DETAILED CURRICULUM B. Sc. Sem. – I ZOOLOGY

SEMESTER PATTERN :

- The Course content has been designed on **Semester pattern**.
- The workload for Theory & Practicals is allotted on Semester pattern.
- There shall be **01 Theory papers 70 marks each** of 2.5 Hours duration.
  [70+30 marks Internal =100marks]
- Zoology Practical Examination shall be of 100 **marks** of 3.0 **hours duration** in University Examination.
- There shall be **Two Semesters** in an academic Year. (Semester-1 & 2)

SEMESTER-I

Paper No.	Name Of The Paper	Total Marks Ext.+Int* = Total	Passing Standarad Ext.+Int = Total	Total Teaching Hours	Exam Hours	Credits
ZOO-CC-103	Diversity of Life, General Morphology and functional anatomy, Genetics and Animal Biotechnology, Histology and Environmental Biology.	70+30 =100	28+12=40	15 WEEKS X 4 HOURS =60	2.5	04
ZOO-CC-104	Zoology practical	100	40	15 WEEKS X 6 HOURS =90	03	06

INTERNAL MARKS : 30

Test	15 Marks
Assignment/Presentation:	10 Marks
Seminar/Attendance	05 Marks
TOTAL	**30 Marks**

DETAILED CURRICULUM B.Sc. Sem. I ZOOLOGY

Paper No: Zoology ZOO–CC-103 Code: 20463

Title of the Paper: Diversity of Life, General Morphology and functional anatomy, Genetics and Animal Biotechnology, Histology and Environmental Biology.

Credits: 04 Marks: 70

Marks: Semester End Examination: 70Marks

Internal : 30 Marks

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
1	**A Diversity of Life** **Classification of the following animals up to the classes:** ➢ Classification of phylum Protozoa with examples. ➢ Classification of phylum Porifera with examples. ➢ Classification of phylum Coelenterata with examples. ➢ Classification of phylum Platyhelminthes with examples. ➢ Classification of phylum Nemathelminthes with examples. ➢ Classification of Protochordata (Hemichordata, Cephalochordata, Urochordata) up to classes with Examples. ➢ Classification of Chondricthes, Ostricthes, up to sub classes with examples. **B Adaptations.** ➢ Terrestrial. ➢ Aquatic Primary and Secondary. ➢ Arboreal. ➢ Fossorial (Borrowings). ➢ Volant : Active flight and Passive Flight.	15	18
2	**General Morphology and functional anatomy:** **Hydra:** • Different methods of locomotion. • Different methods of Reproduction. • Body wall. • Cnedoblast. **Liver fluke** • External character. • Body wall. • Digestive system. • Nervous system. • Excretory system. • Reproductive system. **Life cycle:** Liver fluke • Fertilized egg. • Miracidium larva	15	18

	• Sporocyst. • Radia larva. • Cercaria. • Metacercaria. • Adult Liver fluke • Parasitic adaptation of liver fluke.		
3	**Genetics and Animal Biotechnology.(Animal cell culture)** **(A) Genetics** - Introduction to Gene - Introduction to Mendelian laws of Heredity - Monohybrid and dihybrid cross. - Incomplete dominance (e.g. Mirabilis Jalapa). - Co dominance (e.g. Roan cattle). - Multiple allels e.g. ABO blood group in humans - Rh factor- Erythroblastosis foetalis. - Polygenic inheritance (e.g. skin colour in humans). - Lethal Genes (e.g. yellow coat colour in mice, thalassemia). **(B) Animal Biotechnology:** - Brief introduction & Definition - Fields of animal biotechnology - Some lab. Facilities needed for setting up a tissue culture laboratory - Glass wares - Autoclave - pH meter	15	17
4	**A Study of mammalian Tissue system.** **Histological structure of the following organs:** ➢ Stomach. ➢ Intestine. ➢ Liver. ➢ Pancreas. ➢ Kidney. ➢ Smooth Muscles. ➢ Skeletal Muscles. ➢ Cardiac Muscles. **B Pollution:** **A brief account of :** - Air pollution - Water pollution - Soil pollution - Noise pollution - Plastic pollution	15	17

DETAILED CURRICULUM B. Sc. Sem. I ZOOLOGY

Paper ZOO-CC-104 **Code:** 20464

Title of the Paper: Zoology Practical

Credits: 06

Marks: Semester End Examination: 100 Marks

DETAILED CURRICULUM FOR PRACTICAL

[Based on paper ZOO-CC-103]

Dissection is not performed in ref. to: UGC's D.O. Letter No.:F.1-80/2006 (Secu.) dated: 31/10/06

All the topics of the practicals are being taught by Models, Charts, Figures, Slides and computer animations.

