Sadguru Gadage Maharaj College

Karad (Autonomous)

Under

Choice Based Credit System
(CBCS)

B.Sc. Part II Zoology

Semester III

Paper V: Animal Diversity II

Paper VI: Biochemistry

Semester IV

Paper VII: Reproductive Biology

Paper VIII: Applied Zoology

Syllabus implemented from June 2023-2024

Sadguru Gadage Maharaj

College Karad

(Autonomous)

Syllabus for Bachelor of
Science Part II

I) Title: Zoology

II) Year of Implementation: 2023-2024

III) Structure of Course:

1. Structure of Syllabus:

B.Sc. – II **Semester –III**

Sr. No.	Course Title	Theory			Practical		
		Paper No.& Paper Code	No. of lectures Per week	Credits	Course Title	No. of lectures per week	Credits
1	Zoology	Paper-V: BZT22-301	3	2		8	4
		Paper-VI: BZT22-302	3	2			

B.Sc. – II **Semester –VI**

Sr. No.	Course Title	Theory			Practical		
		Paper No.& Paper Code	No. of lectures Per week	Credits	Course Title	No. of lectures Per week	Credits
1	Zoology	Paper-VII: BZT22-401	3	2	**BZP22-403** Practical: I based on BZT22-301 &302 Practical-II: based on BZT22-401 &402	8	4
		Paper-VIII: BZT22-402	3	2			

Note: B: B. Sc. T=Theory and P= Practical

Evaluation Structure: B. Sc. II Sem-III & IV (Zoology)

Semester	Paper No.& Code	ESE	Internal Exam		Paper No. & Code	Practical			Total
			ISE I	ISE II		Exam	Journal	Day to Day Performance	
III	Paper V :BZT22-301	40	5	5	-	-	-	-	**100**
	Paper VI :BZT22-302	40	5	5	-	-	-	-	
	Total	**80**	**10**	**10**	**Total**				**100**
IV	Paper VII BZT22-401	40	5	5	BZP22-403 Practical: I based on BZT22-301 & 302 Practical-II: based on BZT22-401 & 402	35	10	5	**100**
	Paper VIII BZT22-402	40	5	5		35	10	5	**100**
	Total	80	10	10	**Total**	70	20	10	**200**
Total of Sem. III &IV		160	20	20	**Total**	70	20	10	**300**

III[rd] Semester – Number of papers 2

B.Sc. II Zoology
Second Year – Number of papers II

Paper V:
Animal Diversity II

Paper VI:

Biochemistry

IV[th] Semester – Number of papers 2

B.Sc. II Zoology
Second Year – Number of papers II

Paper VII:
Reproductive Biology

Paper VIII:
Applied Zoology

BZP22-403
Practical- I: based on BZT22-301 & 302
Practical-II: based on BZT22- 401 & 402

ZOOLOGY
PAPER V
BZT22-301 (ANIMAL DIVERSITY-II)

Theory: 36 hrs. (45 lectures of 48 minutes)

Marks-50 (Credits: 02)

Learning Objectives:

1. To acquire knowledge of biology in diversity of organism.
2. Students will be able to explain and apply the fundamental concepts of animal diversity.
3. Students will be able to communicate scientific information
4. Students should able to explain characteristics and classification.

Unit 1:

Protochordates: **(5)**

General features and Retrogressive metamorphosis in Ascidian tadpole (Eg. Herdmania)

Agnatha: **(5)**

General features of Agnatha and classification of cyclostomes up to classes.

Pisces: **(6)**

General features and Classification up to order: Swim bladder, Breeding and parental care in fishes

Amphibia: **(7)**

General features and Classification up to order: Neoteny and Parental care in Amphibia (Order:Anura, Apoda, Urodela) Icthyophis

Unit 2:

Reptiles: **(7)**

General features and Classification up to order: Venomous and non-venomous snakes, Biting mechanism in snakes. First Aid Treatment, Sources of treatment (Govt. hospitals) Information of Haffkin institute.

Aves: **(7)**

General features and Classification up to order: Brain of fowl, Aerial Adaptations in birds (Morphological, Anatomical and Physiological).

