxine*

OR

b) Describe the structure of heart of *Scoliodon*

11 a) Describe the brain of *Rana hexadactyla*

OR

b) Explain the external features of *Calotes*

12 a) Write an essay on flight adaptations in birds

OR

b) Explain the respiratory system of *Columba livia*

13 a) Compare the characters of Metatheria and Eutheria

14 OR

b) Write an essay on Placentation in mammals

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ZOOLOGY – SEMESTER III

**PAPER – III: CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND
EVOLUTION**

HOURS:60 (5X12)

Max. Marks:100

Course Outcomes:

The overall course outcome is that the student shall develop deeper understanding of what life is and how it functions at cellular level. This course will provide students with a deep knowledge in Cell Biology, Animal Biotechnology and Evolution and by the completion of the course the graduate shall able to –

- CO1** To understand the basic unit of the living organisms and to differentiate the organisms by their cell structure.
- CO2** Describe fine structure and function of plasma membrane and different cell organelles of eukaryotic cell.
- CO3** To understand the history of origin of branch of genetics, gain knowledge on heredity, interaction of genes, various types of inheritance patterns existing in animals
- CO4** Acquiring in-depth knowledge on various aspects of genetics involved in sex determination, human karyotyping and mutations of chromosomes resulting in various disorders
- CO5** Understand the central dogma of molecular biology and flow of genetic information from DNA to proteins.
- CO6** Understand the principles and forces of evolution of life on earth, the process of evolution of new species and apply the same to develop new and advanced varieties of animals for the benefit of the society

Learning Objectives

- To understand the origin of cell and distinguish between prokaryotic and eukaryotic cell
- To understand the role of different cell organelles in maintenance of life activities

To provide the history and basic concepts of heredity, variations and gene interaction

- To enable the students distinguish between polygenic, sex-linked, and multiple

allelic modes of inheritance.

- To acquaint student with basic concepts of molecular biology as to how characters are expressed with a coordinated functioning of replication, transcription and translation in all living beings
- To provide knowledge on origin of life, theories and forces of evolution
- To understand the role of variations and mutations in evolution of organisms

Unit I: Cell biology

- 1.1 Definition, History, Prokaryotic and Eukaryotic cells, Virus, Viroids, Mycoplasma
- 1.2 Electron microscopic structure of eukaryotic cell
- 1.3 Plasma membrane—different models of plasma membrane
- 1.4 Structure and functions of Endoplasmic reticulum, Mitochondria, golgi complex
- 1.5 Structure of Ribosomes, lysosomes, Nucleus and Chromatin,
- 1.6 Structure and significance chromosomes- structure types and functions

Unit – II Genetics - I

- 2.1 Mendel's work on transmission of traits
- 2.2 Gene Interaction – Incomplete Dominance, Codominance, Lethal Genes
- 2.3 Polygenes (General Characteristics & examples); Multiple Alleles (General Characteristics and Blood group inheritance)
- 2.4 Sex determination (Chromosomal, Genic Balance, Hormonal, Environmental and Haplo-diploidy types of sex determination)
- 2.5 Sex linked inheritance (X-linked, Y-linked & XY-linked inheritance)

Unit – III Genetics - II

- 3.1 Mutations & Mutagenesis
- 3.2 Chromosomal Disorders (Autosomal and Allosomal)
- 3.3 Human Genetics – Karyotyping, Pedigree Analysis (basics)
- 3.4 Basics on Genomics and Proteomics

UNIT IV: Molecular Biology

- 4.1 Central Dogma of Molecular Biology
- 4.2 Basic concepts of -
 - a. DNA replication – Overview (Semi-conservative mechanism, Semi-discontinuous mode, Origin & Propagation of replication fork)
 - b. Transcription in prokaryotes – Initiation, Elongation and Termination, Post-

transcriptional modifications (basics)

c. Translation – Initiation, Elongation and Termination

4.3 Gene Expression in prokaryotes (Lac Operon); Gene Expression in eukaryotes

Unit V: Evolution

5.1 Origin of life

5.2 Types of evolution, Lamarckism, Darwinism, Neo Darwinism Hardyweiberg Equilibrium

5.3 Types of Natural Selection (Directional, Stabilizing, Disruptive selection)

5.4 Forces of evolution Variations isolation Genetic draft Mutations migration

5.5 Speciation (Allopatric and sympatric)

Co-curricular activities (Suggested)

- Model of animal cell
- Working model of mitochondria to encourage creativity among students
- Photo album of scientists of cell biology
- Charts on plasma membrane models/cell organelles
- Observation of Mendelian / Non-Mendelian inheritance in the plants of college botanical garden or local village as a student study project activity
- Observation of blood group inheritance in students, from their parents and grand parents
- Karyotyping and preparation of pedigree charts for identifying diseases in family history
- Charts on chromosomal disorders
- Charts on central dogma/lac operon/genetic code
- Model of semi-conservative model of DNA replication
- Model of tRNA and translation mechanism
- Power point presentation of transcription or any other topic by students
- Chart on industrial melanism to teach directed selection, Darwin's finches to teach genetic drift, collection of data on weight of children born in primary health centres to teach stabilizing selection etc.

REFERENCES:

1. Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnell 'Molecular Cell Biology' W.H.Freeman and company New York.
2. Cell Biology by De Robertis
3. Bruce Alberts, Molecular Biology of the Cell
4. Rastogi, Cytology
5. Varma & Aggarwal, Cell Biology

6. C.B. Pawar, Cell Biology
7. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics. VIII Edition. Wiley India.
8. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
9. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings.
10. Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.
11. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. Introduction to Genetic Analysis. IX Edition. W. H. Freeman and Co.
12. Ridley, M. (2004). Evolution. III Edition. Blackwell Publishing
13. Molecular Biology by freifielder
14. Instant Notes in Molecular Biology by Bios scientific publishers and Viva Books Private Limited
15. Hall, B. K. and Hallgrimsson, B. (2008). Evolution. IV Edition. Jones and Bartlett Publishers
16. Campbell, N. A. and Reece J. B. (2011). Biology. IX Edition, Pearson, Benjamin, Cummings.
17. Douglas, J. Futuyma (1997). Evolutionary Biology. Sinauer Associates.
18. Minkoff, E. (1983). Evolutionary Biology. Addison-Wesley.
19. James D. Watson, Nancy H. Hopkins 'Molecular Biology of the Gene'
20. Jan M. Savage. Evolution, 2nd ed, Oxford and IBH Publishing Co., New Delhi.
21. Gupta P.K., 'Genetics

ZOOLOGY PRACTICAL SYLLABUS FOR III SEMESTER

ZOOLOGY - PAPER - III

CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

Periods: 24

Max. Marks: 50

Learning Objectives:

- Acquainting and skill enhancement in the usage of laboratory microscope
- Hands-on experience of different phases of cell division by experimentation
- Develop skills on human karyotyping and identification of chromosomal disorders
- To apply the basic concept of inheritance for applied research
- To get familiar with phylogeny and geological history of origin & evolution of animals

I. Cell Biology

1. Preparation of temporary slides of Mitotic divisions with onion root tips
2. Observation of various stages of Mitosis and Meiosis with prepared slides
3. Mounting of salivary gland chromosomes of *Chironomus*

II. Genetics

1. Study of Mendelian inheritance using suitable examples and problems
2. Problems on blood group inheritance and sex linked inheritance
3. Study of human karyotypes (Down's syndrome, Edwards, syndrome, Patau syndrome, Turner's syndrome and Klinefelter syndrome)

III. Evolution

1. Study of fossil evidences
2. Study of homology and analogy from suitable specimens and pictures
3. Phylogeny of horse with pictures
4. Study of Genetic Drift by using examples of Darwin's finches (pictures)
5. Visit to Natural History Museum and submission of report

Dr V.S. Krishna Govt. Degree College (A)

Zoology Course Paper 3:

Cell biology, genetics and Evolution

Blue print for question paper setter

Time : 3 hrs

Max Marks: 75

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 5 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT I CELL BIOLOGY	03	02	35
UNIT II GENETICS	01	02	25
UNIT III HUMAN GENETICS	02	02	30
UNIT IV MOLECULAR BIOLOGY	01	02	25
UNIT V EVOLUTION	01	02	25
TOTAL	08	10	140

NOTE: The question paper setters are requested to kindly adhere to the format given in the above table

The question paper setters are also requested to set the questions in the following way.

- 80% memory and understanding based
- 20% creativity, application, and skill based. Please avoid repetitions questions.

ZOOLOGY MODEL PAPER FOR III SEMESTER

ZOOLOGY - PAPER - III

CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

Time : 3 hrs

Max. Marks : 75

I. Answer any FIVE of the following :

5x5=25

Draw labeled diagrams wherever necessary

1. Structure of Bacterial cell
2. Lysosomes
3. Polytene chromosomes
4. Incomplete dominance
5. Haemophilia
6. Gene mutations
7. geographical isolation
8. Hardey Weinberg law

II. Answer any FIVE of the following:

5x10=50

Draw labeled diagrams wherever necessary

9.a) Describe the structure of plasma membrane and add note on its functions

OR

b) Describe the structure of Mitochondria and note on its functions

b. a) Write essay on polygenic inheritance with suitable examples

OR

b) Write about the different types of sex determination based on chromosomal theory

11.a) Describe the human karyotyping?

OR

b) Explain about the chromosomal disorders in man

12. a) Describe the process of transcription in prokaryotes

OR

b) Explain the Operon concept of gene regulation

13) a) Describe the Darwin theory of Evolution?

Or

b) Describe the mechanism of Isolation in Evolution?

**Dr. V S. KRISHNA GOVERNMENT DEGREE COLLEGE AND PG
COLLEGE (A), VISAKHAPATNAM
ZOOLOGY – SEMESTER IV
PAPER – IV: ANIMAL PHYSIOLOGY, CELLULAR
METABOLISM AND EMBRYOLOGY**

HOURS : 60 (5X12)

Max. Marks: 100

Course Outcomes:

This course will provide students with a good knowledge in Physiology, Cellular metabolism and Embryology and by the completion of the course the graduate shall be able to –

- CO1** Understand the functions of important animal physiological systems including digestion, cardio-respiratory and renal systems.
- CO2** Understand the structure and functional specificity of muscular system and the neuro-endocrine regulation of animal growth, development and metabolism with a special focus on hormonal control of human reproduction.
- CO3** Understand the structure, classification and chemistry of biomolecules and enzymes responsible for sustenance of life in living organisms
- CO4** Develop broad understanding the basic metabolic activities pertaining to the catabolism and anabolism of various biomolecules
- CO5** Understand the important changes taking place during the early embryonic development starting from gamete formation upto gastrulation and formation of primary germ layers.

Learning Objectives

- To achieve a thorough understanding of various aspects of physiological systems and their functioning in animals.
- To assimilate the concept of hormonal regulation of physiology, metabolism and reproduction in animals.

- To understand the disorders associated with the deficiency of hormones
- To understand the necessity of thorough knowledge of chemistry in relation to Biology in terms of biomolecules.
- To provide insightful knowledge on the structure and classification of carbohydrates, proteins, lipids and enzymes
- To demonstrate an understanding of fundamental biochemical principles such as the function of biomolecules, metabolic pathways and the regulation of biochemical processes
- To make students gain proficiency in laboratory techniques in biochemistry and orient them to apply the scientific method to the processes of experimentation.

**Dr. V S. KRISHNA GOVERNMENT DEGREE COLLEGE AND PG
COLLEGE (A), VISAKHAPATNAM
ZOOLOGY SYLLABUS FOR IV SEMESTER
PAPER – IV: ANIMAL PHYSIOLOGY, CELLULAR
METABOLISM AND EMBRYOLOGY**

HOURS: 60(5X12)

Max. Marks: 100

UNIT I Animal Physiology - I

- 1.1 Process of digestion and assimilation, Gastrointestinal disorders
- 1.2 Respiration - Pulmonary ventilation, transport of oxygen and CO₂(Note: Need not study cellular respiration here)
- 1.3 Circulation - Structure and functioning of heart, Cardiac cycle
- 1.4 Excretion - Structure and functions of kidney urine formation, counter current Mechanism

UNIT II Animal Physiology - II

- 2.1 Nerve impulse transmission - Resting membrane potential, origin and propagation of action potentials along myelinated and non-myelinated nerve fibers.
- 2.2 Muscle contraction - Ultra structure of muscle, molecular and chemical basis of muscle contraction
- 2.3 Endocrine glands - Structure, functions of hormones of pituitary, thyroid, parathyroid, adrenal glands and pancreas
- 2.4 Hormonal control of reproduction in a mammal

UNIT III Cellular Metabolism – I (Biomolecules)

- 3.1 Carbohydrates - Classification of carbohydrates. Structure of glucose
- 3.2 Proteins - Classification of proteins. General properties of amino acids
- 3.3 Lipids - Classification of lipids
- 3.4 Enzymes: Classification and Mechanism of Action

UNITIV Cellular Metabolism – II

- 4.1 Carbohydrate Metabolism - Glycolysis, Krebs cycle, Electron Transport Chain, Glycogen metabolism, Gluconeogenesis, Pentose phosphate pathway.
- 4.2 Lipid Metabolism – β -oxidation of palmitic acid
- 4.3 Protein metabolism - Transamination, Deamination and Urea Cycle

Unit – V Embryology

- 5.1 Gametogenesis
- 5.2 Fertilization
- 5.3 Types of eggs
- 5.4 Types of cleavages
- 5.5 Development of Frog upto formation of primary germ layers
- 5.6 Introduction to neurulation: primary and secondary neurulation.

Co-curricular activities (Suggested)

- Chart on cardiac cycle, human lung, kidney/nephron structure etc.
- Working model of human / any mammalian heart.
- Chart of sarcomere/location of endocrine glands in human body
- Chart affixing of photos of people suffering from hormonal disorders
- Student study projects such as identification of incidence of hormonal disorders in the local primary health centre, studying the reasons thereof and measures to curb or any other as the lecturer feels good in nurturing health awareness among students
- Chart on structures of biomolecules/types of amino acids (essential and non-essential) Chart preparation by students on Glycolysis / kreb's cycle/urea cycle etc.
- Model of electron transport chain
- Preparation of models of different types of eggs in animals
- Chart on frog embryonic development, fate map of frog blastula, cleavage etc

Reference books:

1. Telugu academy Book on physiology, biomolecules and embryology.
2. Animal Physiology by A k Berry
3. Animal Physiology by Nagabhushanam.
4. Text book of Biochemistry by U. Satyanarayana
5. Embryology by Veer Bal Rastogi.