Students have to prepare their Practical journals of Zoology for Laboratory work and they have to submit certified journals in the University practical exams. Students are not allowed in the laboratory without certified journals in the University practical examination.

There shall be Local Excursion/ Camp for the awareness to the* Biodiversity *and conservation.

Detailed Syllabus for Zoology practical
Practical-1A To Study various components of compound microscope.
Practical-1B To Study Bacteria and typical animal cell.
Classification of the following animals up to the classes:
Practical –2A Classification of Phylum Protozoa.
Protozoa : Amoeba, paramecium, euglena, Arcella cerratium Plasmodium, Opalina
Practical – 2B Classification of Phylum Porifera to Coelenterata.
Porifera : Grantia, Hylonema, leucosolenia.
Coelenterata: Hydra, Sea-anemone, Jelly fish, physalia, Rhizostoma, Gorgonia, Coral.
Practical–3A Classification of Phylum Platyhelminthes and Nemathelminthes.
Platyhelminthes : Liver fluke, Planaria, Tapeworm.
Nemathelminthes: Guinea worm, Ascaris (Male & Female), Filaria.
Practical-3B Classification of Protochordata and Cyclostomata.
Protochordata: Ascidia, Amphioxus, Balanoglosus.
Cyclostomata: Lamprey.
Practical-4A Classification of super class Pisces (up to sub class):
: Scoliodon, Electric ray, Eel, Ophiocephalus, Sea horse.
Practical-4B To Study life history of Hydra.
Practical-5A To Study life history of Liver fluke.
Practical-5B Histological studies of the followings, mammalian tissues with the help of permanent slides: 1. Stomach. 2. Intestine. 3. Liver. 4. Kidney
Practical-6A Histological studies of the followings, mammalian tissues with the help of permanent slides: 1. Pancreas. 2. Smooth muscles. 3. Skeletal muscles. 4. Cardiac muscles.

Practical-6B Ecological adaptations.

Aquatic:1 Fresh water : Vorticella, Spongilla, Hydra, Pila, Ophiocephalus.

2. marine water: Noctiluca, Sea anemone, Aranicola, Loligo, Neries, Megalopa - larva, Chiton, Mudskipper.

3. Deep sea: Sole fish, Chimera.

Practical-7A Ecological adaptations.

Terrestrial : Toad, Jackal.

Arboreal : Chameleon, Parrot, Draco.

Fossorial : Phrynosoma, Snake.

Volant : Bat, Crow.

Practical-7B Study of ABO blood group and Rh factors.

Practical-8A Study of human Blood cell (RBC, WBC and Platelets).

Practical-8B Genetic problem: Dominant alleles.

Practical-9A Genetic problem: Incomplete dominance**.**

Practical-9B Genetic problem: Co dominance**.**

Practical-10A Genetic problem: Polygenic inheritance.

Practical-10B Genetic problem: Lethal gene.

Practical-11B Genetic problem: Multiple alleles.

Practical-12A Mendel's dihybrid ratio.

Practical-12B To detect the pH from various sample.

Practical-13 Local excursion.

TEXT BOOKS RECOMMENDED FOR PAPER ZOO-CC-103 & ZOO-CC-104

1. Text book of Zoology R. D. Vidyarthi
2. Animal Ecology S.P.Singh
3. Genetics. P.K. Gupta
4. Ecology Sarus Publication
5. Pranishastra (Gujarati) Ravi Prakashan\
6. Jiv Vignan-2 (Gujarati) Nirav Prakashan
7. A Text Book of General Biology Tomer & Singh
8. Modern Text Book of Zoology(vertebrate) R.L.Kotpal
9. Modern Text Book of Zoology(invertebrate) R.L.Kotpal
10. Concept of Ecology N.Arumugam
11. Economic Zoology G.S.Shukla & V.B.Upadhyay
12. Pruthvanshi Praniyo ane Garbhvidya (Gujarati) A.B.Vyas
13. Utkrushtha Aprushthvanshi Praniyo (Gujarati) U.M.Rawal
14. Invertebrate Zoology E.L.Jordan & P.S.Verma
15. Prani Auotiki (Gujarati) Desai and Akhunji
16. Cell biology Genetics and Molecular Biology V.B. Rastogi
17. Molecular Biology and Genetic Engineering Saras Publication.
18. Cell and Molecular Biology Saras Publication.
19. Animal Diversity. Cleveland P. Hickman, Larry S Roberts, Susan L.