Mammals: **(8)**

General features and Classification up to order: Study of Adaptive radiations in mammals, (Duck Billed Platypus, Kangaroo, Bottle nose Dolphin, Blue Whale, Scaly ant eater, Spiny ant eater)

Learning Outcomes:

1. Students should learn about classification and general characters of animals.
2. Students should will learn difference between venomous and non-venomous snake.
3. Student should learn to apply treatment for snake bite.
4. Students should learn to classify animal's upto orders.

References:

1. Chordate Zoology-Jhordan & Verma – (Unit 1)

2. Chordates- V.S.Verma- S.Chand Publication- (Unit 1)

3. Vertebrate Zoology- P.S.Dhami- S.Chand Publication (Unit 1 & 2)

4. Modern textbook of Zoology- Vertebrates 2nd edition- R.L.Kotpal –Rastogi Publication (Unit-2)

5. Zoology of chordates- Nigam- (Unit 1)

6. Fundamental of Zoology-Verma and Dudhane (Unit 2)

7. Practical Zoology –Vertebrates-R.L.Kotpal (Unit 1,2)

8. Mannual of Practical Zoology –Chordates-P.S.Verma (Unit 1)

9. Textbook of Zoology- S.S.Lal (Unit 1,2)

10. Vertebrate Zoology –R.L.Kotpal (Unit 1,2)

B. Sc. Part II Semester- III

ZOOLOGY

Paper-VI

BZT22-302 (BIOCHEMISTRY)

Theory: 36 hrs. (45 lectures of 48 minutes)

Marks-50 (Credits: 02)

Learning Objectives

1. Students will be able to acquire the specialized knowledge relevant to biochemistry.
2. Students will be able to demonstrate and understanding the biochemical principles.
3. Students will be able to understand basic laboratory technique in both chemistry and biology
4. Students will be able to apply the scientific method to the experiments.

Unit 1:

Water: Molecular structure of water, Properties of water and Significance of water **(5)**

Unit 2.

Nucleic acids:

1. **DNA and RNA**.Types ,Structure and functions **(5)**
2. **Carbohydrate Metabolism:** Classification, Glycolysis, Krebs cycle, (**10)** Pentose Phosphate Pathway, Gluconeogenesis, Biological Significance. Metabolic disorders of Carbohaydrate metabolism (Diabetes mellitus)

Unit 3:

Lipid Metabolism: (8)

Classification and β oxidation of palmitic acid, Biological Significance.

Lipid profile disorder (Obesity)

Protein metabolism: (8)

Classification, Transamination, Deamination and Urea Cycle, Biological Significance. Disorders of Protein Metabolism (Common any two)

Enzymes: (9)

Introduction (Classification and structure), Mechanism of enzyme action, BiologicalSignificance, serum glutamic-oxaloacetic transaminase (SGOT), serum glutamate pyruvate transaminase (SGPT) tests.

Learning Outcomes:

1. Students should understand properties and significance of water.
2. Student should learn interaction and interdependence of biochemical process.
3. Student should know about synthesis of proteins, lipids and role in metabolic pathway.
4. Students should understand types of enzymes and their mechanism.

References:

1. Biotechnology and biochemistry- U.Sattyanarayana (Unit 3&4)

2. Elements of Biochemistry- H.S.Shrivastava- (Unit 1)

3. Animal Physiology and Biochemistry- Agarwal (Unit 2& 3)

4. Textbook of Biochemistry-Arumugam (Unit 2,3)

5. Cell biology,Genetics,Molecular biology and Evolution-P.S.Verma (Unit 1,2,3)

6. Textbook of Biochemistry-Dubey (Unit 2,3)

7. Molecular biology of Gene-Lewin (Unit 2,3)

8. Bichemistry by Lehninger(Unit 1,2,3)

9. Elements of Biochemistry- Kohnstuff(1,2,3)

10. Concept of Biochemistry –Martin (Unit 1,2,3)

11. Medical Chemistry –Sood and Sood(Unit 2,3)

12. Biochemistry and Molecular biology –Wilson and Walker (Unit 1,2,3)

13. Tools and Techniques of Biochemistry –Twyman (Unit 2,3)

B. Sc. Part II Semester- IV

ZOOLOGY

Paper-VII

BZT22- 401 (REPRODUCTIVE BIOLOGY)

Theory: 36 hrs. (45 lectures of 48 minutes)

Marks-50 (Credits: 02)

Learning Objectives

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1. Students will be able to understand the scientific principles of reproduction.
2. Students will be able to understand human male and female reproductive anatomy.
3. Students will be able to understand role of male and female reproductive hormones.
4. Students will be able to understand modern approach about human infertility.