**Dr. V S. KRISHINA GOVERNMENT DEGREE COLLEGE AND PG
COLLEGE (A), VISAKHAPATNAM
ZOOLOGY PRACTICAL SYLLABUS FOR SEMESTER IV
COURSE – IV: ANIMAL PHYSIOLOGY, CELLULAR METABOLISM
AND EMBRYOLOGY**

Periods: 24

Max. Marks: 50

Learning Objectives:

- Identification of an organ system with histological structure
- Deducing human health based on the information of composition of blood cells
- Demonstration of enzyme activity *in vitro*
- Identification of various biomolecules of tissues by simple colorimetric methods and also quantitative methods
- Identification of different stages of early embryonic development in animals

I. ANIMAL PHYSIOLOGY

1. Qualitative tests for identification of carbohydrates, proteins and fats
2. Study of activity of salivary amylase under optimum conditions
3. T.S. of duodenum, liver, lung, kidney, spinal cord, bone and cartilage
4. Differential count of human blood

II. CELLULAR METABOLISM

1. Estimation of total proteins in given solutions by Lowry's method.
2. Estimation of total carbohydrate by Anthrone method.
3. Qualitative tests for identification of ammonia, urea and uric acid
4. Protocol for Isolation of DNA in animal cells

III. EMBRYOLOGY

1. Study of T.S. of testis, ovary of a mammal
2. Study of different stages of cleavages (2, 4, 8 cell stages)
3. Construction of fate map of frog blastula

REFERENCE BOOKS:

- 1) Harper's Illustrated Biochemistry
- 2) Cell and molecular biology: Concepts & experiments. VI Ed. John Wiley & sons. Inc.
- 3) Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.
- 4) Laboratory techniques by Plummer

**Dr. V S. KRISHNA GOVERNMENT DEGREE COLLEGE AND PG
COLLEGE (A), VISAKHAPATNAM
ZOOLOGY MODEL PAPER FOR SEMESTER IV
COURSE – IV: ANIMAL PHYSIOLOGY, CELLULAR METABOLISM
AND EMBRYOLOGY**

Time: 3 hrs

Max. Marks: 75

BLUEPRINT FOR QUESTION PAPER SETTER

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 5 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT - I (ANIMAL PHYSIOLOGY - I)	02	02	30
UNIT - II (ANIMAL PHYSIOLOGY II)	02	02	25
UNIT - III (CELLULAR METABOLISM - I)	01	02	30
UNIT -IV (CELLULAR METABOLISM - II)	01	02	25
UNIT - V (EMBRYOLOGY)	02	02	30
TOTAL No. of Questions	08	10	
Total marks including choice			140

NOTE: The question paper setters are requested to kindly adhere to the format given in the above table.

The question paper setters are also requested to set the questions in the following way.

- a) 80% memory and understanding based
- b) 20% creativity, application, and skill based
- c) Please avoid repetition of questions.

**Dr. V S. KRISHNA GOVERNMENT DEGREE COLLEGE AND PG
COLLEGE (A), VISAKHAPATNAM
ZOOLOGY MODEL PAPER FOR SEMESTER IV
COURSE – IV: ANIMAL PHYSIOLOGY, CELLULAR
METABOLISM AND EMBRYOLOGY**

Time: 3 hrs

Max. Marks: 75

I. Answer any FIVE of the following: 5x5=25

Draw labeled diagrams wherever necessary

1. Pulmonary ventilation
2. Cardiac cycle
3. Ultrastructure of muscle
4. Pituitary gland
5. Classification of lipids
6. Glycolysis
7. Oogenesis
8. Types of cleavages

II. Answer any FIVE of the following: 5x10=50

Draw labeled diagrams wherever necessary

9. a) Write an essay on structure and function of heart.

OR

b) Write an essay on process of digestion and assimilation

10. a). Explain in detail resting membrane potential, origin and propagation of action potential.

OR

b). Give a detailed account of hormonal regulation of mammalian reproduction.

11. a) Write an essay on classification of carbohydrates.

OR

b) Write an essay on classification of proteins.

12. a) Give a detailed account of classification of enzymes and add a note on mechanism of action.

OR

b) Describe the Krebs cycle and Electron transport chain mechanism.

13. a). Write an essay on the process of spermatogenesis.

OR.

b). Describe in detail the process of fertilization.

B.Sc. ZOOLOGY PRACTICAL EXAMINATIONS 2022-23

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PAPER – V: IMMUNOLOGY & ANIMAL BIOTECHNOLOGY

Periods: 24

Max. Marks: 50

1. **Major I Experiment (Immunology):** **1 x 10 = 12 Marks**
Determination of ABO and Rh Blood Groups in the given blood sample. Or
Demonstration of Lymphoid Organs Or
Principle and Procedure for ELISA Or
Principle and Procedure for Immunoelectrophoresis

2. **Major II Experiment (Animal Biotechnology):** **1 x 10 = 12 Marks**
Quantification of DNA by DPA method Or
Separation of DNA by agarose gel electrophoresis technique OR
Separation of biological compounds by paper chromatography

3. **Slides (T.S. of Spleen, Thymus, Lymph Nodes):** **2 x 3 = 6 Marks**
 A. Slide – 1
 B. Slide – 2

4. **Minor Experiment (Biotechnology):** **1 x 5 = 5 Marks**
Explain the Procedure of Southern Hybridization Or
Explain the Procedure of DNA fingerprinting technique Or
Explain the Procedure for cleaning and sterilization of glass ware for cell culture. Or
Explain the Procedure for preparation of Culture Media

5. **Record:** **10 Marks**

6. **Internal Evaluation:** (Attendance for practicals, Performance in practicals and Attendance for Mock Practical Examination) **5 Marks**

Dr. V.S. KRISHNA GOVERNMENT DEGREE COLLEGE (A),
VISAKHAPATNAM

(w.e.f. 2022-23)

ZOOLOGY – SEMESTER IV

PAPER – V: IMMUNOLOGY & ANIMAL BIOTECHNOLOGY

HOURS: 60 (5 X 12)

Max. Marks: 100

Unit – I Immunology – I (Overview of Immune system)

- 1.1 Introduction to basic concepts in Immunology
- 1.2 Innate and adaptive immunity, Vaccines and Immunization programme
- 1.3 Cells of immune system
- 1.4 Organs of immune system

Unit – II Immunology – II (Antigens, Antibodies, MHC and Hypersensitivity)

- 2.1 Antigens: Basic properties of antigens, B and T cell epitopes, haptens and adjuvants; Factors influencing immunogenicity
- 2.2 Antibodies: Structure of antibody, Classes and functions of antibodies
- 2.3 Structure and functions of major histocompatibility complexes
- 2.4 Hypersensitivity – Classification and Types

Unit – III Biotechnology - I

- 2.1 Animal Cell, Tissue and Organ culture media: Natural and Synthetic media,
- 2.2 Cell cultures: Establishment of cell culture (primary culture, secondary culture, types of cell lines; Protocols for Primary Cell Culture); Organ culture; Cryopreservation of cultures
- 2.3 Stem cells: Types of stem cells and applications
- 2.4 Hybridoma Technology: Production & applications of Monoclonal antibodies (mAb)

Unit – IV Biotechnology - II

- 3.1 Genetic Engineering: Basic concept, Vectors, Restriction Endonucleases and Recombinant DNA technology
- 3.2 Gene delivery: Microinjection, electroporation, biolistic method (gene gun), liposome and viral-mediated gene delivery



- 3.3 Transgenic Animals: Strategies of Gene transfer and applications
- 3.4 Manipulation of reproduction in animals: Artificial Insemination, *In vitro* fertilization, super ovulation, Embryo transfer, Embryo cloning

Unit – V Biotechnology - III

- 4.1. Techniques: Basics of PCR, Gel Electrophoresis (Agarose & PAGE)
- 4.2 DNA Sequencing: Sanger's method of DNA sequencing
- 4.3 Hybridization techniques: Southern, Northern and Western blotting
- 4.4 DNA fingerprinting: Procedure and applications
- 4.5 Fermentation Technology: Fermentation Definition and Different types of Fermentation

Co-curricular activities (suggested)

- Organizing awareness on immunization importance in local village in association with NCC and NSS teams
- Charts on types of cells and organs of immune system
- Student study projects on aspects such as – identification of allergies among students (hypersensitivity), blood groups in the class (antigens and antibodies duly reported) etc., as per the creativity and vision of the lecturer and students
- Visit to research laboratory in any University as part of Zoological tour and exposure and/or hands-on training on animal cell culture.
- Visit to biotechnological laboratory in University or any central/state institutes and create awareness on PCR, DNA finger printing and blot techniques or Visit to a fermentation industry or Visit to a local culture pond and submit report on culture of fishes etc.

REFERENCE BOOKS

1. Immunology by Ivan M. Riott
2. Immunology by Kubey
3. Sreekrishna V. 2005. *Biotechnology –I, Cell Biology and Genetics*. New Age International Publ. New Delhi, India.

ZOOLOGY –SEMESTER II

PAPER – V: IMMUNOLOGY & ANIMAL BIOTECHNOLOGY

TIME: 3 Hrs

Max. Marks: 75

MODULE NO. & NAME	SHORT ANSWER QUESTIONS 5 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT I (Immunology - I)	01	02	30
UNIT II (Immunology - II)	02	02	30
UNIT III (Biotechnology - I)	01	02	30
UNIT IV (Biotechnology - II)	02	02	25
UNIT V (Biotechnology - III)	02	02	25
Total no. of Questions	08	10	
Total Marks including Choice			140

NOTE :

1. The Question paper setters are requested to kindly adhere to the format given in the above table.
2. The Question paper setters are also requested to set the questions in the following way:
 - a. 80% of questions – Memory and understanding based.
 - b. 20% of questions – Creativity, application and skill based.
3. Please avoid repetition of questions

ZOOLOGY – SEMESTER IV

PAPER – V: IMMUNOLOGY & ANIMAL BIOTECHNOLOGY

Time: 3 hrs

Max. Marks: 75

I. Answer any FIVE of the following:

5x5=25

Draw labeled diagrams wherever necessary.

1. Vaccines
2. Structure of antibody
3. Basic properties of antigens
4. Cryopreservation of cultures
5. Artificial insemination
6. Vectors
7. DNA fingerprinting
8. Fermentation

II. Answer any FIVE of the following:

5x10=50

Draw labeled diagrams wherever necessary

9. a) Write an essay on innate immunity.

OR

b) Write an essay on different cells of the immune system

10. a) Explain the different classes of antibodies, add a note on their functions.

OR

b) Explain the structure and functions of MHC.

11. a) Describe in detail about the stem cells and their applications.

OR

b) Write an essay on primary and secondary cell cultures, add a note on cell lines.

12. a) Explain any three gene delivery mechanisms.

OR

b) Write an essay on the restriction endonucleases, add a note on its application

13. a) Explain Sanger's method of DNA sequencing.

OR.

b) Write an essay on different types of fermentation and its applications.

ZOOLOGY – SEMESTER IV – PRACTICAL SYLLABUS
PAPER – V: IMMUNOLOGY & ANIMAL BIOTECHNOLOGY

Periods: 24

Max. Marks: 50

Learning Objectives:

- Acquainting student with immunological techniques vis-à-vis theory taught in the class room
- Interconnect the theoretical and practical knowledge of immunity with the outer world for the development of a healthier life.
- Demonstrate basic laboratory skills necessary for Biotechnology research
- Promoting application of the lab techniques for taking up research in higher studies

I. IMMUNOLOGY

1. Demonstration of lymphoid organs (as per UGC guidelines)
2. Histological study of spleen, thymus and lymph nodes (through prepared slides)
3. Blood group determination
4. Demonstration of
 - a. ELISA
 - b. Immunoelectrophoresis

II. Animal Biotechnology

1. DNA quantification using DPA Method.
2. Agarose Gel Electrophoresis
3. Virtual Lab Techniques: Southern Hybridization, DNA Fingerprinting
4. Separation of biological compounds by paper chromatography
5. Cleaning and sterilization of glass wares for cell culture.
6. Preparation of culture media.