Keen, Allan Larson, David Eisenhour. McGraw-Hill Higher Education, 2008.

20. Animal Diversity. Diana R. Kershaw. University Tutorial Press, 1984.
21. Animal Diversity: A Textbook ofInvertebrate Zoology. Eylers. Mosby, Incorporated, 1991.
22. Laboratory Studies in Animal Diversity. Cleveland P. Hickman, Lee B. Kats. McGraw-Hili Higher Education, 2008.
23. Digital Zoology: Version 2.0 CD-RO Mand Student Workbook. Jon G.Houseman. McGraw-HilI, 2003.
24 Laboratory Studies- in Animal Diversity. Cleveland P. Hickman, Lee B. Kats,William C. Ober. McGraw-Hill, 2006.
25. Glencoe Science Modules: Life Science, Animal Diversity, Lucy Daniel, Dinah Zike. McGraw-Hill, Student Edition. 2007
26. Invertebrate Zoology: A Functional Evolutionary Approach. Edward E. Ruppert, Richard S. Fox, Robert D. Barnes. Thomson-Brooks/Cole, 2004.
27. Invertebrate Zoology: A Laboratory Manual. Robel1 L. Wallace, Walter Kingsley Taylor. Prentice Hall, 2002.
28. Vertebrate Zoology: An Experimental- Field Approach. Nelson G. Hairston. Cambridge University Press, 1994.

DETAILED CURRICULUM B. Sc. Sem.: II ZOOLOGY

SEMESTER-II

Detailed syllbus

B.Sc. Year: First Semester: II

Paper No.	Name Of The Paper	Total Marks Ext.+Int* = Total	Passing Standarad Ext.+Int = Total	Total Teaching Hours	Exam Hours	Credits
ZOO-CC-203	Diversity of Life, Cytology, Genetics, Animal biotechnology, Pathology, Ecology and Economic Zoology.	70+30 =100	28+12 =40	15 WEEKS X 4 HOURS =60	2.5	04
ZOO-CC-204	Practical	100	40	15 WEEKS X 3 HOURS X 02 DAYS=90	03	06

INTERNAL MARKS : 30

Test	15 Marks
Assignment/Presentation:	10 Marks
Seminar/Attendance	05 Marks
TOTAL	**30 Marks**

DETAILED CURRICULUM B. Sc. Sem. II ZOOLOGY
Detailed syllbus

B.Sc. Year: First Semester: II

Paper ZOO-CC-203 **Code:** 20613

Title of the Paper: Diversity of Life, Cytology, Genetics, Animal biotechnology, Pathology, Ecology and Economic Zoology.

Credits: 04 Marks: 70

Marks: Semester End Examination: 70Marks

Internal : 30 Marks

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
I	**Diversity of Life** ➢ Classification of phylum Annelida with examples. ➢ Classification of phylum Arthropoda with examples. ➢ Classification of phylum Mollusca with examples. ➢ Classification of phylum Echinodermata with examples. ➢ Classification of Chordata (Amphibia, Reptile, Aves and Mammals) up to sub classes with examples. ➢ General Morphology and functional anatomy of Earth Warm: ➢ External character. ➢ Body Wall, ➢ Digestive system, ➢ Reproductive system, ➢ Nervous systems, ➢ Septal Nephridia, ➢ Blood Gland, ➢ Setae.	15	18
II	**A. Cytology:** ➢ General idea of prokaryotic and eukaryotic cells. ➢ Ultramicroscopic structure of an animal cell. ➢ Cell division. ➢ Endoplasmic reticulum ➢ Golgi apparatus, synthesis and packaging. ➢ Cell defense system – Lysosome. ➢ Energy producing system – Mitochondria. ➢ Nucleus. **B. Genes & Animal biotechnology:** ➢ **Non allelic gene Interaction** ➢ Complementary genes (Flower colour in sweat pea) ➢ Epistasis – Dominant (Colour pattern in poultry) ➢ **Sex linked inheritance** ➢ X- linked (e.g. colour blindness in man, eye color in	15	18