Unit 1:

Pituitary Gland: Hormones related to reproductive physiology (3)

Functional anatomy of female reproduction: (14)

Ovary: folliculogenesis, ovulation, corpus luteum formation and regression; and Reproductive cycles in human and their regulation, changes in the female tract; Ovum transport in the fallopian tubes; Sperm transport in the female tract, fertilization; Hormonal control of implantation; Hormonal regulation of gestation, Pregnancy diagnosis, Mechanism of parturition and ts hormonal regulation; Lactation and its regulation.

Major disorders of pregnancy: Erythroblastosis foetalis

Miscarriage, Pre-eclampsia and Foetal growth restriction,

Unit 2:

Functional anatomy of male reproduction: (14)

Testis: Cellular functions, germ cell; Spermatogenesis; hormonal regulation; Epididymal function and sperm maturation; Accessory glands functions; Sperm transportation in maletract.

Abnormality, Prostatic hypertrophy, Causes and Types of Infertility

Unit 3: Reproductive Health: (14)

Infertility in male and female: Causes, diagnosis and management

Assisted Reproductive Technology: Sex selection, Sperm bank and laws, frozen embryos,invitro fertilization, Tubal Embryo Transfer (TET), Frozen Embryo Transfer (FET),

Intra Uterine Insemination (IUI), Zygote Intra Fallopian Transfer (ZIFT), Gamete Intra Fallopian Transfer (GIFT), Intra Cytoplasmic Sperm Injection, (ICSI), Modern contraceptive technologies. Menstrual problems, Ectopic pregnancy, Endometriosis, Ovarian Tumors, Ovarian cysts, ovarian torsion, polycystic ovary.

Learning Outcomes:

1. Students will come to know about role of hormones in reproductive system.
2. Students will understand mechanism in female reproductive system.
3. Students will understand mechanism in male reproductive system.
4. Students will be aware about the reproductive health.

References:

1. Human Physiology-Guyton (Unit 1,2,3)

2. The Physiology of Reproduction-Knobil, *et al*. (2014). (4^{th} eds). (Unit 3,4)

3. The Physiology-A.K.Berry (2,3)

4. Human Physiology –Genarld Karp (Unit 1,2,3)

5. Animal Physiology –Mohan Arora (Unit 1,2)

6. Human Physiology –P.S.Verma (Unit 1,2,3)

7. Gynacology-Shaw (Unit 1,2,3)

8. Human Obs.Gynac.-Datta (Unit 1,2,3)

9. Human Anatomy-P.S.Verma (Unit 1,2)

10. Medical Gyanacology –Devid and Mathew(Unit 1,2,3)

B. Sc. Part II Semester- IV

ZOOLOGY

Paper-VIII

BZT22- 402(APPLIED ZOOLOGY)

Theory: 36 hrs. (45 lectures of 48 minutes)

Marks-50 (Credits: 02)

Learning Objectives

1. Students will be able to know host parasitic relationship.
2. Students will be able to know economic importance of Dairy farming.
3. Students will be able to know aspects of poultry farming.
4. Students will be able know economic importance of Lac.

Unit 1:

Introduction to Host-parasite Relationship: (8)

Host, Definitive host, Intermediate host, Parasitism, Symbiosis, Commensalism, Reservoir, Zoonosis (Common Infectious Diseases)

Unit 2:

Epidemiology of Diseases: (8)

Transmission, Prevention and control of diseases: Tuberculosis, Herpes Rickettsia and Spirochetes: Brief account of *Rickettsia prowazekii* and *Treponema pallidum.*

Unit 3:

Insects of Economic Importance: (8)

Biology, Control and damage caused by *Helicoverpa armigera, Pyrilla perpusilla* and *Papilio demoleus, Callosobruchus chinensis, Sitophilus oryzae, Tribolium castaneum*

Unit 4:

