SHIVAJI UNIVERSITY, KOLHAPUR
Revised Syllabus for Bachelor of Science
B. Sc. III – Zoology –To be implemented from June 2010

GENERAL OBJECTIVES OF THE COURSE

A) Aims :

1) To impart the knowledge of animal science to the pupils.

2) To make the pupils to use the knowledge in their daily life.

3) To make the pupils aware of natural resources and environment.

4) Application of knowledge in Zoology for nutrition, agriculture & live stock.

5) To provide practical experiences which form a part of their learning processes.

6) To develop aptitude for scientific work & ability to pursue studies far beyond graduation.

7) To encourage the pupils to take life science as a carrier which is the need now a days.

8) To make the pupils fit for the society.

B) Objectives -

1) To impart knowledge is the basic aim of education. The students are expected to acquire the knowledge of animal science, natural phenomenon, manipulation of nature & environment by man.

2) Understanding the scientific terms, concepts, facts, phenomenon & their interrelationships.

3) Applications of the knowledge.

4) To develop skills in practical work, experiments & laboratory materials, instruments.

5) To develop interests in the subject & scientific hobbies.

6) To develop scientific attitude which is the major objective? This makes the students open minded, critical observations, curiosity, thinking etc.

7) Abilities to apply scientific methods, collection of scientific data, problem solving, organize science exhibitions, clubs etc.

9) Appreciation of the subject, contributions of scientists, scientific methods, scientific programs etc.

5. DURATION

- The course shall be full time course.
- The duration of course shall be three years.

6. PATTERN

Pattern of Examination will be Annual.

10. MEDIUM OF INSTRUCTION:

The medium of instruction shall be in English.

11. STRUCTURE OF COURSE

B.Sc. III – Zoology

Third year – No. of Papers: Four

Sr. No.	Subject	Marks
1.	Zoology Paper- V	100
2.	Zoology Paper- VI	100
3.	Zoology Paper- VII	100
4.	Zoology Paper- VIII	100
5.	Practical – I	50

6.		
7.	Practical – II	50
8.	Practical – III	50
9.	Practical – IV	50
	Total	**600**

12. SCHEME OF TEACHING AND EXAMINATION

Teaching scheme (Hrs/Week)

Sr. No.	Subject/Paper	L	T	P	Total
	Zoology Paper V	3	-	-	
	Zoology Paper VI	3	-	-	
	Zoology Paper VII	3	-	-	
	Zoology Paper VIII	3	-	-	12
	Practical I	-	-	5	
	Practical II	-	-	5	
	Practical III	-	-	5	
	Practical IV	-	-	5	20
	Total				**32**

13 SCHEME OF EXAMINATION

Question paper will be set in the view of the / in accordance with the entire syllabus and preferably covering each unit of
syllabi.

14. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS (FOR REVISED SYLLABUS)

Refer copy of revised syllabus

✸ **OTHER FEATURES**

1. Required Books, Journals stated in each syllabus of Part I, Part II and Part III Zoology and Fisheries.

A) LIBRARY :

Reference and Text Books, Journals, and Periodicals, Reference Books for Advanced Studies.

B) SPECIFIC EQUIPMENTS: Necessary to run the Course (T.V., L.C.D., and Overhead Projector), (Computer and necessary soft wares , operating systems etc.)

C) LABORATORY SAFETY EQUIPMENTS

• Fire Extinguishers at least two sets in each laboratory. (Lab. area 600 sq.ft.)
• Leakage of gases be avoided.
• Primary medical aid box (First Aid Kit)
• Sugar / Glucose – 500 gm pack: Pinch of sugar and a cup of drinking water in hypoglycemic condition. OR In extreme weakness of student or person concerned.
• Rules of animal ethics should be strictly followed.