	drosophila) ➢ Y – linked (Holandric genes) ➢ Sex –influenced inheritance : ➢ Baldness in Man ➢ **Animal biotechnology :** ➢ Some more labs facilities needed for setting up a tissue culture laboratory ➢ Incubators ➢ Centrifuges ➢ Photo Electric Colorimeter ➢ Introduction to genetics engineering in zoology		
III	**Animal Pathology:** **Diseases causing protozoans:** ➢ Plasmodium and types of Malaria. ➢ Trypanosoma. ➢ Entamoeba. **Diseases causing Nematodes:** ➢ Ascaris. ➢ Guinea worm. ➢ Filaria worm. **Diseases transmitting insects:** ➢ Lifecycle and mouth parts of Anopheles. ➢ Lifecycle and mouth parts of Culex. **Poultry diseases:** A. Bacterial disease: 1. Puloram 2. Chronic Respiratory disease B. Viral disease: 1. Fowl pox 2. Ranikhet C. Fungal disease: 1. Aspargilloses 2. Afla-toxicosis	15	17
IV	A **Ecology:** ➢ Limiting factors of environment. ➢ Aquatic habitats: o Fresh water: i. Lentic ii. Lotic o Marine water: ➢ Characteristic of marine habitat. ➢ Stratification of marine habitat. ➢ Terrestrial habitats: o Deciduous forest eg. Gir forest. o Desert. o Grass land eg. BBNP. o Tundra. o Conifer.	15	17

	➢ General concept of Biodiversity of Gujarat and its Conservation measures. B **Economic Zoology :** ➢ Biological method of pest control. ➢ Artificial insemination in cattle. ➢ Economic importance of fisheries ➢ Apiculture**:** Types of honey bee, Indigenous method, Modern Method, Benefits and Drawbacks. ➢ Poultry: Importance of poultry, Poultry Breeds, Methods of Poultry Farming, feeding apparatus, Poultry disease.		

TEXT BOOKS RECOMMENDED FOR PAPER ZOO-CC-203 & ZOO-CC-204

1. Text book of Zoology R. D. Vidyarthi
2. Animal Ecology S.P.Singh
3. Genetics. P.K. Gupta
4. Ecology Sarus Publication
5. Pranishastra (Gujarati) Ravi Prakashan\
6. Jiv Vignan-2 (Gujarati) Nirav Prakashan
7. A Text Book of General Biology Tomer & Singh
8. Modern Text Book of Zoology(vertebrate) R.L.Kotpal
9. Modern Text Book of Zoology(invertebrate) R.L.Kotpal
10. Concept of Ecology N.Arumugam
11. Economic Zoology G.S.Shukla & V.B.Upadhyay
12. Pruthvanshi Praniyo ane Garbhvidya (Gujarati) A.B.Vyas
13. Utkrushtha Aprushthvanshi Praniyo (Gujarati) U.M.Rawal
14. Invertebrate Zoology E.L.Jordan & P.S.Verma
15. Prani Auotiki (Gujarati) Desai and Akhunji
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17. Molecular Biology and Genetic Engineering Saras Publication.
18. Cell and Molecular Biology Saras Publication.
19. Animal Diversity. Cleveland P. Hickman, Larry S Roberts, Susan L. Keen, Allan Larson, David Eisenhour. McGraw-Hill Higher Education, 2008.
20. Animal Diversity. Diana R. Kershaw. University Tutorial Press, 1984.
21. Animal Diversity: A Textbook ofInvertebrate Zoology. Eylers. Mosby, Incorporated, 1991.
22. Laboratory Studies in Animal Diversity. Cleveland P. Hickman, Lee B. Kats. McGraw-Hili Higher Education, 2008.
23. Digital Zoology: Version 2.0 CD-RO Mand Student Workbook. Jon G.Houseman. McGraw- HilI, 2003.
24 Laboratory Studies- Cleveland P. Hickman, Lee B. Kats,William C. Ober.

in Animal Diversity. McGraw- Hill, 2006.
25. Glencoe Science Modules: Lucy Daniel, Dinah Zike. McGraw-Hill, Student Edition. 2007
Life Science, Animal Diversity,
26. Invertebrate Zoology: Edward E. Ruppert, Richard S. Fox, Robert D. Barnes.
A Functional Evolutionary Thomson-Brooks/Cole, 2004.
Approach.
27. Invertebrate Zoology: Robel1 L. Wallace, Walter Kingsley Taylor.
A Laboratory Manual. Prentice Hall, 2002.
28. Vertebrate Zoology: Nelson G. Hairston. Cambridge University Press, 1994.
An Experimental- Field Approach.