Poultry Farming: Indigenous and Exotic breeds **(10)**

Principles of poultry breeding, Management of breeding stock and broilers, Processing and Preservation of eggs. Atomization of Poultry .Poultry Diseases: Coccidiosis, avian Flu, Fowl pox, Botulism, Fowl chlorella

Dairy Farming: (9)

Management of model dairy farming

Common livestock diseases

Nutritive value of Milk products

Lac culture: Life cycle of Lac insect and Economic importance of Lac **(2)**

Learning Outcomes:

1. Students should understand host-parasitic relationship.
2. Students will learn about transmission, control and prevention about diseases.
3. Students should learn about insect biology and control.
4. Student should apply poultry and dairy farming in career.
5. Students will be able to start their own business.

References:

1. Applied Zoology- Dairy Farming –Dr.N.Arumugam- Saras Publication (Unit 4)
2. Textbook on applied entomology. K.P.Shrivastava (Unit 3)
3. Elements of Entomology- Rajendra Singh- (Unit 1,2,3)
4. Applied Zoology by R.L.Kotpal (Uint 1,2,3,4)
5. Economic Zoology by Manju Yadav (Unit 3,4)
6. Economic Zoology –Shailendra Singh (Unit 3,4)
7. Animal Husbundry by Ashok Kumar (Unit 1,2,3,4)
8. Applied Zoology by N. Arumugam (Unit 3,4)

BZP22-403
ZOOLOGY PRACTICAL-I
Marks-100 (Credits: 04)

PRACTICAL-I (Based on Animal diversity-II and Biochemistry of Semester-III).

Learning Objectives

1. To develop scientific attitude which is the major objective, this makes the students open minded, critical observations, curiosity, thinking etc.
2. Abilities to apply scientific methods, collection of scientific data, problem solving, organize science exhibitions, clubs etc.
3. Appreciation of the subject, contribution of the scientists, scientific methods, scientific programmes etc.
4. Applications of the knowledge

Animal diversity-II: Part A

1. **Study of the following specimens with reference to morphological peculiarities andclassification upto orders:**Herdmania, Branchiostoma, Petromyzon, Sphyrna, Pristis, Torpedo,

2. **Study of the following specimens with reference to morphological peculiarities and classification upto orders** Labeo, Exocoetus, Anguilla, Ichthyophis, Ureotyphlus,

3. **Study of the following specimens with reference to morphological peculiarities and classification upto orders** Salamandra, Bufo, Hyla,

4. **Study of the following specimens with reference to morphological peculiarities andclassification upto orders** *Chelone, Hemidactylus, Chamaeleon, Draco, Crocodylus, and Gavialis.*

5 Characters identifyingvenomous and non-venomoussnakes: Russell's viper, Saw scaled viper, Common krait, Indian Cobra, Sea snake, Rat snake and checkered keel back, Sand bow.

6 Study of common birds from any sixdifferent orders.

7. Study of the following specimens with reference to morphological peculiarities and classification up to orders:*Sorex, Pipistrellus pipistrellus*, *Funambulus* and *Nycticebus bengalensis.*

An "**animal album**" containing photographs, cut outs, with appropriate write up about theabove mentioned taxa. Different taxa/ topics may be given to students for this purpose.

6. Dissection of brain of fowl.

7. Temporary preparation of Hyoid apparatus, Sclerotic plate, Pecten of fowl.

8. Temporary preparation of Cycloid, Ctenoid and Placoid scales in fishes.

9. Desert adaptations in reptiles: Phyrenosoma, Chameleon, Crocodile, Wall lizard

10. Review article/work experience /project/visit

Reproductive Biology: Part B

11. Study of animal house: Set up and maintenance of animal house, ,

12. Study of animal house: Breeding techniques

13. Study of animal house: care of normal and experimental animals.

14 Study of stages of estrus cycle through permanent slides.

15 Examination of histological sections from photomicrographs/ permanent slides of rat: Sections of testis, epididymis and accessory glands of male reproductive systems.

16 Examination of histological sections from photomicrographs/ permanent slides of rat: Sections of ovary, fallopian tube, uterus (proliferative and secretory stages), cervix andvagina of female reproductive systems.