✸ **LABORATORY INSTRUCTIONS**

1) Always wear an apron inside the laboratory. Do not wear it outside.
2) Do not drink or eat inside the laboratory.
3) Do not place pencil, fingers or any material in the mouth. Moisten labels with water.
4) Use microscopes and other instruments carefully.
5) Discard all used glassware such as test tube, pipettes, petry-plates, glass slides in a receptacle meant for it.
6) Put cotton plugs, papers, matches, waste dissection material etc. in a waste-paper basket. Do not throw them in sink not leave them on desk or floor.
7) Regard all cultures as pathogenic. Take every precaution against infection.
8) Report all accidents to the instructor immediately.
9) Wash hands thoroughly with soap and water before and after dissection and experiment.
10) Always turn off water, gas and electricity before leaving the laboratory.
11) When students enter in lab. they should have – A Laboratory Journal, pencil and eraser, foot rule, dissection box with dissecting instruments, a small napkin.
12) All drawings must be made with drawing pencil only.
13) As the journal is to represent student's bonafide work during the whole year, student should keep it as clean as possible and
DO NOT LOOSE IT.
14) Students should not forget that unless their journals are certified, they are not allowed to appear for the university examination.

SHIVAJI UNIVERSITY, KOLHAPUR

Revised Syllabus for B.Sc. Ill Zoology
To be implemented from June, 2010

PAPER - V
FUNCTIONAL ANATOMY OF NON-CHORDATES, BIOSTATISTICS, BIOINFORMATICS AND MEDICAL ZOOLOGY.

A) Lectures / Contact hours per unit - 11
B) Contact hours per practical - 05

SECTION - I
FUNCTIONAL ANATOMY OF NON-CHORDATES.

Unit – I

I. Protozoa: (4)

1. Nutrition in Protozoa.
2. Reproduction in Protozoa.

II. Porifera: (2)

1. Canal Systems.

III. Coelenterata: (4)

1. Polymorphism.
2. Corals and Coral reef. .

IV. Salient features of Ctenophora with suitable example (1)

Unit – II

V. Annelida:

Type Study - Leech: - (10)

1. Systematic position.
2. Habits and habitat.
3. Morphology and body wall.-
4. Locomotion.
5. Food, feeding and digestive system.
6. Haemo-coelomic system.
7. Excretory system.
8. Nervous system.
9. Sense organs.
10. Reproductive system, copulation and cocoon formation.
11. Parasitic adaptations,
12. Economic importance of Leech

Unit – III

VI. Arthropoda:

1. Crustacean larvae. - (2)
2. Insect larvae. - (2)
3. Insect metamorphosis and its hormonal control. - (2)
4. Insect collection and preservation (2)

Collection- Swap net and light trap

Preservation- Sun dry and oven dry

VII. Mollusca : - (2)

1. Torsion and Detorsion.

Unit – IV

VIII. Echinodemata:

1. Type study –Sea star. - (8)

a. Systematic position.

b. Habits and habitat.

c. Morphology and body wall.

d. Food, feeding and digestive system.

e. Water vascular system and locomotion.

f. Reproductive system.

g. Nervous system and sense organs.

h. Haemal and perihaemal system.

2. Echinoderm larvae. - (2)

IX. Structure and significance of Tornaria larva. - (1)

X Minor phyla: Salient features of: (3)

1. Bugula 2. Sagitta. 3. Lingula.

Total periods. - (45)

SECTION – II

BIOSTATISTICS, BIOINFORMTICS AND MEDICAL ZOOLOGY.

Unit – V

I) Biostatistics :-

1) Classification – (2)

a) Definition -

b) Collection of data

c) Basis of classification

d) Types of classification.

2) Frequency distribution - (3)

a) Principles of frequency distribution

b) Examples based on grouped data

c) Graphical representation

i) Histogram- equal and unequal classes.

ii) Polygon and frequency curve

iii) Ogive curve.

3) Tabulation – (3)

a) Definition

b) Requirements of a good table

c) Parts of the table

d) Types of tabulation

e) Examples on tabulation

4) Measures of central Tendency – mean, median, mode (4)

Unit – VI

5) Dispersion – Mean Deviation, standard Deviation (2)

6) Correlation – (4)

a) Scatter diagram

b) Types of correlation

c) Correlation coefficient and examples based on

i) Karl Pearson's correlation coefficient

ii) Spearman's Rank correlation coefficient

Unit – VII

II) Bioinformatics :-

1) Study of computer and computer devices (2)

2) Three levels of Bioinformatics in structural Biology (2)

3) Applications of Bioinformatics in life sciences (2)

4) Internet and Web site (1)

Unit – VIII

III) Medical Zoology : –

1) Brief introduction to pathogenic microbes (10)

a) Viruses – Polio virus, Influenza virus, Herpes virus, Rabis, Virus, and HIV.

b) Spirochaetes.

c) Bacteria – Salmonella, Streptococcus, Mycobacterium tuberculosis, Helicobacter pylori.