Paper ZOO-CC-204 **Code:** 20614
Title of the Paper: Zoology Practical
Credits: 06
Marks: Semester End Examination: 100Marks

DETAILED CURRICULUM FOR PRACTICAL

[Based on paper ZOO-CC-203]

Dissection is not performed in ref. to: UGC's D.O. Letter No.:F.1-80/2006 (Secu.) dated: 31/10/06
All the topics for the practical are being taught by Models, Charts, Figures, Slides and multimedia.
Students have to prepare journals for Botany & Zoology Practicals.
Students have to submit certified journals in the University practical examination.
There shall be Local Excursion/ Camp for Awareness and conservation of Biodiversity.

Detailed Syllabus for Zoology
Classification of the following animals. **Practical-1A** Classification of phylum Annelida and Arthropoda up to the classes: Annelida : Nereis, Earthworm, Leech. Arthropoda : Paripatus, Crab, Prawn, Centipede, Millipede, Bed bug, Grass hopper, Scorpion, Tick. **Practical-1B** Classification of phylum Mollusca and Echinodermata up to the classes: Mollusca : Chiton, Pila, Unio, Pearl oyster, Sepia, Dentalium. Echinodermata: Starfish, Brittle star, Sea cucumber, Sea- lily, Sea-urchin. **Practical-2A** Classification of class Amphibia and Reptiles up to the sub classes: Amphibia : Ichthiophis, Toad, Salamander. Reptiles : Chameleon, Turtle, Cobra, Krait, Saw scale Viper, Gavialis, Calotes. **Practical-2B** Classification of class Aves up to the sub classes: Aves : Archaeopteryx, Kingfisher, Hoopoe, Myna, Saras crane, House Sparrow. **Practical-3A** Classification of class Mammals up to the sub classes: Mammals: Duckbill platypus, Spiny ant eater, Kangaroo, Rabbit, Bat, Hedge hog, Rat. **Practical-3B** To Study External characters of Earthworm. **Practical-4A** To Study Digestive system of Earthworm by charts, models and Multimedia. **Practical-4B** To Study Reproductive system of Earth worm by charts, models and Multimedia. **Practical-5A** To Study Nervous system of Earth worm by charts, models and Multimedia. **Practical-5B** To Study Temporary mountings of ovary, Blood glands, setae and Septal Nephridia, T.S. passing through various body parts of Earth worm by permanent slides, charts, models and Multimedia. **Practical-6A** Genetic problem: Complementary genes (Flower colour in sweat pea). **Practical-6B** Genetic problem: Dominant Epistasis (Colour pattern in poultry). **Practical-7A** Genetic problem: X- linked (e.g. colour blindness in man) **Practical-7B** Genetic problem: Y – linked (Holandric genes) Sex –influenced inheritance: Baldness in Man.

Practical- 8A To Study Lifecycle and mouth parts of Anopheles.
Practical- 8B To Study Lifecycle and mouth parts of Culex.
Practical- 9A To Study pathogenic Protozoans.
1. Plasmodium
2. Trypanosome
3. Entamoeba

Practical- 9B To Study pathogenic Nematodes.
1. Ascaris
2. Guinea worm
3. Filaria worm

Practical- 10A To Study different stages of mitosis by Permanent slides.
Practical-10B To study animals of various forest habitats.
Deciduous forest animals: Lion, Leopard, Spotted dear, Blue bull.
Desert animals : Wild ass, Desert fox, Uromastrix.
Grass land animals : Black buck, Harrier.
Practical-11A To Study various types of poultry houses.
Practical-11B To Study various types of poultry breeds.
Practical-12A To Study various types of feeders used in poultry houses.
Practical-12B To prepare a bird list of college campus / Uni. Campus.

DETAILED CURRICULUM B. Sc. Sem. – III ZOOLOGY

SEMESTER PATTERN :

- The Course content has been designed on **Semester pattern**.
- The workload for Theory & Practical is allotted on Semester pattern.
- There shall be **02 Theory papers 70 marks each** of 2.5 Hours duration.

[70 marks external +30 marks Internal =100marks]

- Zoology Practical Examination shall be of 100 **marks** of 09 **hours duration** in University Examination.
- There shall be **Two Semesters** in an academic Year. (Semester-III & IV)

SEMESTER-III

SR. NO.	PAPER NO.	NAME OF THE PAPER	TOTAL MARKS EXT.+INT*= TOTAL	PASSING STANDARAD EXT.+INT = TOTAL	TOTAL TEACHING HOURS	EXAM HOURS	CREDITS
1	1	Paper ZOO-CC-303	70+30=100	28+12=40	15 WEEKS X 4 HOURS =60	2.5	04
2	2	Paper ZOO-CC-304	70+30=100	28+12=40	15 WEEKS X 4 HOURS =60	2.5	04
3	3	Paper ZOO-CC-305 **practical**	100	40	15 WEEKS X 9 HOURS =135	09	06