REFERENCE BOOKS

1. Immunology Lab Biology 477 Lab Manual; Spring 2016 Dr. Julie Jameson
2. Practical Immunology A Laboratory Manual; LAP LAMBERT Academic Publishing
3. Manual of laboratory experiments in cell biology by Edward, G
4. Laboratory Techniques by Plummer

B.Sc. ZOOLOGY PRACTICAL EXAMINATIONS 2022-23

BLUE PRINT

PAPER – V: IMMUNOLOGY & ANIMAL BIOTECHNOLOGY

Periods: 24

Max. Marks: 50

-
1. **Major I Experiment (Immunology):** **1 x 10 = 12 Marks**
Determination of ABO and Rh Blood Groups in the given blood sample. Or
Demonstration of Lymphoid Organs Or
Principle and Procedure for ELISA Or
Principle and Procedure for Immunoelectrophoresis

 2. **Major II Experiment (Animal Biotechnology):** **1 x 10 = 12 Marks**
Quantification of DNA by DPA method Or
Separation of DNA by agarose gel electrophoresis technique OR
Separation of biological compounds by paper chromatography

 3. **Slides (T.S. of Spleen, Thymus, Lymph Nodes):** **2 x 3 = 6 Marks**
 A. Slide – 1
 B. Slide – 2

 4. **Minor Experiment (Biotechnology):** **1 x 5 = 5 Marks**
Explain the Procedure of Southern Hybridization Or
Explain the Procedure of DNA fingerprinting technique Or
Explain the Procedure for cleaning and sterilization of glass ware for cell culture Or
Explain the Procedure for preparation of Culture Media

 5. **Record:** **10 Marks**

 6. **Internal Evaluation:** (Attendance for practicals, Performance in practicals and Attendance for Mock Practical Examination) **5 Marks**

**Dr. V S. KRISHNA GOVERNMENT DEGREE COLLEGE AND PG
COLLEGE (A), VISAKHAPATNAM
DEPARTMENT OF ZOOLOGY**

Domain Subject: ZOOLOGY

Skill Enhancement Courses (SECs) for Semester V, from 2022-23

(Syllabus with Learning Outcomes, References, Co-curricular Activities & Model Q.P. Pattern)

Structure of SECs for Semester-V

(To choose one pair from the four alternate pairs of SECs)

Univ Code	Course Number	Name of Course	Hours/Week Theory +Practical	Credits Theory+ Practical	Marks	
					IA-20 FW- 05	Sem End T+P
	6&7					
	6A	SUSTAINABLE AQUACULTURE MANAGEMENT	3+3	3+2	25	75+50
	7A	POST HARVEST TECHNOLOGY OF FISH AND FISHERIES	3+3	3+2	25	75+50

OR

	6B	LIVE STOCK MANAGEMENT-I (BIOLOGY OF DAIRY ANIMALS)	3+3	3+2	25	75+50
	7B	LIVE STOCK MANAGEMENT -II (DAIRY PRODUCTION AND MANAGEMENT)	3+3	3+2	25	75+50

OR

	6C	POULTRY MANAGEMENT- I (POULTRY FARMING)	3+3	3+2	25	75+50
	7C	POULTRY MANAGEMENT- II (POULTRY PRODUCTION AND MANGEMENT)	3+3	3+2	25	75+50

OR

	6D	SERI CULTURE -I***	3+3	3+2	25	75+50
	7D	SERI CULTURE -II	3+3	3+2	25	75+50

Note:1

For Semester-V, for the domain subject Zoology, any one of the four pairs of SECs shall be chosen as courses 6 and 7, i.e., 6A & 7A or 6B & 7B or 6C & 7C or 6D & 7D. The pair shall not be broken (ABCD allotment is random, not on any priority basis).

Note-2:

One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate skills related to the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the skills embedded in syllabus citing related real field situations.



Dr. V S Krishna Government Degree and PG
College (Autonomous) Visakhapatnam.

Domain Subject: ZOOLOGY
III Year B. Sc.–Semester –V

Max. Marks: 100+50

W.e.f., 2022 - 2023

Course6 A: SUSTAINABLE AQUACULTURE MANAGEMENT
(Skill Enhancement Course (Elective), -Credits: 05)

- I. Course Outcomes: Students at the successful completion of this course will be able to
- Evaluate the present status of aquaculture at the Global level and National level
 - Classify different types of ponds used in aquaculture
 - Demonstrate induced breeding of carps
 - Acquire critical knowledge on commercial importance of shrimps
 - Identify fin and shell fish diseases

Syllabus: (Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.)

Unit: 1

- 1.1 Present status of Aquaculture – Global and National scenario
- 1.2 Major cultivable species for aquaculture: freshwater, brackish water and marine., criteria for selection of species for culture.
- 1.3 Culture practices and culture systems: Traditional, extensive, modified extensive, semi-intensive and intensive cultures , ponds, raceways, cages and pens
- 1.4 Site selection criteria

Unit: 2

- 2.1 Functional classification and management of ponds -rearing, production, stocking and quarantine ponds
- 2.2 Pond preparation: fertilizers and manure application in culture ponds
- 2.3 Optimal Physio-chemical conditions of soil and water optimum for culture (Temperature, depth, turbidity,PH, BOD, CO₂ , N, P, K, Nand C/N ratio)

Unit: 3

- 3.1. Induced breeding in craps (*catla/Labeo*) and shrimp (*P. Vannamei/P.Monodon*)
- 3.2. Culture of Indian major carps - Stocking & post-stocking management
- 3.3. Culture of Lates calcarifer

Unit: 4

- 4.1 Commercially important species of shrimp & prawn
- 4.2 *Macrobrachium rosenbergii*- biology, seed production.
- 4.3 Culture of *P. vannamei* – hatchery technology and culture practices
- 4.4 Mixed culture of fish and prawns
- 4.5 Integrated aquaculture.

Unit: 5

- 5.1 Bacterial diseases of Finfish & Shell fish
- 5.2 Viral diseases of Fin Fish & shell fish
- 5.3 Fungal diseases of Fin & Shell fish
- 5.4 Nutritional disease in fin fishes and shell fishes
- 5.5 Protozoan and metazoan diseases of finfishes and shell fishes.



II. References:

1. Pillay TVR & M.A.Dill, 1979. Advances in Aquaculture. Fishing News Books Ltd., London
2. Stickney RR 1979. Principles of Warm Water Aquaculture. John Wiley & Sons Inc.1981
3. Boyd CE 1982. Water Quality Management for Pond Fish Culture. Elsevier Scientific Publishing Company.
4. Bose AN et.al. 1991. Costal Aquaculture Engineering. Oxford & IBH Publishing Company Pvt. Ltd.

Web Links:

1. http://www.fao.org/fishery/docs/CDrom/FAO_Training/FAO_Training/General/x6708e/x670Se06.htm
2. http://aquaticcommons.org/1666/1/Better-Practice3_opt.pdf
3. <https://www.notesonzoology.com/india/fishery/fish-diseases-symptoms-and-control-fishery/871>

Course 6 A: SUSTAINABLE AQUACULTURE MANAGEMENT PRACTICAL SYLLABUS

Course Outcomes:

On successful completion of this practical course, student shall be able to:

- Identify the characters of Fresh water cultivable species
- Estimate physico-chemical characteristics of water used for aquaculture
- Examine the diseases of fin and shell fish
- Suggest measures to prevent diseases in aquaculture

Practical (Laboratory) Syllabus: (30hrs) (Max.50Marks)

1. Fresh water Cultivable species any (Fin & Shell Fish Specimens – Observation of morphological characters by observation and drawings)-5
2. Brackish water cultivable species (Fin & Shell fish- Specimens- Observation of Morphological Characters by observing drawing) -5
3. Hands on training on the use of kits for determination of water quality in aquaculture (DO, Salinity, pH, Turbidity- Testing kits to be used for the estimation of various parameters/ Standard procedure can be demonstrated for the same)
4. Demonstration of Hypophysation (Procedure of hypophysation to be demonstrated in the practical lab with any edible fish as model)
5. Viral diseases of Fin & Shell Fish (Observation of his to pathological slides / Charts/ Models of viral pathogens in fin/ shell fish – one edible specimen can be used for observation of same in the laboratory)
6. Bacterial diseases of Fin & Shell Fish (Observation of his to pathological slides / Charts/ Models of Bacterial pathogens in fin/ shell fish – One edible specimen can be used for observation of same in the laboratory)
7. Fungal diseases of Fin & Shell Fish (Observation of his to pathological slides / Charts/ Models of Bacterial pathogens in fin/ shell fish – One edible specimen can be used for observation of same in the laboratory)



III. Lab References

1. Boyd CE 1982. Water Quality Management for Pond Fish Culture. Elsevier Scientific Publishing Company
2. http://www.fao.org/fishery/docs/CDrom/FAO_Training/FAO_Training/General/x6708e/x6708e06.htm
3. http://aquaticcommons.org/1666/1/Better-Practice3_opt.pdf
4. <https://www.notesonzoology.com/india/fishery/fish-diseases-symptoms-and-control-fishery/871>

Web resources suggested by the teacher concerned and the college librarian including reading material

IV. Co-Curricular Activities

a) **Mandatory:** (Student training by teacher in field skills: Total 15 hrs., Lab: 10 + field 05)

1. For Teacher: Training of students by the teacher in laboratory/field for not less than 15 hours on Breeding- Induced breeding in carps -hatchery technology of *L. Vennami*- Farming techniques- disease diagnostic techniques—concepts –Demonstration @ any aqua laboratory
2. For Student: Students shall (individually) visit a Hatchery/Farm/ Aqua diagnostic center and make careful observations of the process method and implements- protocols and report on the same in 10 pages hand written Fieldwork/Project work Report.
3. Max marks for Fieldwork/Project work Report: 05.
4. Suggested Format for Fieldwork/Project work: Title page, student details, index page, details of place visited, observations made, findings and acknowledgements.
5. Class tests.

b) **Co-Curricular Activities Planned to conduct.**

1. Preparation of Model/Charts of Cultivable species of fin fish shell fish
2. Preparation of Model/Chart of Ideal fish Pond- with the standards prescribed.
3. Observation of aquaculture activities in their area (Observation of any activity related to aquaculture in the vicinity of the college/village)
4. Preparation of Model – charts of Fin /Shell fish Diseases with eco-friendly material.
5. Assignments, Group discussion, Seminar, Quiz, Collection of Material, Video preparation etc., Invited lecture

Dr. V S. KRISHNA GOVERNMENT DEGREE COLLEGE (A), VISAKHAPATNAM

Domain Subject: ZOOLOGY, III Year B. Sc.–Semester –V
Course 6A: SUSTAINABLE AQUACULTURE MANAGEMENT

Time: 3 hrs

Max. Marks: 75

BLUEPRINT FOR QUESTION PAPER SETTER

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 5 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT – I	02	02	30
UNIT – II	01	02	25
UNIT - III	02	02	30
UNIT -IV	02	02	30
UNIT - V	01	02	25
TOTAL No. of Questions	08	10	
Total marks including choice			140

NOTE: The question paper setters are requested to kindly adhere to the format given in the above table.

The question paper setters are also requested to set the questions in the following way.

- 80% memory and understanding based
- 20% creativity, application, and skill based
- Please avoid repetition of questions.

Dr. V S Krishna Government Degree and PG College (Autonomous)
Domain Subject: ZOOLOGY, III Year B. Sc.–Semester –V
Course 6A: SUSTAINABLE AQUACULTURE MANAGEMENT

TIME : 3 Hours

Max. Marks: 75

SECTION – A (Short answer questions)

Answer any **FIVE** of the following:

Marks: 5x5 = 25

Draw neat labelled diagrams wherever necessary.

1. Present status of aquaculture
2. Site selection criteria.
3. Nursery ponds
4. Algal blooms
5. *Lates calcarifer*
6. Commercially important shrimp species
7. Biology of *Macrobrachium rosenbergii*
8. Furunculosis

SECTION – B (Essay answer questions)

Answer any **FIVE** of the following:

Marks: 5x10 = 50

Draw neat labelled diagrams wherever necessary.

- 14 a) Write an essay on the major cultivable marine fishes.
Or
b) Give a detailed account of the construction of fish farm
- 15 a) Explain about the optimum physico – chemical conditions of soil and water required in aquaculture.
Or
b) Write an essay on the classification of ponds.
- 16 a) Write an essay on prestocking management practices in Indian major carp culture.
Or
b) Explain the technique of induced breeding in major carps.
- 17 a) Write an essay on hatchery technology of *L. vannamei*.
Or
b) Write an essay on integrated aquaculture.
- 18 a) Write an essay on any 2 bacterial and any 2 viral diseases of shrimp.
Or
b) Describe in detail about the nutritional diseases in fin fish and shell fish.

**Dr. VS Krishna Government
Degree & PG College
(Autonomous)
Domain Subject: ZOOLOGY
III Year B. Sc.–Semester –V
W.e.f., 2022 - 2023**

**Course 7 A: POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES
(Skill Enhancement Course (Elective), - Credits: 05)**

Max Marks: 100+50

I Course Outcomes: Students at the successful completion of this course will be able to

- Identify the types of preservation methods employed in aquaculture
- Choose the suitable Processing methods in aquaculture
- Learn about the Maintenance of the standard quality control protocols laid down in aqua industry
- Identify the best Seafood quality assurance system

Syllabus: *Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.)*

Unit – I Handling and Principles of fish Preservation

- 1.1 Handling of fresh fish, storage and transport of fresh fish, post mortem changes (rigor mortis and spoilage), microbial spoilage in fish and their preservation process, value calculation.
- 1.2 Principles of preservation – cleaning, lowering of temperature, rising of temperature, denudation, use of salt, use of fish preservatives, exposure to low radiation of gamma rays.

Unit – II Methods of fish Preservation

- 2.1 Traditional methods - sun drying, salt curing, pickling and smoking.
- 2.2. Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, irradiation and Accelerated Freeze drying (AFD).

Unit – III Processing and preservation of fish and their by-products

- 3.1 Fish products – fish minced meat, fish meal, fish oil, fish liquid (ensilage), fish protein concentrate, fish cake, fish sauce, fish salads, fish powder, pet food from trash fish, fish manure.
- 3.2 Fish byproducts – fish glue, Ising glass, chitosan, pearl essence, shark fins, fish Leather and fish maws.

Unit – IV Sanitation and Quality control

- 4.1 Sanitation in processing plants - Environmental hygiene and Personal hygiene in processing plants.
- 4.2 Quality Control of fish and fishery products – pre-processing control, control during processing and control after processing.

Unit – V Quality Assurance, Management and Certification

- 5.1. Seafood Quality Assurance and Systems: Good Manufacturing Practices (GMPs); Good Laboratory Practices (GLPs); Standard Operating Procedures (SOPs); Concept of Hazard Analysis and Critical Control Points (HACCP) in seafood safety, traceability.
- 5.2 National and International standards – ISO 9000: 2000 Series of Quality Assurance System, *Codex Alimentarius*. Detection of antibiotics and heavy metals in fishery products.