2) Pathogenic protozoans and their control. (2)

Entamoeba histolytica and Plasmodium vivax.

3) Pathogenic helminthes and their control (2)

Ascaris and Wauchereria

4) Mosquitoes as vector of human diseases and their control- (3)

Malaria, Dengue and Chikungunya

5) Study of following Antibiotics – (3)

origin, chemical nature and action.

Ampicillin and Norphloxin.

Total Periods - (45)

REFERENCE BOOKS :

1. Invertebrate Zoology - (W.B. Saunders Co.) - Barnes R.D.
2. Modern Text Book of Zoology, Invertebrates - R.L.Kotpal.
3. Invertebrate Zoology- E. L. Jordon, S. Chand and Co. New Delhi.
4. Life of Invertebrates - S.N. Prasad, Vikas publishing House, New Delhi.
5. Invertebrate Zoology- P.S. Dhami and J.K. Dhami, R. Chand & Co. New Delhi.
6. A Text Book of Zoology Invertebrates, Parker and Haswell, edited by Marshall and Williams, CBS Publishers and Distributors, New Delhi.
7. A Life of Invertebrates- Russell & Hunter.
8. Practical Zoology, Invertebrates- S.S. Lal.
9. Infotechnology- S. Chand and Co.
10. Bioinformatics- Murti, Himalaya Publications.
11. General Parasitology- Cheng, T.C. Academic Press.
12. Medical Parasitology- Dey and Dey, Allied Agency, Kolkata.

13. Parasitology- K. D. Chaterjee, Chaterjee Medical Publication, Kolkata.
14. Parasitotogy-Chandler, Allied Agency, Kolkata.
15. Essentials of Parasitology - Gerald D. Smidth.
16. Economic Zoology- Shukla and Upadhyay.
17. Medical Zoology - R. C. Sobti, Shoban Lal & Co.
18. An Introduction to bioinformatics- S. Sundar rajan & R. Balaji- Himalaya Publishing house, Delhi.
19. Z S I publications.

PAPER- VI
COMPARATIVE ANATOMY OF CHORDATES & DEVELOPMENTAL BIOLOGY.

A) Lectures / Contact hours per unit - 11
B) Contact hours per practical – 05

SECTION -1
COMPARATIVE ANATOMY OF CHORDATES

Unit – I

I. **Integument** and its derivatives. (7)

II. **Endoskeleton** –Vertebral column and Appendicular skeleton (6)

Unit – II

III. **Digestive system** – Alimentary canal and associated glands. (5)

IV. **Respiratory system** - Cutaneous respiration, - Gills, Lungs, Air sacs in birds (5)

Unit – III

V. **Circulatory system** - Evolution of heart, Aortic arches and Portal systems. (7)

VI. **Excretory system** - Evolution of kidney and its ducts. (4)

Unit – IV

VII. **Nervous system** - Comparative anatomy of Vertebrate brain. (6)

VIII. **Sense organs**- Comparative anatomy of ear and eye. (5)

Total periods. (45)

SECTION -II
DEVELOPMENTAL BIOLOGY

Unit – V

I. Gametogenesis. (2)

II. Process of fertilization. (2)

III. Types of eggs and cleavages. (3)

IV. Development of Amphioxus upto coelom formation (6)

Unit – VI

V. Ascidian tadpole and retrogressive metamorphosis. (2)

VI. Development of Frog up to three germinal layers and metamorphosis (7)

Unit – VII

VII. Development of chick upto 72 hours. (15)

Unit – VIII

VIII. Organizer - Concept and process of induction. (2)

IX. Foetal membranes in chick. (2)

X. Placenta- types and significance. (2)

XI. Cloning - techniques, significance and ethical issues. (2)

Total periods. (45)

REFERENCE BOOKS –

1. An Introduction to Embryology 1981, Balinsky B.L., Saunders College, Philadelphia.

2. Developmental Biology; Patterns/Principles/Problems, 1982, Saunders J. W. Collier MacMillan, Publishers, London.

3. Developmental Biology, 1997, 3rd Edition, Gilbert S.F. Saunder Associates Inc. U.S.A.

4. Developmental Biology, 1992 3rd edition, Browder L.W. Erickson C.A. & Williams, R J. Saunders College, Publications, London.