INTERNAL MARKS : 30

Test	15 Marks
Assignment/Presentation:	10 Marks
Seminar/Attendance	05 Marks
TOTAL	**30 Marks**

DETAILED CURRICULUM B.Sc. Sem. III ZOOLOGY

Paper no. : ZOO-CC-303 Code: 20674

Title of the paper: Invertebrate, economic zoology, genetic and enzyme

Credit:4 Marks: 70

Semester end Examination: 70 marks

Internal : 30 marks

UNIT	Detailed Syllabus		
Unit-1	**Diversity of Life** **Classification of the following animals up to the class** 1.1 Classification of Protozoa with example. Class :- (i) Rhizopoda (ii) Ciliata (iii) Mastigophora (Flagellata) (iv) Sporozoa 1.2 Classification of Porifera with example. Class :- (i) Calcarea (ii) Hexactinellida (iii) Demospongia 1.3 Classification of Coelenterata with example. Class :- (i) Hydrozoa (ii) Scyphozoa (iii) Anthozoa (Actinozoa) 1.4 Classification of Platyhelmenthes with example. Class :- (i) Turbellaria (ii) Trematoda (iii) Cestoda (Cestoidea) 1.5 Classification of Aschelminthes with example. Class :- Nematoda	15	18
Unit-2	General Morphology and Functional Anatomy of the following animals; 2.1 Plasmodium Vivex :- (i) Distribution of Plasmodium (ii) Life cycle: - a. A sexual cycle b. Sexual Cycle (iii) Human Malaria:- a. Early History b. Symptoms and Pathogenesis c. Duration of Infection d. Control of Malaria 2.2 Leucosolenia: - a. Habit & Habitat b. External Morphology and Body Wall c. Reproduction and Development 2.3 Leech: - a. Habit & Habitat b. External Morphology c. Body Wall and Locomotion d. Digestive System e. Excretory System	15	18

	f. Nervous System g. Reproductive System & Development h. Parasitic adaptation		
Unit-3	**A Economic Zoology :-** Economic importance of the following animals 1) Aedes - Dengue, 2) Paragonimus westermani (Lung worm) 3) Schistosoma (Blood fluke) 4) Enterobius vermicularis 5) Trichinella Spiralis 6) Tape worm 7) Coral 8) Mudskipper 9) Pomfret 10) Prawn 11) Lobster **B Enzymes** (i) Introduction (ii) Nomenclature (Classification) (iii) Chemistry of Enzymes (iv) Enzyme catalysis (v) General Properties (vi) Mechanism of Enzyme action (vii) Effect of various conditions on enzymes activity a. Influence of Temperature b. Effect of pH c. Concentration of Enzyme d. Concentration of Substrate e. Other factors (ix) Classification of Enzymes 1. Oxidoreductase 2. Transferases 3. Hydrolyses 4. Lysases 5. Isomerases 6. ligases or Synthetases (x) Biological functions of enzymes	15	17
Unit -4	**Genetics :** Interaction of genes :- (i) Duplicatory genes (15:1) (ii) Epistasis: Recessive Epistasis (9:3:4) (iii) Inheritance of comb in fowls (9:3:3:1) Sex determination in animals :- (i) Chromosomal theory of sex determination (a) Sex determination in Drosophila (b) Sex determination in Butterfly (c) Sex determination in Grasshopper (d) Sex determination in Man (e) Genic balance theory (f) Gynandromorph (ii) Environmental determination of sex : Bonelia (iii) Hormonal theory of sex determination : Free-martin (iv) Metabolic differentiation theory (v) Effect of parasites in sex determination	15	17

DETAILED CURRICULUM B.Sc. Sem. III ZOOLOGY

Paper no. : ZOO-CC-304 Code: 20675

Title of the paper: Vertebrate, Histolohy, embryology and zoogeography

Credit: 4 Marks: 70

Semester end Examination: 70 marks

Internal : 30 marks

UNIT	Detailed Syllabus	Teaching hours	Marks Weightage
Unit-1	**Classification and general characters of chordates:** **Classification of the following animals:** 1.1 General characters of Protochordates. 1.2 Classification of protochordates up to class with example. 1.3 Affinities of protochordates. 1.4 General characters of Cyclostomata. 1.5 Classification of Cyclostomata with example. 1.6 General characters of Pisces. 1.7 Classification of Pisces up to sub class with example. 1.8 General characters of Amphibia. 1.9 Classification of Amphibia up to sub class with example.	15	18
Unit-2	A The study of organizational and functional anatomy of the Scoliodon: **a. External character** **b. Digestive system** **c. Arterial System** **d. Brain and their functions** **e. Urinogenital system** **f. Internal Ear** **g. Ampullae of lorenzini** **h. Types of scales** **I Types of fins** **J lateral line organ** **K Parental care** B Histology Study of Epithelial and connective tissues **- Squamous epithelium - Cuboidal epithelium** **- Columnar epithelium - Ciliated epithelium** **- Stratified epithelium - Areolar connective tissue** **- Cartilage connective tissue**	15	18