I. References:

1. Santharam R, N Sukumaran and P Natarajan 1987. A manual of aquaculture, Oxford- IBH, NewDelhi
2. Lakshmi Prasad's, Fish Processing Technology 2012, Arjun Publishing House
3. Dr Sunitha Rai, Fish Processing Technology, 2015, Random Publications
4. Safety and Quality Issues in Fish Processing (Woodhead Publishing Series in Food Science, Technology and Nutrition)by H A Bremner
5. K.A Mahanthy, Innovations in Fishing and Fish Processing Technologies, January 2021

Web Resources:

1. <http://ecoursesonline.iasri.res.in/mod/page/view.php?id=145743>
2. https://ecourses.icar.gov.in/e-Learningdownload3_new.aspx?Degree_Id=03

**Course 7 A: POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES
PRACICAL SYLLABUS**

II. Learning Outcomes: On successful completion of this practical course, student shall be able to:

- Identify the quality of aqua processed products.
- Determine the quality of fishery by products by observation
- Analyze the protocols of aqua processing methods

III. **Practical(Laboratory) Syllabus:**

1. Evaluation of fish/ fishery products for organo leptic, chemical and microbial quality.
2. Preparation of dried, cured and fermented fish products
For detailed procedure method visit sites:
3. Examination of salt, protein, moisture in dried / cured products
4. Examination of spoilage of dried / cured fish products, marinades, pickles, sauce.
5. Preparation of isinglass, collagen and chitosan from shrimp and crab shell.
6. Developing flow charts and exercises in identification of hazards – preparation of hazard analysis worksheet
7. Corrective action procedures in processing of fish- flow chart- work sheet preparation (** Refer the following web sites for complete procedure method and estimations of above listed practicals)

IV. References:

1. Dr Sunitha Rai, Fish Processing Technology, 2015, Random Publications
2. https://ecourses.icar.gov.in/e-Learningdownload3_new.aspx?Degree_Id=03
3. <https://vikaspedia.in/agriculture/fisheries/post-harvest-and-marketing/processing-in-fisheries/fermented-products>
4. <https://krishi.icar.gov.in/jspui/bitstream/123456789/20500/1/Fermentation%20technology%20for%20fish.pdf>
5. <http://jebas.org/00200620122014/Abujam%20et%20al%20JEBAS.pdf>
6. https://krishi.icar.gov.in/jspui/bitstream/123456789/20770/1/Training%20Manual_Hygienic%20drying%20and%20packing%20of%20fish.pdf
7. https://krishi.icar.gov.in/jspui/bitstream/123456789/20770/1/Training%20Manual_Hygienic%20drying%20and%20packing%20of%20fish.pdf
8. https://agritech.tnau.ac.in/fishery/fish_byproducts.html
9. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5352841/>
10. <http://www.fao.org/3/i1136e/i1136e.pdf>
11. <http://www.fao.org/3/x5989e/X5989e01.htm#What%20is%20sensory%20assessment>

Web resources suggested by the teacher concerned and the college librarian including reading material

V. Co-Curricular Activities

a) **Mandatory:** *(Lab/field training of students by teacher (lab 10 + field 05):*

1. For Teacher: Training of students by the teacher in laboratory/field for not less than 15 hours on various steps of post-harvest techniques of fishes, on the advanced techniques in post-harvest technology – Training of students on other employability skills in the Post-harvest sector of Aquaculture Industry- like Processing, Packing, marketing of processed aqua products.
2. For Student: Students shall (individually) visit - Any fish/shrimp Processing Plant/Packing industry and make observations on post harvesting techniques and submit a brief handwritten Fieldwork/Project work Report with pictures and data /survey in 10 pages.
3. Max marks for Fieldwork/Project work Report: 05.
4. Suggested Format for Fieldwork/Project work: *Title page, student details, index page, details of place visited, observations made, findings and acknowledgements*
5. (IE): Unit tests,

b) Suggested Co-Curricular Activities

1. Observation of fish/shrimp processing plants – visit web sites of processing companies and record the details of that Unit
 2. Interaction with local fishermen to know the method of preservation and details about the available traditional technology
 3. Collection of web resources on the Quality assurance, quality control measures in Aqua Industries- cross checking the standards during the visit to any processing units.
 4. Assignments, Seminar, Group discussion. Quiz, Collection of Material, Invited talks, Video preparation etc.,
-

Dr. V S. KRISHNA GOVERNMENT DEGREE COLLEGE (A), VISAKHAPATNAM

Domain Subject: ZOOLOGY, III Year B. Sc.–Semester –V
Course 7A: POST HARVEST TECHNOLOGY OF FISH AND FISHERIES

Time: 3 hrs

Max. Marks: 75

BLUEPRINT FOR QUESTION PAPER SETTER

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 5 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT – I	01	02	25
UNIT – II	02	02	30
UNIT - III	03	02	35
UNIT -IV	01	02	25
UNIT - V	01	02	25
TOTAL No. of Questions	08	10	
Total marks including choice			140

NOTE: The question paper setters are requested to kindly adhere to the format given in the above table.

The question paper setters are also requested to set the questions in the following way.

- 80% memory and understanding based
- 20% creativity, application, and skill based
- Please avoid repetition of questions.

Dr. V S Krishna Government Degree and PG College (Autonomous)
Domain Subject: ZOOLOGY, III Year B. Sc.–Semester –V
Course 7A: POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES

TIME : 3 Hours

Max. Marks: 75

SECTION – A (Short answer questions)

Answer any FIVE of the following:

Marks: 5x5 = 25

Draw neat labelled diagrams wherever necessary.

1. Spoilage in Marine fish
2. Any two traditional fish preservation methods
3. Any two advanced fish preservation methods
4. Fish meal
5. Fish oil
6. Pearl essence
7. Personal hygiene in processing plants
8. HACCP

SECTION – B (Essay answer questions)

Answer any FIVE of the following:

Marks: 5x10 = 50

Draw neat labelled diagrams wherever necessary.

- 9 a) Write an essay on the storage and transport of fresh fish and add a note on post mortem changes.
Or
b) Give a detailed account of different preservation principles employed in aqua industry.
- 10 a). Describe the different traditional methods pf fish preservation.
Or
b) Explain the various advanced methods of fish preservation.
- 11 a) Explain about any 5 fish products adding a note on their utility.
Or
b) Write an essay on any 5 fish byproducts.
- 12 a) Give a detailed account of sanitation in processing plants.
OR
b) Elaborate the procedures followed during processing and after processing.
- 13 a) Describe in detail about the seafood quality assurance and systems.
Or
b) Give a detailed explanation of national and international standards of certification.

**Dr. VS Krishna Government Degree &
PG College (Autonomous)
III B.Sc. Domain Subject:
ZOOLOGY
II Year B. Sc–Semester –V
W.e.f. 2022 - 2023
Course 6 B: LIVE STOCK MANAGEMENT-I
(BIOLOGY OF DAIRY ANIMALS)
(Skill Enhancement Course (Elective), - Credits: 05)**

Max Marks: 100+50

I. Course Outcomes: Students at the successful completion of the course will be able to

- Select the suitable breeds of livestock for rearing
- Relate the anatomy of udder with letdown of milk
- Identify and manipulate the reproductive behavior of cattle
- Inspect the economics of dairy farming
- Learn the various breeding techniques employed in live stock

II Syllabus: (Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.)

Unit 1:

Livestock census;
Breeds of Dairy cattle,
Buffaloes and Goats.
Indigenous, Exotic and Crossbred Cattle breeds

Unit 2:

Anatomy of Udder;
Development of udder;
Lacto genesis and
Galactopoises; Letdown of milk.

Unit 3:

Artificial insemination;
Oestrous cycle;
Symptoms of heat in cows and buffaloes.
Conception, Pregnancy diagnosis in cattle.
Multi ovulation and embryo transfer technique.
Cloning.

Unit4:

Economic traits of Dairy cattle.
Methods of selection of dairy animals.

Unit5:

Systems of Dairy cattle breeding.
Inbreeding, out breeding,
Heterosis or hybrid vigour
Grading up.
Selection methods, fertility and breeding efficiency

III References:

1. Textbook of Animal Husbandry-GC Benarjee
2. Handbook of Animal Husbandry –ICAR Edition
3. Principles and practices of Dairy Farm–Jagdish Prasad

Web resources:

1. <http://ecoursesonline.iasri.res.in/course/index.php?categoryid=42>
2. <https://vetsebooks.blogspot.com/p/e-books.html>
3. <https://www.basu.org.in/study-materials/veterinary-science/>
4. <https://vikaspedia.in/agriculture/livestock/cattle-buffalo/breeds-of-cattle-buffalo>

**Course 6 B: LIVE STOCK MANAGEMENT-I-PRACTICAL SYLLABUS
(BIOLOGY OF DAIRY ANIMALS)**

II. Learning Outcomes:

On successful completion of this practical course, student shall be able to

1. Examine the points of dairy cow
2. Understand the behavioral changes of cow during the reproductive period
3. Differentiate the merits and demerits of cross breeds in cattle

III. Practical(Laboratory) Syllabus:(30hrs) (Max.50Marks)

1. Points dairy cow. (Explanation with observation of charts- Model evaluation to be performed by the student in the laboratory)
2. Identification of different breeds of dairy cattle and buffaloes.(Observation of Charts of breeds in the laboratory- at least 3 breeds should be identified by the students in their locality with video, photo)
3. Male and female reproductive systems of cow – Model/ Chart (Student has to draw a labeled diagram of the male and female reproductive systems of cow – acquire skill to identify the parts).
4. Symptoms of heat in cow (Study and Understanding the physiological symptoms during heat).
5. Artificial in semi nation (Flow chart of implements – Procedure- precautions)
6. Pregnancy diagnosis in cattle.
7. Study comparative merits of cows and buffaloes; zebu and cross bred cows (Examination of merits)

IV. Lab References:

1. Principles and practices of Dairy Farm–Jadish Prasad
2. Dairy cow points: <https://www.icar.org/Guidelines/05-Conformation-Recording.pdf>
3. Pregnancy test protocol:
<https://cgspace.cgiar.org/bitstream/handle/10568/109408/Milk%20testing%20lab%20protocol.pdf?sequence=1&isAllowed=y>

Web resources suggested by the teacher concerned and the college librarian including reading material

V. Co-Curricular Activities

a) **Mandatory:**(Lab/ field training of students by teacher :(lab: 10 + filed: 05):

1. For Teacher: Training of students by the teacher in laboratory/field for not less than 15 hours on principles and practices of dairy industry- breeds –artificial insemination- reproductive behavior of cows etc. as per the syllabus above.
2. For Student: Students shall individually visit to any of the nearby cattle rearing centers/ veterinary hospital/Raithu Bharosa Kendra and make observations of the procedure and quality enhancement activities and submit a handwritten Fieldwork/Project work Report in 10 pages.
3. Max marks for Fieldwork/Project work Report: 05.
4. Suggested Format for Fieldwork/Project work Report: *Title page, student details, index page, details of place visited, observations made, findings and acknowledgements*
5. (IE)Unit tests,

b) Suggested Co-Curricular Activities

1. Collection of various cattle breed images from the web to prepare a album
2. Visit the sites of Veterinary colleges in India and preparation of brief report on the videos and content/ employment details
3. Sketch a model dairy farm with details
4. Invited lecture and presentation on related topics by experts
5. Seminar, Assignment, Group discussion. Quiz, Collection of Material, Invited lecture, Video preparation etc.

Dr. V S. KRISHNA GOVERNMENT DEGREE COLLEGE (A), VISAKHAPATNAM

Domain Subject: ZOOLOGY, III Year B. Sc.–Semester –V
Course 6B: LIVE STOCK MANAGEMENT – I (BIOLOGY OF DAIRY ANIMALS)

Time: 3 hrs

Max. Marks: 75

BLUEPRINT FOR QUESTION PAPER SETTER

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 5 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT – I	02	02	30
UNIT – II	01	02	25
UNIT - III	02	02	30
UNIT -IV	01	02	25
UNIT - V	02	02	30
TOTAL No. of Questions	08	10	
Total marks including choice			140

NOTE: The question paper setters are requested to kindly adhere to the format given in the above table.

The question paper setters are also requested to set the questions in the following way.

- 80% memory and understanding based
- 20% creativity, application, and skill based
- Please avoid repetition of questions.



Dr. V S Krishna Government Degree and PG College (Autonomous)
Domain Subject: **ZOOLOGY, III Year B. Sc.–Semester –V**
Course 6B: **LIVE STOCK MANAGEMENT – I (BIOLOGY OF DAIRY ANIMALS)**

TIME : 3 Hours

Max. Marks: 75

SECTION – A (Short answer questions)

Answer any FIVE of the following:

Marks: 5x5 = 25

Draw neat labelled diagrams wherever necessary.

1. Indigenous cattle breeds
2. Crossbred cattle breeds
3. Lactogenesis
4. Oestrous cycle
5. Artificial insemination
6. Economic traits of dairy cattle
7. Outbreeding
8. Grading of buffaloes

SECTION – B (Essay answer questions)

Answer FIVE of the following:

Marks: 5x10 = 50

Draw neat labelled diagrams wherever necessary.

- 9 a) Write an essay on dairy cattle and buffaloes.
Or
b) Write an essay on indigenous and exotic cattle breeds.
10. a) Give a detailed account of anatomy and development of udder.
Or
b) Write in detail about lactogenesis and lactopoiesis, add a note on letdown of milk.
- 11 a) Give a detailed account of artificial insemination and oestrous cycle in dairy animals.
Or
b) Explain about the multi ovulation and embryo transfer technique.
- 12 a) Write an essay the economic traits of cattle.
Or
b) Describe the methods of selection of dairy animals.
- 13 a) Write an essay on inbreeding and outbreeding techniques.
Or
b) Explain the grading up, , selection methods and factors affecting the breeding efficiency.

**Dr. VS Krishna Government Degree and
PG College (Autonomous)**

III B.Sc. Domain Subject:

ZOOLOGY

III Year B. Sc.–Semester –V

W.e.f. 2022 - 2023

Max Marks: 100+50

**Course 7B: LIVE STOCK MANAGEMENT -II
(DAIRY PRODUCTION AND MANAGEMENT)**
(Skill Enhancement Course (Elective), - Credits: 05)

- I. Course Outcomes: Students after the successful completion of the course will be able to
- Identify and suggest the suitable housing system for the dairy farming
 - Understand management practices for the dairy farming
 - Learn the process of milk pasteurization
 - Prepare cream from milk

II. Syllabus: (Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.)

Unit1:

Systems of Housing of Dairy cattle- Loose Housing and Conventional Dairy Barns. Drawing of layouts for dairy cattle dwellings; Criteria for selecting site for establishing Dairy farm buildings; Water requirement of dairy animals.

Unit2:

Management of different classes of Dairy animals- Milk producing animals, pregnant animals dry animals, heifers and calves. Management practices for Dairy farm; Identification, Dehorning, Castration, Deworming, Vaccination, Disinfection, and Milking.