5. A Text Book of Embryology, Dr. Puranik P. G., S. Chand & Co.

6. Developmental Biology, 1984, Browder L.W. , Saunders College Publicaions, U.S.A.

7. Development of Chick embryo, 1972, Lillie.

8. Developmental Biology, 1991, 3rd Edition, Sinaur Associates, Inc. U.S.A.

9. Outlines of comparative anatomy, Romer & Parsons, Central Book Depot, The Vertebrate Body (Saunders).

10. Biology of Vertebrates Walter & Sayles; (McMillan).

11. Chordate Zoology, P.S. Dhami & J. K. Dhami - R. Chand & Co., New Delhi.

12. Modern Textbook of Zoology, R. L. Kotpal, Rastogi Publications, Meerut.

13. The Life of Vertebrates, 3rd Edition, 1993, J. Z. Young E. L. B.S. Oxford.

14. Chordate Zoology - E.L. Jordan, S. Chand & Co., New Delhi.

15. The Phylum Chordata - 1987, H.H. Newman, Distributor Satish Book Enterprise, Agra.

16. Comparative Anatomy of the Vertebrates G. C. Kent.

PAPER - VII
PHYSIOLOGY, ENDOCRINOLOGY, ENVIRONMENTAL BIOLOGY AND TOXICOLOGY.

A) Lectures / Contact hours per unit - 11
B) Contact hours per practical - 05

SECTION -1

PHYSIOLOGY

Unit – I

I. **Nutrition** - 1. Nutritional requirement & balanced diet - (5)
2. Digestion and absorption.

II. **Metabolism-** (6)

1. Carbohydrate metabolism:- Glycogenesis, Glycogenolysis, Glycolysis, Kreb's cycle and Gluconeogenesis
2. Protein metabolism: - Transamination, Deamination.
3. Lipid metabolism. (B- oxidation hypothesis)

III. **Vitamins** - Water soluble -B -Complex and C. Fat soluble- A, D, E and K. With reference to source, role and deficiency. (4)

Unit – II

IV. **Respiration** - 1. Transport of respiratory gases (4)
2. Chemical and nervous regulation of Respiration

V. **Circulation** -1. Origin and conduction of heart beat. Cardiac cycle (7)
2. ECG, Blood pressure, Capillary pressure and Regulation

Unit – III

VI. **Excretion** -1. Structure of nephron & Physiology of urine formation. (4)
2. Composition of normal urine
3. Dialysis

VII. **Muscle** 1. Ultra structure of striated muscle 6)
2. Molecular mechanism of muscle contraction.

Unit – IV

VIII. **Nerve** 1. Ultra structure of neuron (7)
2. Origin and conduction of nerve impulse.
3. Synapse and synaptic transmission.

IX. **Stress** Physiological response to body exercise and yoga with reference to circulation and respiration. (2)

Total periods. (45)

SECTION – II

ENDOCRINOLOGY, ENVIRONMENTAL BIOLOGY AND TOXICOLOGY

Unit – V

I. Endocrinology:- (14)

1. Study of endocrine glands – Anatomy and Histology.
Hormones – Nature, role, regulation and disorders with reference to the following :- Thyroid gland, parathyroid, Adrenal gland and islets of Langerhans.

Unit – VI

2. Hormone receptors and Mechanism of hormonal actions (2)
3. Prostaglandins. (2)
4. Neurohormones- GnRH, CRH, TRH, Dopamine, Orexine (2)

Unit – VII

II. Environmental Biology:-

1. Biodiversity and wildlife managements

A. Biodiversity :- (6)

1. Definition and Scope of biodiversity
2. Characterizations
3. Conservation strategies

B. Wild life managements:- National parks and Sanctuaries of India. (6)
Crocodile park, Sanjay Gandhi, Kaziranga, Ragiv Gandhi Snake Park, Jim Corbett Park and Bharatpur, Bandipur, Radhanagari, Tadoba sanctuary

Unit – VIII

5. Characteristics and faunal adaptations with references to following habitat – Freshwater, Marine water and Terrestrial (6)

III. Toxicology : (7)

1. Classification of toxicants.
2. Toxic agents and mode of action – Pesticides, Metals (Hg, Pb, As, Cd) and Mycotoxins.
3. Applications of Toxicology.