Unit-3	**3.** The study of organizational and functional anatomy of the Frog: **a. External character** **b. Digestive system** **c. Arterial System** **d. Male Urinogenital System** **e. Female reproductive system** **f. Brain and their functions** **g. Skeletal system** Axial skeletal**:** **skull,** **vertebrae** Appendicular skeletal **Girdles.** **Fore limb bones,** **Hind limb bones** h. **Hyoid apparatus**.	15	17
Unit-4	**A Embryology:** Amphioxus embryology (i) Eggs (ii) Fertilization (iii) Cleavage (iv)Blastulation (v) Gastrulation and organogenesis (vi) Larval development **B Zoogeography:** 1. Animal distribution a. Continuous b. Discontinuous 2. Brief account of Zoogeographical realms with mammalian fauna a. Australian Region, b. Oriental Region c. Neotropical Region, d. Ethiopian Region e. Nearctic Region f. Palearctic Region Study of endemic animals in reference to their geographical distribution. a. Indian Pea fowl b. Lesser Florican c. The great Indian bustard. d. Indian rock python	15	17

DETAILED CURRICULUM B.Sc. Sem. III ZOOLOGY

Paper no. : ZOO-CC-305 Code: 20676

Title of the paper: Practical

Credit: 9 **Marks:** 100

Semester end Examination: 100 marks

Dissection is not performed in ref. to: UGC's D.O. Letter No.:F.1-80/2006 (cir.) dated: 31/10/06 All the topics of the practicals are being taught by Models, Charts, Figures and Slides.

Study of living animals are replaced by Computer Animation/Chart/Model.

Students will have to prepare their Practical journals as a part of Laboratory work and they will have to submit certified journals in the University practical exam.

Students shall not be allowed without certified journals in the University practical examination.

There shall be Local Excursion/Camp to bring awareness for the conservation of biodiversity.

Paper 303	Detailed Syllabus	Teaching hours	Marks Weightage
SEC. A	**Based on theory Zoo-cc-301** **Classification of the following animals up to the classes:** **Practical -1** Classification of Phylum Protozoa Entamoeba, Difflugia, Noctiluca, Trypanosoma, Nyctotherus, Balantidium, Plasmodium. **Practical-2** Classification of Phylum Porifera. Clathrina, Scycon, Hyalonema, Euplectella, Euspongia, Cliona, Spongilla **Practical-3** Classifications of Phylum Coelenterata. Obelia, Bougainvillea, Tubularia, Physalia, velella Pennaria, Plumularia, Zooanthus, Fungia, Coral. **Practical -4** Classifications of Phylum Platyhelmenthes. Polystoma, Schistosoma, Fasciola, Taenia solium. **Practical -5** Classifications of Phylum Aschelminthes. Trichinella, Wauchereria (Filaria), Enterobius (Pin worm), Ancyclostoma (Hook worm) **To study Temporary mountings from class work materials** **Practical- 6** prepare Temporary mountings from class work materials – Euglena, Paramecium, **Practical- 7** prepare Temporary mountings from class work materials – Sponge Gemmule, Sponge Spicules		

Practical- 8 prepare Temporary mountings from class work materials – Liver fluke miracidium, Redia, Cercaria.

Practical -9 **To study External Morphology of Leech.**

Practical -10 **To study Digestive system of Leech.**

Practical -11 **To study Nervous system of Leech.**

Practical -12 **To study Reproductive system of Leech.**

Practical -13 **Effect of ptyline and pepsin on food stuff.**

Practical -14 **Estimations of free CO_2 in the sample water.**

Practical -15 **Estimations of Alkalinity in the sample water.**

Practical -16 **Estimations of Chlorinity in the sample water.**

Practical -17 Estimations of Hardness in the sample water.

Practical- 18 **To solve the problems of Interaction of genes.**

(a) Duplicatory genes (15:1)

(b) Recessive Epistasis (9:3:4)

(c) Inheritance of comb in fowls (9:3:3:1)

(d) Gene Balance (Drosophilla).