Unit 3:

(a) Pasteurization of milk: Definition, objects of pasteurization, objections to pasteurization, Principles of heat exchange. Methods of pasteurization: LTLT, HTST and Uperization.
(b) Sterilization of milk. Homogenization: Factors influencing homogenization

Unit 4:

Market milk: Toned milk, double toned milk, Reconstituted milk, Standardized milk and fullcream milk–Standards and methods of manufacture.

Unit 5:

Cream: Types of cream, composition, methods of cream separation, gravity and centrifugal methods, types of cream separators, factors affecting fat losses in skim milk and fat percentage in cream.

III. References:

1. Textbook of Animal Husbandry-G C Benarjee
2. Handbook of Animal Husbandry –ICAR Edition
3. Principles and practices of Dairy Farm–Jagdish Prasad
4. <http://ecoursesonline.iasri.res.in/course/index.php?categoryid=42>
5. <https://vetsebooks.blogspot.com/p/e-books.html>
6. <https://www.basu.org.in/study-materials/veterinary-science/>
7. <https://vikaspedia.in/agriculture/livestock/cattle-buffalo/breeds-of-cattle-buffalo>



Course 7 B: LIVE STOCK MANAGEMENT -II – PRACTICAL SYLLABUS
(DAIRY PRODUCTION AND MANAGEMENT)

IV. Course Outcomes:

On successful completion of this practical course, student shall be able to:

- Design a model dairy farm layout
- Understand procedure of milk pasteurization at milk processing centers
- Identify various important management practices in dairy farming

V. Practical (Laboratory) Syllabus:(30hrs) (Max.50Marks)

1. Dairy Farm layout (In the laboratory student has to sketch a dairy farm with all its components)
2. Identification of cows (students have to identify the breeds of cows from the images/charts – have to identify any two breeds in the vicinity of the college/ their locality).
3. Dehorning of calves : (Method - protocol- precautions)
4. Castration of bulls (Method – Apparatus- Time-importance)
5. Deworming of dairy cattle : (Schedule – method- benefits)
6. Pasteurization of milk (Batch Method- procedure- Observation)
7. Sterilization of milk (In bottle sterilization- procedure – protocol)
8. Cream separation (By gravity method- procedure- hands on experiment)

VI. Lab References

1. Handbook of Animal Husbandry –ICAR Edition
2. Dairy farm layout : <https://www.youtube.com/watch?v=dmukHUEUvKc>
3. Dehorning procedure : <http://www.omafra.gov.on.ca/english/livestock/dairy/facts/09-003.htm>
4. Castration of bulls: <https://vikaspedia.in/agriculture/livestock/general-management-practices-of-livestock/castration-of-ruminants>
5. Deworming: https://kvk.icar.gov.in/API/Content/PPUpload/k0347_10.pdf
6. Pasteurization of milk : <http://www.jnkvv.org/PDF/08042020170652part%203.pdf>
7. <http://ecoursesonline.iasri.res.in/mod/page/view.php?id=1690>
8. Cream separation: <http://ecoursesonline.iasri.res.in/mod/page/view.php?id=147910>

Web resources suggested by the teacher concerned and the college librarian including reading material

VII. Co-Curricular Activities

a) **Mandatory:** (Lab/field training of students by teacher; lab 10+ field :05)

1. For Teacher: Training of students by the teacher in laboratory and filed format less than 15 hours on skills of dairy management – housing-management of dairy animals of various stages- procedure of preparation of marketable milk with procedures like sterilization, pasteurization and other techniques)
 2. For Student: Student shall (individually) visit a nearby dairy farm- house hold cattle rearing – make observations on aspects like housing – management – feed- milk- revenue- breed selection- qualities of breed –etc. A handwritten Fieldwork/Project work Report to be submitted in the given format.
 3. Max marks for Fieldwork/Project work Report: 05.
 4. Suggested Format for Fieldwork/Project work Report: *Title page, student details, index page, details of place visited, observations made, findings and acknowledgements.*
 5. Class tests.
- b) Suggested Co-Curricular Activities
1. Sketch model dairy house with details
 2. Web resources on Protocols in the management of stages of cattle
 3. Properties of varieties of milk from the market observation
 4. Assignment, Seminar, Invited lecture, Group discussion. Quiz, Collection of Material, Video preparation etc.

Dr. V S Krishna Government Degree and PG College (Autonomous)
Domain Subject: ZOOLOGY, III Year B. Sc.–Semester –V
Course 7B: LIVE STOCK MANAGEMENT – II (DAIRY PRODUCTION AND MANAGEMENT)

Time: 3 hrs

Max. Marks: 75

BLUEPRINT FOR QUESTION PAPER SETTER

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 5 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT – I	01	02	25
UNIT – II	02	02	30
UNIT - III	02	02	30
UNIT -IV	02	02	30
UNIT - V	01	02	25
TOTAL No. of Questions	08	10	
Total marks including choice			140

NOTE: The question paper setters are requested to kindly adhere to the format given in the above table.

The question paper setters are also requested to set the questions in the following way.

- a) 80% memory and understanding based
- b) 20% creativity, application, and skill based
- c) Please avoid repetition of questions.

Dr. V S Krishna Government Degree and PG College (Autonomous)
Domain Subject: **ZOOLOGY, III Year B. Sc.–Semester –V**
Course 7B: **LIVE STOCK MANAGEMENT – II (DAIRY PRODUCTION AND MANAGEMENT)**

TIME : 3 Hours

Max. Marks: 75

SECTION – A (Short answer questions)

Answer any five of the following:

Marks: 5x5 = 25

Draw neat labelled diagrams wherever necessary.

1. Water requirement of dairy animals.
2. Management of milk producing animals.
3. Castration.
4. Homogenisation
5. HTST
6. Toned milk
7. Reconstituted milk
8. Types of cream separators

SECTION – B (Essay answer questions)

Answer FIVE of the following:

Marks: 5x10 = 50

Draw neat labelled diagrams wherever necessary.

9. a) Write an essay on systems of housing of dairy cattle.
Or
b) Write an essay on criteria of site selection for establishing a dairy farm.
10. a) Give a detailed account of various management practices in a dairy farm.
Or
b) Write in detail about the management of different classes of Dairy animals.
- 11 a) Give a detailed account of methods of pasteurization of milk.
Or
b) Explain about the sterilization process in dairy production.
- 12a) Write an essay about market milk.
Or
b) Describe the standards and methods of milk manufacture.
- 13 a) Write an essay on types and composition of cream. Add a note on methods of cream separation.
Or
b) Explain the factors affecting fat losses in skim milk and fat percentage in cream.

Dr. VS Krishna Government Degree and

PG College (Autonomous)

III B.Sc. Domain Subject:

ZOOLOGY

III Year B. Sc.–Semester –V

Max. Marks: 100

W.e.f. (2022 – 2023)

Course6 C: POULTRY MANAGEMENT- I (POULTRY FARMING)

(Skill Enhancement Course (Elective), - Credits: 05 (3+2))

I. Learning Outcomes:

Students at the successful completion of the course will be able to

- Evaluate the status of Indian Poultry Industry
- Explain the Scientific Poultry keeping
- Compare the diversified Poultry practices
- Inspect the different breeds of chicken

II. Syllabus: (Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.)

Unit 1 Indian poultry Industry

- 1.1 Importance of poultry farming and poultry development in India.
- 1.2 Present status and future prospectus of poultry Industry
- 1.3 Classification of poultry based on genetics Utility

Unit -2 Scientific Poultry Keeping

- 2.1 Modern breeds of Chicken
- 2.2 Present day egg production lines- meat production lines
- 2.3 Mini breeds- dwarfism in mini-Leghorns

Unit-3 Diversified Poultry

- 3.1 Ducks and Geese-classification- rearing system-classification-advantages
- 3.2 Guinea fowls - guinea fowl farming in India-Production-varieties
- 3.3 Emu-rearing- Economical aspects-commercial products

Unit-4 Desi Chickens:

- 4.1 Indigenous breeds and economical aspects of desi chicken
- 4.2 Indigenous breeds-Aseel-Chittagong-Kadaknath- Kalinga brown
- 4.3 Improved varieties in India – Giriraja-Vanaraja-Girirani-,Gramapriya,Swarnandhra

Unit -5 Breeds from Central Avian Research Institute – Izatnagar

- 5.1 CARI Nirbheek - CARI- Shyama-HITCARI (Naked Neck Cross)
- 5.2 CARI- Priya Layer, CARI- Sonali Layer,
- 5.3 CARIBRO-VISHAL, CARI-RAINBRO,
- 5.4 Nandanam chicken-I, Nandanam Chicken-II, Nandanm-Quail

III. References:

1. Text Book of Poultry Science, P V Sreenivasaiah, Write and Print Publications, ISBN No. 9788192970592, 8192970590
2. Poultry Science Practices, Nilothpal Ghosh, CBS Publication & Distributions, 2015
3. Principles of Poultry Science, 1996, CAB Publishers, ISBN 9780851991221
4. A Text Book of Animal Husbandry, C. C. Banerjee, Oxford and IBH, Publish Co, ISBN: 9788120412606

Web sources

1. <https://www.drvet.in/p/e-books.html>



2. <https://byjus.com/biology/animal-husbandry-poultry-farming/>
3. https://www.helpforag.app/2018/02/livestock-production-and-management-lpm_14.html?m=1

Course6 C: POULTRY MANAGEMENT- I (POULTRY FARMING)
PRACTICAL SYLLABUS

IV. Course Outcomes: On successful completion of this practical course, student shall be able to:

- Identify different types of Poultry rearing practices
- Evaluate the efficacy of different types of poultry practices in maximizing yield
- Understand the importance of different hybrid breeds in poultry

V. Practical(Laboratory) Syllabus:(30hrs) (Max.50Marks)

1. Different types of Poultry rearing (Students has to observe and draw the different types of poultry rearing systems)
2. Different types of poultry Housing - Models / Images/charts
3. Different layer breeds images/charts/ Models (Observation of characters)
4. Types of broilers images/charts/ Models (Identification of important Characters)
5. CARI breeds characters –images/charts
6. Nandanam breeds- images/charts (Identification of characters)

*** (This practical is 70 % (Web based /virtual) 30% physical: student and teachers must browse the web for the specimens models – write down the important characters based on the web resources)

VI. Lab references

1. A Text Book of Animal Husbandry, C. C. Banerjee, Oxford and IBH, Publish Co, ISBN: 9788120412606

Web resources suggested by the teacher concerned and the college librarian including reading material

VII. Co-Curricular Activities:

a) **Mandatory:** (Student training by teacher in field skills: total 15 hours (lab: 10, field 05))

1. For Teacher: Training of students by the teacher in laboratory and field for not less than 15 hours on the techniques of identification of layers, broilers and management practices in poultry.
2. For Student: Students shall Individually visit a Poultry farm, make observations and report on the Rearing, Housing, Brooding, Feeding and water management activities. The student shall submit a handwritten Fieldwork/Project work Report on the observations along with pictures in the given format not exceeding 10 pages to teacher.
3. Max marks for Fieldwork/Project work Report: 05.
4. Suggested Format for Fieldwork/Project work: *Title page, student details, index page, details of place visited, observations made, findings and acknowledgements.*
5. Unit tests. (IE)

b) Suggested Co-Curricular Activities

1. Web resources – visiting the web sites of CARI-IZATNAGAR-
<https://cari.icar.gov.in> procuring additional information on the poultry breeds
2. Web resources- visiting the web site of NANADANAM
http://www.tanuvas.ac.in/ippmmadhavaram_tech.html
3. Collection of additional data on different types of Poultry breeds
4. Seminar, Assignment, Group discussion. Quiz, Collection of Material, Invited Lecture, Video preparation etc.

Dr. V S Krishna Government Degree and PG College (Autonomous)
Domain Subject: **ZOOLOGY, III Year B. Sc.–Semester –V**
Course 6C: **POULTRY MANAGEMENT – I (POULTRY FARMING)**

Time: 3 hrs

Max. Marks: 75

BLUEPRINT FOR QUESTION PAPER SETTER

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 5 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT – I	01	02	25
UNIT – II	02	02	30
UNIT - III	01	02	25
UNIT -IV	02	02	30
UNIT - V	02	02	30
TOTAL No. of Questions	08	10	
Total marks including choice			140

NOTE: The question paper setters are requested to kindly adhere to the format given in the above table.

The question paper setters are also requested to set the questions in the following way.

- 80% memory and understanding based
- 20% creativity, application, and skill based
- Please avoid repetition of questions.

Dr. V S Krishna Government Degree and PG College (Autonomous)
Domain Subject: ZOOLOGY, III Year B. Sc.–Semester –V
Course 6C: POULTRY MANAGEMENT – I (POULTRY FARMING)

TIME : 3 Hours

Max. Marks: 75

SECTION – A (short answer questions)

Answer any five of the following:
Draw neat labelled diagrams wherever necessary.

Marks: 5x5 = 25

1. Poultry farming
2. Present day egg production
3. Mini breeds of chicken
4. Ducks and geese in poultry
5. Chittagong breed
6. Gramapriya
7. CARIBRO - VISHAL
8. CARI - PRIYA

SECTION – B (Essay answer questions)

Answer FIVE of the following:
Draw neat labelled diagrams wherever necessary.

Marks: 5x10 = 50

9. a) Describe in detail the present status and future prospectus of poultry industry in India.
Or
b) Write an essay on classification of poultry based on genetic utility.
10. a) Explain about the modern breeds of chicken.
Or
b) Write an essay on present day egg production lines – meat production lines.
- 11 a) Write an essay on guinea fowl farming in India.
Or
b) Explain duck rearing systems in India, add a note on advantages of the system.
- 12a) Write about the indigenous breeds of chicken with a note on the economical aspects.
Or
b) Explain about the improved varieties of poultry breeds in India.
- 13 a) Write in detail about the CARI breeds of poultry.
Or
b) Describe in detail about the Nandanam breeds of chicken.