Total periods (45)

Reference Books -

1. General and Comparative Physiology – Hoar (Prentice Hall).
2. Animal Physiology- Nelson (Cambridge).
3. Comparative Animal Physiology – Prosser (Satish Book Enterprise).
4. Endocrinology- Hadely
5. General Endocrinology- Bagnara and Turner (W.B. Saunders)
6. Reproductive Cycle – Saidapur S. K. (Allied Publishers)
7. Reproductive Physiology – Nalbandov A. V.
8. Ecology – Odum (Amerind)
9. Limnology – Welch (McGraw Hill)
10. Introduction to Environmental Science- Y Anjaneyulu (B.S. Publications)
11. Animal Physiology – Adaptaion & Environmental- Schiemdt Nielson (Cambridge)
12. Physiology : A regulatory systems approach – Strand F. L. (Mc Millon Publications Co.).
13. Environmental & Metabolic Animal Physiology – Prosser C.L. (Wiley – Liss Inc.).
14. Environment Physiology – Wilment P.G., Stone & Johnsion (Blackwell Science,).
15. Physiological Animal Ecology – Loan G. N. (Longman Harlog,UK)
16. Principles and methods of Toxicology – Hayes (Edited A. Wallae Hayes Publications, Raven Press, N. Y.)
17. Medicine and Toxicology - Parekh

PAPER – VIII
MOLECULAR BIOLOGY, BIOTECHNOLOGY, BIOTECHNIQUES AND APPLIED ZOOLOGY.

A) Lectures / Contact Hours Per Unit - 11
B) Contact Hours per Practical - 05

SECTION – I
MOLECULAR BIOLOGY, BIOTECHNOLOGY AND BIOTECHNIQUES

Unit – I

I. Molecular Biology :

1. Organization of DNA – Bacterial, Eukaryotic – Heterochromatin, Euchromatin, Centromere, Telomere, Satellite DNA, coding and noncoding sequences. (2)
2. Replication DNA (2)
3. DNA Damage and Repair Mechanism (1)
4. Regulation of gene expression – Operon concept. (2)
5. Genetic Code (3)
   - i) Properties of Genetic Code.
   - ii) Codon assignments

Unit – II

6. A. Protein Synthesis (6)
   - a) Transcription -
   - i) Process of transcription in prokaryotes and Eukaryotes.
   - ii) RNA polymerase.
   - iii) Post transcriptional modifications in RNA
   - b) Translation-
   - i) Initiation
   - ii) Elongation
   - iii) Termination.

B. Gene evolution with reference to glycolytic genes, multicellularity gene and Hox genes (4)

Unit – III

II. Biotechnology:

1. Recombinant DNA Technology (7)
   - i) Restriction enzymes, DNA ligase, DNA polymerase.
   - ii) Cloning vectors.
   - iii) Transformation and Transduction.
   - iv) Construction of Genomic and c-DNA Libraries
   - v) Polymerase Chain Reaction.
   - vi) DNA probes.
   - vii) Southern Blotting.
   - viii) DNA Fingerprinting.
2. Immunological techniques (5)

i) Hybridoma and Monoclonal Antibody.

ii) ELISA.

Unit – IV

3. Applications of Biotechnology in - (3)

Medicine, Animal Husbandry and Agriculture.

4. Human Genome project (2)

III. Biotechniques :

1. Separation Techniques. (4)

i) Chromatography TLC and HPLC.

ii) Electrophoresis – Gel Electrophoresis.

2. Animal Cell Culture. (4)

i) Introduction and Principles

ii) Requirement and Application

iii) Stem cells

iv) Tissue and organ culture

v) Embryo culture. **Total periods - (45)**

SECTION – II

APPLIED ZOOLOGY

Unit – V

I. Fisheries : (12)

i) Economic importance of Fin fishes

ii) Economic importance of Lobster, Crab, Prawn, Mussel & Sepia.

iii) Pearl Culture.

iv) Fishing Crafts and Gears.

v) Fish farming –Construction and Maintenance.

vi) Maintenance of Aquarium and Aquarium fishes.