17 Sperm count and sperm motility.

18 Study of modern contraceptive devices (Photographs).

19. Visit to gynecology section

20. Awareness regarding population explosion

1. Learning outcomes:-

1. Students will be able to identify organisms up to order level.
2. Students develop the skill of dissection of brain of fowl.
3. Students will be able to identify Characters of venomous and non-venomous snakes.
4. Students understand Ethological peculiarities in desert animals.

Reference Books for Paper V and VI

1. Biochemistry. VI Edition. W.H Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006).

2. Textbook of Medical Physiology, XII Edition, Guyton, A.C. and Hall, J.E. (2011). 3. Evolution. IV Edition.-B.K. and Hallgrimsson, B. (2008

5. Harper's Illustrated Biochemistry. XXVIII Edition. Lange Medical Books/Mc Graw3Hill. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2009).

6. Principles of Biochemistry Nelson, D. L., Cox, M. M. and Lehninger, A.L. (2009

7. Vertebrate life, 8th Edition Pough H. (2008)., 7.Young, J. Z. (2004).. III Edition. Oxford

PRACTICAL-II (Based on Biochemistry and Applied Zoology of Semester-).

Learning Objectives

1. To develop skills in practical work, experiments and laboratory materials, instruments
2. To develop interest in the subject and scientific hobbies.
3. The students are expected to acquire the knowledge of animal science, natural phenomenon, manipulation of nature and environment by man.
4. Understanding the scientific terms, concepts, facts, phenomenon and their interrelationships.

Biochemistry: Part A

1. Qualitative tests of carbohydrates and lipid from given solutions (Glucose, Fructose,Sucrose, Lactose and Lipid).

2. Estimation of total protein in given solutions by Lowry's method/ Quantitative estimationof amino acids by using Ninhydrin reaction.

3. Study of activity of salivary amylase under optimum conditions.

4. DNA isolation from plant/animal.

5. Abnormal constituents of Urine and pathological significance.

6. Estimation of Blood glucose

7. Estimation of Blood Creatinine

8. Estimation of blood Cholesterol9.Estimation of Blood Urea

Applied Zoology: Part B

9. Study of arthropod vectors associated with human diseases: *Pediculus, Culex,Anopheles, Aedes* and *Xenopsylla.*

10. Study of insect damage to different plant parts/stored grains through damaged

Products / photographs.

11. Identifying feature and economic importance of *Helicoverpa* (*Heliothis*) *armigera,Papilio demoleus, Pyrilla perpusilla,*

12. Identifying feature and economic importance of*Callosobruchus chinensis,Sitophilus oryzae* and*Tribolium castaneum.*

13. Poultry: Egg and Meat Nutritive value
14. Poultry diseases-

15. Dairy: Nutritive value of Milk Products: Curd, Buttermilk, Ghee, Paneer, Cheese
16. Life cycle of lac insect.

17. Economic importance of Lac.
18. Field trip to poultry farm or animal breeding center or any other suitable placerelated to Syllabus. Submission of Tour report (Printed/Hand writings).

Learning outcomes:-

1. Students will be able to acquire the knowledge of applied Zoology for the development own business (Income generation).
2. The students will be able to identify organisms in their own habitat with the help of study tour.
3. Calculate nutritive value of required daily food.
4. Students will study the vectors of human disease.

Reference Books

1. Medical Parasitology. II Ed Arora, D. R and Arora, B. (2001)..

2. Agricultural Pests of India and South East AsiaAtwal, A.S. (1986)

3. Reproduction in Mammals. Austin, C.R. and Short, R.V. (1982).

4. The Insects: Structure and Function.IV Edition-Chapman, R.F. (1998)., 5.Dennis, H. (2009). Agricultural Entomology. Timber Press (OR).

6. Endocrinology. W.B. Saunders and Company-Degroot, L.J. and Jameson, J.L. (2010).

7. Aquaculture and Fisheries Biotechnology Genetic Approaches Dunham R.A. (2004)..

8. Reproduction in Farm Animals. Hafez, E. S. E. (1962).

9. The Physiology of Reproduction Knobil, *et al*. (2014). (4^{th} eds

10. Preventive and Social Medicine. XVI Edition Park, K. (2007).

11. Entomology and Pest Management.Pedigo L.P. (2002).