**Dr. VS Krishna Government Degree and PG College
(Autonomous)**

**Domain Subject: ZOOLOGY
III Year B. Sc.–Semester –V**

Max. Marks: 100+50

**Course 7 C: POULTRY MANAGEMENT -II (POULTRY PRODUCTION
AND MANGEMENT)
(Skill Enhancement Course (Elective), - Credits: 05)**

- I. Course Outcomes: Students at the successful completion of the course will be able to
- Suggest measure for Health care in Poultry
 - Evaluate the economics of poultry production
 - Elaborate the poultry Breeder flock management
 - Differentiate the poultry hatchery practice
- I. Syllabus: (Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.)

Unit-1 HEALTH CARE

- 1.1 Common poultry diseases: bacterial, viral, fungal, parasitic and nutritional deficiencies.
1.2 Vaccination schedule for commercial layers and broilers: factors that govern vaccination schedule; vaccination principles type, methods, pre and post vaccination care.
1.3 Disinfection: Types of disinfectants; mode of action; recommended procedure; precaution and handling.

Unit-2 ECONOMICS

- 2.1 Economics of layer and broiler production
2.2 Projects reports in different systems of rearing for layer & broilers.
2.3 Feasibility studies on poultry rearing- in context of small units and their profitability.
2.4 Export/import of poultry and poultry products.

**Unit-3 BREEDER FLOCK
MANAGEMENT**

- 3.1 Layer and broiler breeder flock management housing & space requirements.
3.2 Different stage of management during life cycle; Light management during growing and laying period, Artificial insemination.
3.3 Feeding: Feed restriction, separate male feeding. Nutrient requirement of layer and broiler breeders of different age groups.

Unit-4 BREEDER HEALTHCARE

- 4.1 Vaccination of breeder flock; difference between vaccination schedule of broilers and commercial birds.
4.2 Common diseases of breeders (Infectious and metabolic disorders)-prevention.
4.3 Fertility disorder- etiology, diagnosis and corrective measures. Selection and culling of breeder flocks

Unit-5 HATCHERY PRACTICES

- 5.1 Management principles of incubation.
5.2 Factors affecting fertility and hatchability. Selection, care and incubation of hatching eggs. Fumigation; sanitation and hatchery hygiene.
5.3 Importance of hatchery records, break even analysis of unhatched eggs.
5.4 Computer applications for hatchery management

II. References:

1. HVS Chauhan, S. Roy, Poultry Diseases, Diagnosis and Treatment, New Age International Publishers-2018
2. <https://www.drvet.in/p/e-books.html>
3. <https://byjus.com/biology/animal-husbandry-poultry-farming/>
4. https://www.helpforag.app/2018/02/livestock-production-and-management-lpm_14.html?m=1

Course 7C: POULTRY MANAGEMENT –II- PRACTICAL SYLLLABUS (POULTRY PRODUCTION AND MANGEMENT)

III. Course Outcomes:

On successful completion of this practical course, student shall be able to:

- Identify Poultry diseases by observation
- Analyze Poultry establishment feasibility
- Understand the Poultry Records

IV. Practical(Laboratory) Syllabus:(30hrs) (Max.50Marks)

1. Poultry Viral diseases – Observation of histopathological slides
2. Poultry Fungal Diseases- Observation of histopathological slides
3. Poultry Bacterial Diseases-Observation of histopathological slides
4. Feasibility study of Poultry establishment: (Preparation of feasibility study report with given parameters)
5. Rearing of Layers – (Preparation of Flow chart
6. Rearing of broiler- Flow chart
7. Hatchery records- Model study/analysis- Report with modified data

V. Lab references :

1. HVS Chauhan, S. Roy, Poultry Diseases, Diagnosis and Treatment, New Age International Publishers-2018
2. Flow chart hatchery : <http://lms.tanuvas.ac.in/mod/resource/view.php?id=45106>
3. Feasibility report:
<https://www.manage.gov.in/stry&fcac/content/19.%20Project%20Report%20on%20Layer%20Poultry.pdf>

Web resources suggested by the teacher concerned and the college librarian including reading material

VI. Co-Curricular Activities

a) **Mandatory:** (Lab/field training of students by teacher: (lab10+ field 05)

1. For Teacher: Training of students by the teacher laboratory and field for not less than 15 hours on skills in different practices employed in poultry with regard to the disease management – analysis of poultry project- preparation of flow chart – Observation of Poultry records – computerization activities
2. For Student: students shall (individually) visit a Layer/ Broiler Poultry farming places (small scale/corporate), make observations on practices- resources – management and marketing - analysis and submit a handwritten Fieldwork/Project work Report of 10 pages with necessary images.
3. Max marks for Fieldwork/Project work Report: 05.
4. Suggested Format for Fieldwork/Project work: *Title page, student details, index page, detail of place visited, observations made, findings and acknowledgements.*
6. (IE): Unit tests.

b) **Suggested Co-Curricular Activities**

1. Preparation of Poultry diseases charts
2. Preparation of feasibility report poultry establishment with different variables
3. Seminar, Assignment, Group discussion. Quiz, Collection of Material, Invited



Lecture, Videopreparation etc.

Dr. V S Krishna Government Degree and PG College (Autonomous)
Domain Subject: **ZOOLOGY, III Year B. Sc.–Semester –V**
Course 7C: **POULTRY MANAGEMENT – I (POULTRY PRODUCTION AND MANAGEMENT)**
Time: 3 hrs Max. Marks: 75

BLUEPRINT FOR QUESTION PAPER SETTER

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 5 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT – I	02	02	30
UNIT – II	01	02	25
UNIT - III	02	02	30
UNIT -IV	01	02	25
UNIT - V	02	02	30
TOTAL No. of Questions	08	10	
Total marks including choice			140

NOTE: The question paper setters are requested to kindly adhere to the format given in the above table.

The question paper setters are also requested to set the questions in the following way.

- 80% memory and understanding based
- 20% creativity, application, and skill based
- Please avoid repetition of questions.

Dr. V S Krishna Government Degree and PG College (Autonomous)
Domain Subject: ZOOLOGY, III Year B. Sc.–Semester –V
Course 7C: POULTRY MANAGEMENT – I (POULTRY PRODUCTION AND MANAGEMENT)

TIME : 3 Hours

Max. Marks: 75

SECTION – A (short answer questions)

Answer any five of the following:

Marks: 5x5 = 25

Draw neat labelled diagrams wherever necessary.

1. Nutritional deficiencies in poultry
2. Vaccination schedule in poultry
3. Economics of broiler production
4. Artificial insemination in poultry
5. Space requirements for layers
6. Metabolic disorders in breeders.
7. Hatchery hygiene
8. Computer applications in hatchery management.

SECTION – B (Essay answer questions)

Answer FIVE of the following:

Marks: 5x10 = 50

Draw neat labelled diagrams wherever necessary.

9. a) Write an essay on any 3 bacterial and 2 viral diseases in poultry
Or
b) Describe in detail the types of disinfection, modes of action and procedure.
10. a) Explain about the economics of layer and broiler production.
Or
b) Write in detail about the export and import of poultry and poultry products.
- 11 a) Give a detailed account of layer, broiler breeder flock Management and housing.
Or
b) Explain the different stages of management during lifecycle.
- 12a) Give a detailed account of common diseases of breeders and their prevention.
Or
b) Explain the fertility disorder diagnosis and corrective measures in poultry.
- 13 a) Write an essay on selection, care and incubation of hatching eggs. Add a note on sanitation and hatchery hygiene.
Or
b) Describe in detail about the importance of hatchery records.

Dr. VS Krishna Government Degree and PG college

(Autonomous)

III B.Sc. Domain Subject:

ZOOLOGY

III Year B. Sc. Semester –V

W.e.f. 2022 - 2023

Max. Marks: 100+50

Course6 D: SERI CULTURE -I*
(BIOLOGY AND CULTIVATION OF MULBERRY)
(Skill Enhancement Course (Elective), Credits: 05)

I. Course Outcomes:

- Students at the successful completion of this course will be able to
- Evaluate the general status of Sericulture in India
- Understand the development of sericulture Botany
- Evaluate the use of Silk worm breeds
- Differentiate among various silkworm breeds
- Apprise the economics of silk rearing

I. Syllabus: (Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.)

Unit-1A general introduction to Sericulture

1.1 Sericulture map of India: Components of Sericulture.

1.2 Textile fibers: Types- natural and synthetic fibers- types of silk produced in India; Importance of mulberry silk:

1.3 Sericulture organization in India; role of state departments of Sericulture, Central Silk Board and NGOs in Sericulture development

Unit-2Sericultural Botany.

2.1 Taxonomy of mulberry and food plants of silkworms: Study of salient features of the families- Marceau.

2.2 Morphology of mulberry: different varieties of mulberry.

2.3 Anatomy of mulberry: internal structure of stem, root and leaf; secondary growth in root and stem.

Unit 3Floral biology of mulberry

3.1 Floral biology of mulberry: Sexual behavior, different types of anthers and ovule in mulberry; micro- and megaspore genesis.

3.2 Development of male and female gametophytes; pollination, fertilization

3.3 Development of endosperm, embryo and seed; polyembryony and parthenocarpy in mulberry.

Unit-4 Silkworm Biology.

4.1 Characteristic features of the order Lepidoptera; detailed study of the families- Saturnidae and Bombycid. Classification of sericigenous insects.

4.2 Classification of silkworms based on moultnism, voltinism and geographical distribution; popular silkworm breeds and hybrids of Karnataka; their economic traits

Unit-5 Morphology and anatomy of reproductive systems of silk moth.

5.1 Life cycle of *Bombyx Mori*; morphology of silkworm egg, larva, pupa and adult.

5.2 Silk glands and silk formation.

5.3 Male and female reproductive system.



* This course shall be completely taught by Zoology faculty.

II. References:

1. Hortmann and Kesler (1993) Plant Propagation, principles and practices. Prentice Hall, Hemel Nemstead.
2. Krishna Murthy, N.(1981)Plant growth substances including application in Agriculture. Tata McGraw Hill Pub. Co. Ltd. New Delhi.
3. Shankar, M.A (1998) Handbook on mulberry Nutrition, Multiplex, Bangalore.
4. Subbarao, N.S (1998) Bio fertilizers in Agriculture. Oxford & IBH Pub. Co, Pvt. Ltd, New Delhi.
5. A text Book on Mulberry Crop Protection. Govindaiah, V.P Gupta, D.D Sharma, S. Rajadurai and V. Nishitha Naik, Published by Central Silk Board, Bangalore-68, India.2005.
6. Rajanna L, Das P.K, Ravindra S, Bhogesh K , Mishra R.K, Singhvi N.R, Katigar R.S and Jayaram H. Mulberry Cultivation and Physiology Central Silk Board, Bangalore, Dec.2005

Web resources:

1. <http://www.fao.org/3/ad108e/ad108e0a.htm>
2. https://onlinecourses.swayam2.ac.in/cec19_bt05/preview
3. <https://www.skuastkashmir.ac.in/DisplaySInformation.aspx?id=16&pid=20592>
4. <http://www.fao.org/3/x9895E/x9895e04.htm>
5. <https://www.notesonzoology.com/sericulture/moriculture/common-indian-mulberry-plants-and-their-morphological-characteristics/347>

Web resources suggested by the teacher concerned and the college librarian including reading material

Course6 D: SERI CULTURE -I – PRACTICAL SYLLABUS

III. Course Outcomes:

On successful completion of this practical course, student shall be able to:

- Develop sericulture map of India
- Develop charts on production of silk
- Examine the popular varieties of mulberry
- Display the silk glands of silk worm

IV. Practical(Laboratory) Syllabus:(30hrs) (Max.50Marks)

1. Sericulture map of India and Karnataka.
2. Preparation of histograms and pie charts on:
3. Production of textile fibers in India.
4. Pie chart on mulberry and non-mulberry silk production in India.
5. Life cycle of *Bombyx mori*- Morphology of egg, larva, pupa and adult of *Bombyx mori*.
6. Sex separation in larva, pupa and adult of the silkworm *Bombyx mori*.
7. Dissection and display of: Digestive system of larva. Silk glands.



V. Lab References :

1. Rajanna L, Das P.K, Ravindra S, Bhogsha K , Mishra R.K, Singhvi N.R, Katigar R.S and Jayaram H. Mulberry Cultivation and Physiology Central Silk Board, Bangalore, Dec.2005

Web sources suggested by the teacher concerned and the college librarian including reading material

VI. Co-Curricular Activities :

a) **Mandatory:** (*Student training by teacher in field skills: total 15hrs, Lab: 10+ filed 05*):

1. For Teacher: Training of students by the teacher in the laboratory and field for not less than 15 hours on the skills of preparation of Sericulture Map of India – identification of Mulberry plants – plantation- observation of Silk worm reproductive biology- observation of silk glands
2. For Student: Students shall (individually) visit any local Mulberry Plantation area and Silk worm Rearing center – make observations on plants, procedures and yield. Observations and outcomes shall be submitted as Fieldwork/Project work Report not exceeding 10 pages to teacher in the given format.
3. Max marks for Fieldwork/Project work Report: 05.
4. Suggested Format for Fieldwork/Project work: *Title page, student details, index page, details of place visited, observations made, findings and acknowledgements.*
5. Class tests

6. **b) Suggested Co-Curricular Activities**

1. Webbased : Collection of additional information of mulberry plants
2. Charts /Models preparation of silkworm developmental stages
7. Seminar, Invited lecture, .Assignment, Group discussion. Quiz, Collection of Material, Video preparation etc.

Dr. V S Krishna Government Degree and PG College (Autonomous)
Domain Subject: **ZOOLOGY, III Year B. Sc.–Semester –V**
Course 6D: **SERI CULTURE – I (BIOLOGY AND CULTIVATION OF MULBERRY)**
Time: 3 hrs Max. Marks: 75

BLUEPRINT FOR QUESTION PAPER SETTER

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 5 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT – I	02	02	30
UNIT – II	02	02	30
UNIT - III	02	02	30
UNIT -IV	01	02	25
UNIT - V	01	02	25
TOTAL No. of Questions	08	10	
Total marks including choice			140

NOTE: The question paper setters are requested to kindly adhere to the format given in the above table.

The question paper setters are also requested to set the questions in the following way.