Unit – VI

II. Economic Entomology:

i) Apiculture - Types and castes (6)

Honey comb

Bee keeping

Economic importance.

ii) Lac culture- Classification (6)

External morphology

Life cycle

Rearing

Importance

Unit – VII

iii) Pest and its Management- (11)

a) Crop pests: - Woolly aphid, white fly, jassids and grasshopper.

b) House hold pests:- Cockroach, silverfish, mosquito

c) Store grain pests:- Rice moth, rice weevil and flour beetle.

d) Biological control

Unit – VIII

iv. Emu farming (3)

i) Feeds
ii) Housing
iii) Management
iv) Food value- Egg and meat
v) Diseases

v. Dog-breeds (3)

i) Breeds
ii) Feeds
iii) Housing
iv) Management
v) Diseases
vi) Economic importance

vi. Goat Farming (4)

i) Breeds
ii) Feeding
iii) Housing
iv) Economic importance.

Total periods (45)

REFERENCE BOOKS -

1. Cell and Molecular Biology, 8th Edition, De. Robertis EDP and De Robertis Jr. EMF, Lippincott Williams and Wilkins,Philadelphia.
2. Cell Biology, C.B. Powar, Himalaya Publication House.
3. Cell and Molecular Biology, EJ. Dupraw, Academic Press, NewYork.
4. Cell Structure and Function - A. G. Loewy, P. Siekevitz, J. R. Meninger & J. A. N. Gallant, Saunder College, Philadelphia.
5. Molecular Biology of the Cell - 3rd Edition, Bruce Alberts, Dennis Bray, Julian Lewis, Martin Raff, K. Roberts & James D. Watson, Garian Publishing, New York.
6. Elements of Biotechnology - P. K. Gupta, Rastogi Publications.
7. Gene V & VI, 1994, Lewin B., Oxford University Press, Oxford.
8. Mollusca - Hyman.
9. Prawn and Prawn Fishery of India - Kurian.
10. Fish Culture - K. H. Alikuhni.
11. Fish Culture - Lagter.
12. Fishes of India. - Khanna.
13. Hand Book of Animal Husbandary and Dairy - Mudlyer.
14. Bee keeping in India - Sardar Sing.
15. Bee Keeping in India- M. G. Smith.
16. Poultry keeping in India - Naidu P.N.M.
17. Poultry Husbandary - M. A. Jule.
18. Poultry Husbandary - Moarthy.
19. Concept of genes- Pearson Edition.
20. Cell and molecular biology- Carp

PRACTICAL - I
FUNCTIONAL ANATOMY OF NON-CHORDATES, BIOSTATISTICS, BIOINFORMATICSAND MEDICAL ZOOLOGY.

Unit - I

I. Dissection and Mountings

LEECH:-

1. Digestive system.
2. Nervous system.
3. Reproductive system.
4. Mountings - Nephridium, Salivary glands and jaws,

Unit - II

II. Dissection and Mountings –

SEA STAR: -

1. Digestive system.
2. Water vascular system.
3. Mounting – Tube foot

III. Lingula -

Mounting of Lophophore & Nephridium

IV. Dissection -

Squilla - Nervous system.

Unit - III

V. Mounting -

Sponge spicules, Spongin fibres and Zooids of Porpita.

VI. Study of Protozoans for locomotion – Amoeba, Paramoecium, Euglena

VII. Study of Canal systems -

T.S. and L.S. of Sycon.

VIII. Study of Obelia, Physalia and any four corals.

IX. Study of following -

1. Crustacean larvae.
2. Insect larvae.
3. Insect pest collection and preservation- any five from surrounding.
4. Echinoderm larvae.
5. Tornaria.
6. Bugula, Sagitta.

Unit - IV

X. Examples on Biostatistics, (Any Ten Examples)

XI. Preparation of Rectal parasites in Frog/Rat/Cockroach.

XII. Study of Pathogens and Vectors.

Entamoeba, Plasmodium, Ascaris, Wauchereria, Mosquito, Pediculus.

XIII. Slides –Female anopheles, Female culex and Female aedes (Demonstration)

XIV. Examples based on bioinformatics, amino acids and nucleotide sequence.

XV. Study Tour/Excursion -

Visit to seashore/Water reservoir/Bird sanctuary/Animal sanctuary to study Animal Biodiversity. Report of tour should be submitted at the time of practical examination.

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PARCTICAL - II
COMPARATIVE ANATOMY OF CHORDATES & DEVELOPMENTAL BIOLOGY.

Unit – I

I. Dissection of cranial nerves of Scoliodon

II. Dissection of Neck nerves of Rat.

III. Dissection of Membranous labyrinth of Scoliodon

Unit – II

IV. Dissection of Eye muscles and nerve innervations of Scoliodon and Pigeon / Chick.

V. Dissection of Brain of Rat.

VI. Temporary stained preparations of

Scales -Placoid, Cycloid and Ctenoid.

Columella - Pigeon/ Fowl.

Ear ossicles - Rat.

Unit – III

VII. Study of Eggs -Insect, Amphioxus, Frog and Chick.

VIII. Study of Cleavage, Blastula and Gastrula - Amphioxus and Frog.

IX. Study of Ascidian tadpole and Stages of Metamorphosis in Frog.

X. Study of Whole mounts and T.S. of 13, 18, 24, 33, 48 and 72 hrs chick embryos.

XI. Temporary / Permanent preparation of Chick embryo.

Unit – IV

XII. Study of following. ...

1) V.S. of skin of Vertebrates.
2) Scales - Reptiles.
3) Feathers.
4) Digestive system – Scoliodon, Labeo, frog, calotes, pigeon, Rat.
5) Gill of Fishes and Lungs of Amphibian, Reptiles, Birds and Mammals.
6) Hearts of Vertebrates.
7) Brains of Vertebrates.
8) Types of vertebrae based on centrum.
9) Pectoral and pelvic girdles in the vertebrates.

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PRACTICAL - III
PHYSIOLOGY, ENDOCRINOLOGY, ENVIRONMENTAL BIOLOGY AND TOXICOLOGY.

Unit – I

I. Interpretation of ECG

II. ESR- Erythrocytes Sedimentation Rate

III. Estimation of O_2 consumption in aquatic animals by Winkler's method (Fish/ Crab).

IV. To determine the plasma volume of whole blood by centrifugation method.

Unit – II

IV. Estimation of hemoglobin.

V. Total count of R.B.C., W.B.C. and differential count.

VI. Measurement of blood pressure and heart beat under normal and stress condition.

VII. Measurement of lung capacity.

VIII. Endocrine glands (Anatomy and Histology) - Testis, Ovary, Adrenal, Thyroid, Pancreas.

Unit – III

IX. Estimation of CO2, O2, B O D and COD.

X. Testing of hardness of water.

XI. Study of animals in relation to their habitats.

1. Lotic - Mystus vittatus (Cat fish)
2. Lentic - Any carp
3. Pelagic - Puffer fish.
4. Benthic - Lobster.
5. Grass land - Stick insect.
6. Desert - Phrynosoma.

Unit – IV

XII. Qualitative analysis of phytoplankton's and zooplanktons- any suitable ecosystem

XIII. Any suitable project to be selected by student (Two students per project) under the guidance of teacher and report is to be submitted at the time of practical examination.

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PRACTICAL - IV
MOLECULAR BIOLOGY, BIOTECHNOLOGY, BIOTECHNIQUES AND APPLIED ZOOLOGY.

Unit – I

I. Whole mount permanent preparation - (Protozoans, sponge spicules, sponge fibres, Coelenterate colony, planktons, insect larvae, echinoderm larvae, crustacean larvae, fish scales, feathers, filoplume and down)

II. Microtomy - Preparation of permanent histological slides of organs of frog/ Rat by HE technique.

Unit – II

III. Histochemical techniques:

1. Feulgen Technique,
2. AB Techniques,
3. PAS Technique

(Submission of 10 permanent slides 5HE + 2 Histochemical method + 1 Chick embryo slide + 2 whole mount, at the time of practical examination)

IV. Biotechniques:

1. Chromatography - Separation of Serum protein amino acids by paper Chromatography.
2. DNA / RNA Isolation -
3. Tissue culture / Embryo culture.

V. Cytological preparations:

1. Demonstration of DNA by Feulgen technique.
2. Meiosis in Grasshopper testis or Onion bud.
3. Study of polytene chromosomes to observe puffing, in Chironomous larvae / Drosophila larvae.