- 80% memory and understanding based
- 20% creativity, application, and skill based
- Please avoid repetition of questions.

Dr. V S Krishna Government Degree and PG College (Autonomous)
Domain Subject: ZOOLOGY, III Year B. Sc.–Semester –V
Course 6D: SERI CULTURE – I (BIOLOGY AND CULTIVATION OF MULBERRY)

TIME : 3 Hours

Max. Marks: 75

SECTION – A (Short answer questions)

Answer any five of the following:

Marks: 5x5 = 25

Draw neat labelled diagrams wherever necessary.

1. Role of central silk board
2. Components of sericulture
3. Food plants of silk worm
4. Internal structure of mulberry stem.
5. Floral biology of mulberry.
6. Parthenocarpy in mulberry.
7. Sericigenous insects
8. Silk glands.

SECTION – B (Essay answer questions)

Answer FIVE of the following:

Marks: 5x10 = 50

Draw neat labelled diagrams wherever necessary.

9. a) Write an essay on types of silk produced in India and importance of mulberry silk.
Or
b) Give a detailed account on sericulture organization in and role of state departments of sericulture.
10. a) Write an essay on morphology of mulberry and different varieties of mulberry.
Or
b) Write in detail about the anatomy of mulberry.
- 11 a) Give a detailed account about the development of male and female gametophyte.
Or
b) Explain the development of endosperm, embryo and seed of mulberry.
- 12a) Write an essay on classification of Silk worms.
Or
b) Write an essay on classification of sericigenous insects
- 13 a) Describe the life cycle of *Bombyx mori*.
Or
b) Write an essay on the anatomy of male and female reproductive systems of silk moth.

**Dr. VS Krishna Government Degree and PG
college (Autonomous)**

III B.Sc. Domain Subject:

ZOOLOGY

III Year B. Sc. Semester –V

W.e.f. 2022 – 2023

Max Marks: 100+50

COURSE: 7-D: SERI CULTURE – II

(Biology and rearing of silkworm)

(Skill Enhancement Course (Elective), - Credits: 05

Max Marks: 100+50

I Course Outcomes: Students after the successful completion of this course will be able to

II Syllabus: *(Total Hours: 90 including Teaching, Lab, Field Skills Training, Unit tests etc.)*

Unit-1

1.1 Rearing house: Location, orientation, plan and utilities; model rearing house; low-cost rearing house.

1.2 Rearing appliances-shelf and shoot rearing; requirements of rearing appliances (per unit rearing of 100dfIs).

Unit-2

2.1 Disinfection of rearing house and rearing appliances; (disinfectants formalin, bleaching powder, chlorine dioxide, slaked lime and iodine compounds);

2.2 Rearing and personal hygiene.

Unit-3

3.1 Incubation- definition, requirement of environmental conditions, incubation devices; identification of stages of development; black boxing and its importance.

3.2 Chawki silkworm rearing: Preparation; brushing and its methods; types of chawki rearing - traditional and improved method; optimum environmental conditions; methods and frequency of feeding; methods of bed cleaning; spacing; moulting and care during moult.

Unit -4

4.1 Late age silkworm rearing: Methods; optimum environmental conditions; feeding quantity and frequency; methods of bed cleaning; spacing; moulting and care during moult.

4.2. Identification of spinning larva; spinning; mounting and mounting density; types of mountages, their advantages and disadvantages; environmental requirements during spinning.

Unit -5

5.1 Harvesting: Time of harvesting; sorting, storage/ preservation

5.2 Packaging and transport of cocoons; leaf-cocoon ratio; Maintenance of rearing records.

I. References:

1. Charley, S.R. (1982). Culture and Sericulture. Academic Press Inc., New York, U.S.A
2. Chowdhury, S.N. (1998) Muga Culture. Central Silk Board, Bangalore, India
3. Dokuhon, Z.S. (1998). Illustrated Textbook on Sericulture. Oxford & IBH publishing Co., Pvt. Ltd. Calcutta.
4. Hamamura, Y. (2001). Silkworm rearing on Artificial Diet. Oxford & IBH publishing Co., Pvt. Ltd. New Delhi.
5. Hasao Aruga (1994). Principles of Sericulture (Translated from Japanese) Oxford & IBH publishing Co., Pvt. Ltd. New Delhi.

Web Resources:

1. <http://www.fao.org/3/ad108e/ad108e0a.htm>
2. https://onlinecourses.swayam2.ac.in/cec19_bt05/preview
3. <https://www.skuastkashmir.ac.in/DisplaySInformation.aspx?id=16&pid=20592>

Course 7 -D: SERICULTURE –II-PRACTICAL SYLLABUS (BIOLOGY AND REARING OF SILKWORM)

II. Learning Outcomes:

- On successful completion of this practical course, student shall be able to :
- Appreciate the morphology of silkworm
- Realize the importance of and initiate measures to disinfect the importance of disinfection of rearing houses and rearing appliances
- Differentiate the methods of incubation of silkworm eggs
- Prioritize the records in silkworm rearing

III. Practical (Laboratory) Syllabus:(30hrs) (Max.50Marks)

1. Morphology and structure of silkworm egg, fertilization, Diapause development
2. Rearing house: Location, orientation, plan and utilities; model rearing house; low-cost rearing house.
3. Disinfection of rearing house and rearing appliances;
4. Incubation of silkworm eggs- Methods; black boxing; maintenance of temperature and humidity; Brushing: Methods; chawki rearing; use of paraffin paper and blue polythene sheet.
5. Bed cleaning: use of bed cleaning net and disposal of bed refuses and silkworm litter.
6. Moulting: Identification of moulting larva, care during moulting; mounting and mounting density; harvesting of cocoons; assessment of cocoons; types of mountages;
7. Study the mulberry leaf by graph paper method : (for calculating the leaf area)

IV. Lab References

1. Hasao Aruga (1994). Principles of Sericulture (Translated from Japanese) Oxford & IBH publishing Co., Pvt. Ltd. New Delhi.
- Web resources suggested by the teacher concerned and the college librarian including reading material

V. Co-Curricular Activities

a) **Mandatory:** (Lab/field training of students by teacher (lab10+field5))

1. For Teacher: Training of students by the teacher in laboratory and field for not less than 15 hours on the skills/techniques of Rearing of Silk moth
2. For Student: Students shall (individually) visit to Silk worm rearing center and observe all the

procedures. He/she shall prepare a Fieldwork/Project work Report on the observations made in the given format not exceeding 10 pages and submit to teacher.

3. Max marks for Fieldwork/Project work Report: 05.
4. Suggested Format for Fieldwork/Project work Report: *Title page, student details, index page, details of place visited, observations made, findings and acknowledgements.*
5. (IE). Unit tests.

b) **Co-Curricular Activities planned to be conducted**

1. Model Chart preparation of chawki rearing
2. Cocoon collection and observation of characteristics
3. Mountage images / charts preparation
4. Seminar, Invited Lecture, Assignment, Seminar, Group discussion. Quiz, Seminar, Quiz, Collection of Material, Video preparation etc.

Dr. V S Krishna Government Degree and PG College (Autonomous)
Domain Subject: ZOOLOGY, III Year B. Sc.–Semester –V
Course 7D: SERI CULTURE – II (BIOLOGY AND REARING OF SILKWORM)
Time: 3 hrs **Max. Marks: 75**

BLUEPRINT FOR QUESTION PAPER SETTER

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 5 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT – I	01	02	25
UNIT – II	02	02	30
UNIT - III	02	02	30
UNIT -IV	02	02	30
UNIT - V	01	02	25
TOTAL No. of Questions	08	10	
Total marks including choice			140

NOTE: The question paper setters are requested to kindly adhere to the format given in the above table.

The question paper setters are also requested to set the questions in the following way.

- a) 80% memory and understanding based
- b) 20% creativity, application, and skill based
- c) Please avoid repetition of questions.

Dr. V S Krishna Government Degree and PG College (Autonomous)
Domain Subject: ZOOLOGY, III Year B. Sc.–Semester –V
Course 7D: SERI CULTURE – II (BIOLOGY AND REARING OF SILKWORM)

TIME: 3 Hours

Max. Marks: 75

SECTION – A (Short answer questions)

Answer any five of the following:

Marks: 5x5 = 25

Draw neat labelled diagrams wherever necessary.

1. Rearing appliances
2. Personal hygiene.
3. Disinfection of rearing house
4. Black boxing
5. Methods of bed cleaning in sericulture
6. Spinning larva
7. Moulting and care during moult
8. Harvesting in sericulture

SECTION – B (Essay answer questions)

Answer FIVE of the following:

Marks: 5x10 = 50

Draw neat labelled diagrams wherever necessary.

9. a) Write an essay on the rearing house in sericulture.
Or
b) Give a detailed account of rearing appliances in sericulture.
10. a) Write an essay on disinfection of rearing house and rearing appliances.
Or
b) Write in detail about the rearing and personal hygiene.
11. a) Give a detailed account about incubation devices, required conditions and identification of stages of development.
Or
b) Explain the Chawki rearing in detail.
12. a) Write an essay on late age silkworm rearing.
Or
b) Write an essay on rearing of spinning larva.
13. a) Describe the procedure of harvesting, sorting, preservation.
Or
b) Write an essay on packaging and transport of cocoons..



**Dr. V. S. Krishna Govt. Degree College
Visakhapatnam**

DEPARTMENT OF ZOOLOGY

PROPOSED SYLLABUS FOR

**LIFE SKILL COURSES
AND**

SKILL DEVELOPMENT COURSES

IN UNDERGRADUATE DEGREE PROGRAMME

UNDER AUTONOMY

2022 - 2023

**Dr. V S. KRISHNA GOVERNMENT DEGREE & PG COLLEGE (A),
VISAKHAPATNAM
BSc., ZOOLOGY STREAM
SEMESTER –III GENERAL EDUCATION COMPONENT
TITLE – HEALTH AND HYGIENE Syllabus**

(Total teaching hours – 30 Hrs. @ 02 Hrs. per Week)

The course is designed to provide a complete guidance on health and hygiene systems, guidelines for implementing and role of government and public in maintaining a healthy life. At the end of the course the student shall be able to understand –

- the importance of health and hygiene in life
- the importance of nutrition for a healthy life
- different health care programmes of India
- basic concept of health impact assessment as a means of assessing the policies, plans and projects using quantitative and qualitative techniques
- importance of community and personal health & hygiene measures
- Importance of food, social tenets, mental condition, physical activity on health

Learning Objectives:

- To provide knowledge on different health indicators and types of hygiene methods
- To impart knowledge on different health care programmes taken up by India
- To make student understand the latest concepts of health such as HIA, EIA, SIA and SEA
- To enable student with disaster mitigation strategies
- To create awareness on community health and hygiene
- To enrich knowledge on communicable and non-communicable diseases and their control
- To aware the student on the importance of food, social strategies, mental status and physical activities on health
- To introduce different community-based mobile apps on health to student and thereby to the community

Learning / Course Outcomes: On completion of this course, the students will be able to understand -

- What is a healthy diet
- How can we use available information to optimize our diet?
- Can nutrition be used for a healthy life?
- Is there a one-size-fits-all “good” diet or should we individualize our dietary goals?
- Disaster management and responsiveness of public in pandemic and epidemic diseases
- Assess the impact of policies on health and hygiene Health measures to consider while travelling
- Awareness in public through digital media viz., mobile apps

Unit I: Basics of Nutrition

10 Hrs.

1. Nutrition – definition, importance, Good nutrition and mal nutrition; Balanced Diet: Basics of Meal Planning
2. Carbohydrates –functions, dietary sources, effects of deficiency.
3. Lipids –functions, dietary sources, effects of deficiency.
4. Proteins –functions, dietary sources, effects of deficiency.
5. Brief account of Vitamins- functions, food sources, effects of deficiency,
6. Macro and micro minerals –functions, effects of deficiency; food sources of Calcium, Potassium and Sodium; food sources of Iron, Iodine and Zinc
7. Importance of water– functions, sources, requirement and effects of deficiency.

Unit II: Health

10 Hrs.

8. Health - Determinants of health, Key Health Indicators, Environment health & Public health; Health-Education: Principles and Strategies
9. Health Policy & Health Organizations: Health Indicators and National Health Policy of Govt. of India-2017; Functioning of various nutrition and health organizations in India viz., NIN (National Institution of Nutrition), FNB (Food and Nutrition Board), ICMR (Indian Council of Medical Research), IDA (Indian Dietetics Association), WHO-India, UNICEF-India
10. National Health Mission: National Rural Health Mission (NRHM) Framework, National Urban Health Mission (NUHM) Framework
11. Women & Child Health Care Schemes: Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+); Janani Shishu Suraksha Karyakaram (JSSK); Rashtriya Bal Swasthya Karyakram (RBSK); India Newborn Action Plan (INAP); Adolescent Health- Rashtriya Kishor Swasthya Karyakram (RKSK)
12. Disaster Management – Containment, Control and Prevention of Epidemics and Pandemics – Acts, Guidelines and Role of Government and Public

Unit III: Hygiene

10 Hrs.

13. Hygiene – Definition; Personal, Community, Medical and Culinary hygiene; WASH (Water, Sanitation and Hygiene) programme
14. Rural Community Health: Village health sanitation & Nutritional committee (Roles & Responsibilities); About Accredited Social Health Activist (ASHA); Village Health Nutrition Day, Rogi Kalyan Samitis
15. Community & Personal Hygiene: Environmental Sanitation and Sanitation in Public places
16. Public Awareness through Digital Media - An Introduction to Mobile Apps of Government of India: NHP, Swasth Bharat, No More Tension, Pradhan Mantri Surakshit Mantritva Abhiyan (PM Suman Yojana), My Hospital (Mera aspataal), India fights Dengue, JSK Helpline, Ayushman Bhava, Arogya Setu, Covid 19AP

REFERENCES

- Bamji, M.S., K. Krishnaswamy & G.N.V. Brahmam (2009) *Textbook of Human Nutrition(3rd edition)* Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
- Swaminathan (1995)*Food & Nutrition*(Vol I, Second Edition) The Bangalore Printing &Publishing Co Ltd., , Bangalore
- Vijaya Khader (2000)*Food, nutrition & health*, Kalyan Publishers, New Delhi
- Srilakshmi, B., (2010)*Food Science, (5th Edition)* New Age International Ltd., New Delhi
- Weblinks: <https://nhm.gov.in/>
 - National Rural Health Scheme:
<https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=969&lid=49>
 - National Urban Health Scheme:
<https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=970&lid=137>
 - Village health sanitation & Nutritional committee
<https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=149&lid=225>
 - About Accredited Social Health Activist (ASHA)
<https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=150&lid=226>
 - Village Health Nutrition Day
<https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=152&lid=228>

- Rogi Kalyan Samitis
<https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=153&lid=229>
- Health Impact Assessment - <https://www.who.int/hia/about/faq/en/>
(suggested information only)
http://www.euro.who.int/data/assets/pdf_file/0011/261929/Health-in-Impact-Assessments-final-version.pdf?ua=1
- WASH <https://www.unicef.org/wash/> and
[https://www.unicef.org/wash/files/UNICEF Strategy for WASH 2016 2030.PDF](https://www.unicef.org/wash/files/UNICEF_Strategy_for_WASH_2016_2030.PDF)
- Healthy Living <https://www.nhp.gov.in/healthylivingViewall>

Note: The above web links are from MoHFW, GoI. Teachers can prepare their notes from other resources also.