VI. Microbiology:

1. Preparation of media and cultivation
2. Staining the microbes with Gram's staining.

Unit – III

VII. Genetic Examples: Trihybrid ratio and Interaction of genes,

VIII. Economic importance of Prawn, Lobster, Crab, Oyster, Mussel and Sepia.

IX. Economic importance of Shark, Pomphret, Oil Sardine, Mackerel, Bombay duck, Eel, Ophiocephalus, Catla, Rohu, Mrigal and Cyprinus.

X. Study of fish by products - fish meal, fish glue, fish liver oil, fish body oil, fish manure and shagreen.

XI Study of different Fishing Crafts and Gears (Models).

Unit – IV

XII. Apiculture - Types and Castes of Bees, Honeycomb, Honey, Bee wax, Pollen basket and sting apparatus of honey bees.

XIII. Pest- Identification and control measures.

a. House hold pest-Cockroach, Silverfish.

b. Crop pests- Woolly aphid, White fly, Jassids.

c. Store grain pests- Rice moth, Rice weevil, Flour beetle.

d.) Lac Culture - Lac

XIV. Poultry Science – Emu birds- photo, Egg/Egg shell and manure.

XV. Study Tour / Excursion.

Visit to fish farm / Apiculture centre /Goat farm / Emu farm / Poultry farm/ Dogarry is compulsory. A report of one of the visits is to be submitted at the time of practical examination.

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Skeleton Paper for Theory Examination.
B. Sc. III zoology Paper V, VI VII and VIII

Times Hours – 3

	Section- I		
Q.1	**Multiple Choice Questions (Ten Questions)**		**Marks 10**
Q.2	**Long answer questions (Attempt any Two)**		
	A		**Marks 10**
	B		**Marks 10**
	C		**Marks 10**
Q.3	**Short Notes (Any Four Out of Six)**		**Marks 20**
	Section- II		
Q.4	**Multiple Choice Questions (Ten Questions)**		**Marks 10**
Q.5	**Long answer questions (Attempt any Two)**		
	A		**Marks 10**
	B		**Marks 10**
	C		**Marks 10**
Q.6	**Short Notes (Any Four Out of Six)**		**Marks 20**
	Total Marks -		**100**

Skeleton paper for practical examination

Practical -1:		**Marks**
Q.I:	Major Dissection	12
Q.2:	Minor Dissection -	6
Q.3:	Temporary Mounting	4
Q.4:	Identification	10
Q.5:	Biostatistics example/Bioinformatics example	6
Q.6:	Excursion Report and viva-voce	7
Q.7:	Journal	5
	Total -	**50**
Practical -II:		
Q.I:	Major Dissection	12
Q.2:	Minor Dissection	8
Q.3:	Temporary Mounting	5
Q.4:	Identification	10
Q.5:	Mounting of Chick embryo	10
Q.7:	Journal	*5*
	Total -	**50**
Practical - III:		
Q.I:	Physiological experiment	10
Q.2:	Hemoglobin percentage / Blood Cell counts Measurement of lung capacity	6
Q.3:	Ecological experiment. (Ecological pyramid)	4
Q.4:	Ecological experiment. (Estimation) -	7
Q.5:	Identification	5
Q.6:	Project	8
Q.7:	Viva-voce	5
Q.8:	Journal	5
	Total	**50**
Practical - IV:		
Q.I:	Microtomy - Histological permanent slide	10
Q.2:	Histochemistry	5
Q.3:	Biotechnique / Cytological preparation/Gram's staining Technique	5
Q.4:	Genetic example	5
Q.5:	Identification -	10
Q.6:	Submission of permanent slides	5
Q.7:	Excursion report	5
Q.8:	Journal	5
	Total –	**50**

B.Sc. III: Zoology Equivalence to old Syllabus:

Old Paper V -	Non-chordates, Btostatistics, Computer Applications and Environmental Science.
New Paper V -	Functional Anatomy of Non-chordates, Biostatistics, Bioinformatics and Medical Zoology.
Old Paper VI-	Chordates and Embryology.
New Paper VI-	Comparative Anatomy of Chordates & Developmental Biology.
Old Paper VII -	Cell Biology, Genetics and Applied Zoology.

New Paper VII -	Physiology, Endocrinology, Environmental Biology and Toxicology.
Old Paper VIII -	Comparative Anatomy of Vertebrates, Evolution, Physiology and Biochemistry.
New Paper VIII -	Molecular Biology, Biotechnology, Biotechniques and Applied Zoology.