Dr. V S. KRISHNA GOVERNMENT DEGREE & PG COLLEGE (A),
VISAKHAPATNAM
BSc., ZOOLOGY STREAM
SEMESTER -III GENERAL EDUCATION COMPONENT
TITLE - HEALTH AND HYGIENE

Time : 2 Hours

Marks: 50

BLUEPRINT FOR QUESTION PAPER SETTER

UNIT NO. & NAME	SHORT ANSWER QUESTIONS 5 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT - I	02	02	30
UNIT - II	03	02	35
UNIT - III	03	02	35
TOTAL No. of Questions	08	06	
Total marks including choice			100

NOTE: The question paper setters are requested to kindly adhere to the format given in the abovetable.

The question paper setters are also requested to set the questions in the following way.

- a) 80% memory and understanding based
- b) 20% creativity, application, and skill based
- c) Please avoid repetition of questions.

**Dr. V S. KRISHNA GOVERNMENT DEGREE & PG COLLEGE (A),
VISAKHAPATNAM
BSc., ZOOLOGY STREAM
SEMESTER –III GENERAL EDUCATION COMPONENT
TITLE – HEALTH AND HYGIENE**

Time : 2 hours

Marks : 50

I. Answer any FIVE of the following

5x4=20M

Draw labeled diagrams wherever necessary

1. Balanced diet
2. Dietary sources of proteins.
3. Importance of water
4. Vitamins
5. NUHM
6. IDA
7. WASH
8. Swasth Bharath

II. Answer any FIVE of the following:

3x10=30M

Draw labeled diagrams wherever necessary

9. a) Write an essay on dietary sources of lipids and effects of deficiency.

OR

b) Write an essay on dietary sources of carbohydrates and effects of deficiency

10. a) Write an essay on functions of any 4 nutritional and health organisations in India.

OR

b) Write an essay on National Health Policy of Govt. of India.

11. a). Write an essay on sanitation in public places.

OR.

b). Write an essay on NHP, Swasth Bharat, Pradhan Mantri Surakshit Mantritva Abhiyan(PM Suman Yojana) and Arogya Sethu apps.

**Dr. V S. KRISHNA GOVERNMENT DEGREE COLLEGE AND PG
COLLEGE (A), VISAKHAPATNAM**
Revised CBCS w.e.f. 2022-23
SKILL DEVELOPMENT COURSE To be Offered in Semester II
ZOOLOGY STREAM
Syllabus of
DAIRY TECHNOLOGY
Total 30 hrs (02h/wk), 02 Credits & Max 50 Marks

Learning Outcomes:

After successful completion of the course, students will be able to;

1. Understand the pre-requisites for starting a Dairy farm
2. Recognize different breeds of Cows & buffaloes following safety precautions.
3. Prepare and give recommended feed and water for livestock
4. Maintain health of livestock along with productivity
5. Vaccination of cattle, nutrients requirements
6. Entrepreneurship i.e., Effectively market dairy products
7. Ensure safe and clean dairy farm and Standard safety measures to be taken in establishing an industry
8. Efficiently start and manage to establish or develop a Dairy Industry

Section I (Introduction and Establishment of a Dairy Farm):

05

Hrs

- 1.1 Dairy development in India – Dairy Cooperatives (NDRI, NDDDB, TCMPF) (1hr)
- 1.2 Constraints of Present Dairy Farming and Future Scope of Dairy Farmer. (1 hr)
- 1.3 Selection of site for dairy farm; Systems of housing – Loose housing system, Conventional Dairy Farm; Records to be maintained in a dairy farm. (2 hrs)

Section II (Livestock Identification and Management):

13 Hrs

- 2.1 Breeds of Dairy Cattle and Buffaloes – Identification of Indian cattle and buffalo breeds and Exotic breeds; Methods of selection of Dairy animals. (5 hrs)
- 2.2 Systems of inbreeding and crossbreeding. (2 hrs)
- 2.3 Weaning of calf, Castration, Dehorning, Deworming and Vaccination programme (3 hrs)
- 2.4 Care and management of calf, heifer, milk animal, dry and pregnant animal, bulls and bullocks. (3 hrs)

Section III (Feed Management, Dairy Management, Cleaning and Sanitation): 8 Hrs



- 3.1 Basic Principles of Feed, Important Feed Ingredients, Feed formulation and Feed Mixing (2 hrs)
- 3.2 Operation Flood –Definition of Milk and Nutritive value of milk and ICMR recommendation of nutrients –Per Capita Milk production and availability in India and Andhra Pradesh -Methods of Collection and Storage of Milk–Labelling and Storage of milk products (4 hrs)
- 3.3 Cleaning and sanitation of dairy farm – Safety precautions to prevent accidents in an industry. (2 hrs)

Co-curricular Activities Suggested: (4 hrs)

1. Group discussion & SWOT analysis
2. Visit to a Dairy Farm
3. Visit to Milk Cooperative Societies
4. Visit to Feed Milling Plants
5. Market Study and Identification of Government Schemes, Insurance and Bank Loans in relation to dairy farming

Reference books:

1. Dairy Science: Petersen (W.E.) Publisher – Lippincott & Company
2. Principles and practices of Dairy Farm –Jagdish Prasad
3. Text book of Animal Husbandry - G C Benarjee
4. Hand book of Animal Husbandry - ICAR Edition
5. Outlines of Dairy Technology – Sukumar (De) – Oxford University press
6. Indian Dairy Products – Rangappa (K.S.) & Acharya (KT) – Asia Publishing House.
7. The technology of milk Processing – Ananthakrishnan, C.P., Khan, A.Q. and Padmanabhan, P.N. – Shri Lakshmi Publications.
8. Dairy India 2007, Sixth edition
9. Economics of Milk Production – Bharati Pratima Acharya Publishers.
10. <http://www.asci-india.com/BooksPDF/Dairy%20Farmer%20or%20Entrepreneur.pdf>
11. <https://labour.gov.in/industrial-safety-health>

**Dr. V S. KRISHNA GOVERNMENT DEGREE COLLEGE AND PG
COLLEGE (A), VISAKHAPATNAM
SKILL DEVELOPMENT COURSES**

To be Offered in Semester II
Revised CBCS w.e.f. 2022-23

**ZOOLOGY STREAM
Syllabus of
DAIRY TECHNOLOGY**

Time: 11/2 hrs

Max. Marks: 50

BLUEPRINT FOR QUESTION PAPER SETTER

UNIT NO. & NAME	SHORT ANSWR QUESTIONS 5 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT - I	02	02	30
UNIT - II	03	01	35
UNIT - III	03	02	25
TOTAL No. of Questions	08	05	
Total marks including choice			90

NOTE: The question paper setters are requested to kindly adhere to the format given in the above table.
The question paper setters are also requested to set the questions as given in the above blue print.

**Dr. V S. KRISHNA GOVERNMENT DEGREE COLLEGE AND PG
COLLEGE (A), VISAKHAPATNAM**
Revised CBCS w.e.f. 2022-23
SKILL DEVELOPMENT COURSE To be Offered in Semester II
ZOOLOGY STREAM
Syllabus of
DAIRY TECHNOLOGY
Total 30 hrs (02h/wk), 02 Credits & Max 50 Marks

MODEL QUESTION PAPER & PATTERN

Max. Marks: 50

Time: 1 1/2 hrs (90 Minutes)

SECTION A (Total: 4x5=20 Marks)

(Answer any four questions. Each answer carries 5 marks)
(At least 1 question should be given from each Unit)

1.	Conventional Dairy Farm
2.	Dairy development in India
3.	Animal Inbreeding
4.	Deworming
5.	Identification of characters of any Two Dairy cattle
6.	Feed Mixing
7.	Milk Storage Methods
8.	Sanitation of Dairy Farm

SECTION B

(Total: 3x10 = 30
Marks)(Answer any three questions. Each answer carries 10 marks
(At least 1 question should be given from each Unit)

1.	Write an essay on Dairy development in India, its current position and future scenario.
2.	Explain two methods of systems of housing of dairy animals.
3.	List the different methods involved in selection of dairy animals and discuss briefly.
4.	Explain different methods of collection of milk.
5.	Give an account of feed ingredients and feed management required for dairy animals

**Dr. V S. KRISHNA GOVERNMENT DEGREE COLLEGE AND PG
COLLEGE (A), VISAKHAPATNAM**
SKILL DEVELOPMENT COURSE to be Offered in Semester III
Revised CBCS w.e.f. 2022-23
ZOOLOGY STREAM
Syllabus of
POULTRY FARMING
Total 30 hrs (02h/wk), 02 Credits & Max 50 Marks

Learning Outcomes:

By successful completion of the course, students will be able to;

1. Understand the field level structure and functioning of insurance sector and it's role in protecting the risks
2. Comprehend pertaining skills and their application for promoting insurance coverage
3. Prepare better for the Insurance Agent examination conducted by IRDA
4. Plan 'promoting insurance coverage practice' as one of the career options.

SYLLABUS:

Section I (Introduction to Poultry Farming): 10Hrs

- 1.1 General introduction to poultry farming -Definition of Poultry; Past and present scenario of poultry industry in India.
- 1.2 Principles of poultry housing. Poultry houses. Systems of poultry farming.
- 1.3 Management of chicks, growers and layers. Management of Broilers.
- 1.4 Preparation of project report for banking and insurance

Section II (Feed and Livestock Health Management): 10 Hrs

- 2.1 Poultry feed management – Principles of feeding, Nutrient requirements for different stages of layers and broilers. Feed formulation and Methods of feeding.
- 2.2 Poultry diseases – viral, bacterial, fungal and parasitic (two each); symptoms, control and management; Vaccination programme.

Section III (Harvesting of Eggs and Sanitation): 10 Hrs

- 3.1 Selection, care and handling of hatching eggs. Egg testing. Methods of hatching.
- 3.2 Brooding and rearing. Sexing of chicks.
- 3.3 Farm and Water Hygiene, Recycling of poultry waste.



Co-curricular Activities Suggested: (4 hrs)

1. Group discussion & SWOT analysis
2. Visit to a poultry farm
3. Invited Lectures by Concerned officers of government or private farms
4. Cheap and Healthy Feed preparation by students based on government standards
5. Market study and Survey (Monitoring of daily price hike in poultry market and analysis)
6. Online Swayam Moocs course on poultry farming (see reference 9 below)

Reference books:

1. Sreenivasaiah., P. V., 2015. Textbook of Poultry Science. 1st Edition. Write & Print Publications, New Delhi
2. Jull A. Morley, 2007. Successful Poultry Management. 2nd Edition. Biotech Books, New Delhi"
3. Hurd M. Louis, 2003. Modern Poultry Farming. 1st Edition. International Book Distributing Company, Lucknow."
4. Life and General Insurance Management, "
5. Financial services, Tata McGraw hill
6. <http://www.asci-india.com/BooksPDF/Small%20Poultry%20Farmer.pdf>
7. https://nsdcindia.org/sites/default/files/MC_AGR-Q4306_Small-poultry-farmer-.pdf
8. <http://ecoursesonline.iasri.res.in/course/view.php?id=335>
9. https://swayam.gov.in/nd2_nou19_ag09/preview

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COLLEGE (A), VISAKHAPATNAM
SKILL DEVELOPMENT COURSE to be Offered in Semester III
ZOOLOGY STREAM
Syllabus of
POULRY FARMING**

Time: 11/2 hrs

Max. Marks: 50

BLUEPRINT FOR QUESTION PAPER SETTER

UNIT NO. & NAME	SHORT ANSWR QUESTIONS 5 MARKS	ESSAY QUESTIONS 10 MARKS	MARKS ALLOTTED TO THE UNIT
UNIT - I	02	02	30
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SKILL DEVELOPMENT COURSE to be Offered in Semester III
Revised CBCS w.e.f. 2022-23
ZOOLOGY STREAM
Syllabus of
POULTRY FARMING
Total 30 hrs (02h/wk), 02 Credits & Max 50 Marks

MODEL QUESTION PAPER & PATTERN

Max. Marks: 50

Time: 1 1/2 hrs (90 Minutes)

SECTION A (Total: 4x5=20 Marks)

(Answer any four questions. Each answer carries 5 marks (At least 1 question should be given from each Unit))

1.	Poultry house
2.	Broilers
3.	Any two viral diseases of poultry
4.	Any two bacterial diseases of poultry
5.	Any two fungal diseases of poultry
6.	Egg testing
7.	Brooding
8.	Sexing chicks

SECTION B

(Total: 3x10 = 30

Marks)

(Answer any three questions. Each answer carries 10 marks
(At least 1 question should be given from each Unit))

1.	Discuss briefly the past, present and future scenario of poultry farming industry in India.
2.	Explain principles of poultry housing in detail, with examples.
3.	Write an essay on nutritional requirements in poultry.
4.	Give an account of fungal and bacterial diseases (any two each) of poultry
5.	Write an essay on selection, handling and hatching of eggs.