Based on theory Zoo-cc-302

CLASSIFICATION OF THE FOLLOWING ANIMALS UP TO THE SUB CLASSES:

Practical -1 Classification of protochordates.

Hemichordata :- Balanoglossus,

Urochordata :- Ascidia, Salpa, Doliolum, Pyrosoma, Oikopleura,

Cephalochordata: - Amphioxus.

Practical -2 Classification of Cyclostomata.

:- Lamprey, Hagfish.

Practical -3 Classifications of Pisces.

Chondrichthyes :- Pristis, Torpedo, Chimaera, Sting Ray

Osteichthyes :- Protopterus, Amia, Lepidosteus, Eel, Cat fish, Labeo rohita, Hippocampus.

Practical -4 Classification of Amphibia.

Ichthyophis, Cryptobranchus, Axolotal-Larva, Triton, Siren, Salamander, Hyla, Alytes, Frog, Buffo.

Practical -5 **To study External character & Digestive system of the Scoliodon.**

Practical -6 **To study Arterial system of the Scoliodon.**

Practical -8 **To study Brain (dorsal and ventral view) of the Scoliodon.**

	Practical -9 **To study Urinogenital system of the Scoliodon (male and female).** Practical -10 **(a) To study mountings of Internal Ear in Scoliodon.** **(b) To perform Placoid scales from the Scoliodon.** Practical -11 **(a) To study various type of fins in Fishes.** **(b) To study various type of Scales in Fishes.** Practical -12 **To Study Parental care in Fishes.** Practical -13 **To study External character & Digestive system of the Frog.** Practical -14 **To study Arterial system of the Frog.** Practical -15 **To study Brain (dorsal and ventral view) of the Frog.** **Practical -16 a.** To study male Urinogenital system of the Frog. **b.** To study female reproductive system of the Frog. **Practical -17** To study Skeletal system of frog part-I. **Practical -18** To study Skeletal system of frog part-II. **Practical -19** To study the embryological development in Amphioxus (by permanent slides). (i) Eggs (ii) Fertilization (iii) Cleavage (iv) Blastulation (v) Gastrulation and organogenesis **(vi) Larval development.** **Practical -20** To Study Epithelial and connective tissues of Mammals. Practical -21 **Zoogeographical distribution of mammalian fauna Part-1.** Practical 22 **Zoogeographical distributions of mammalian fauna Part-II.** Practical -23 **Fill the map of Zoogeographical distribution of mammals.** Practical -24 **To Study Endemic Animals.** **Indian Pea fowl, Lesser Florican,** **The Great Indian Bustard, Indian Rock Python**		

TEXT BOOK RECOMNDED

1. Text Book of Zoology – Phylum Series	-R.L.Kotpal.
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4. Invertebrate Zoology	- E. L. Jordan & P. S. Verma.
5. Invertebrate Zoology	- Majupuria.
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14. T. B. of Cytology	- Wilson and Morrison.
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17. Text book of Zoology	- R. D. Vidyarthi.
18. Animal Ecology	-S.P.Singh.
19.Genetics.	-P.K.Gupta.
20. Ecology	- R.L.Kotpal.
21. Pranishastra (Gujarati)	- Ravi Prakashan.
22. Jiv Vignan-2 (Gujarati)	- Nirav Prakashan.
23. A Text Book of General Biology	- Tomer & Singh.
24. Text Book of Zoology	- Sarus Publication.
25.Concept of Ecology	- N.Arumugam.
26. Economic Zoology	- G.S.Shukla & V.B.Upadhyay.
27.Pruthvanshi Praniyo ane Garbhvidya	- A.B.Vyas.
28. Utkrushtha Aprushthvanshi Praniyo	- U.M.Rawal.
29.Laboratory manual in biochemistry	- J Jayaraman.
30.Environmental science	-S.C. Santra
31.Manual of prac. zoology vol.- I,II,III	-P.K.G.Nair

DETAILED CURRICULUM B. Sc. Sem. – IV ZOOLOGY

SEMESTER PATTERN:

- The Course content has been designed on **Semester pattern**.
- The workload for Theory & Practical is allotted on Semester pattern.
- There shall be **02 Theory papers 70 marks each** of 2.5 Hours duration.

[70 marks external +30 marks Internal =100marks]

- Zoology Practical Examination shall be of 100 **marks** of 09 **hours duration** in University Examination.
- There shall be **Two Semesters** in an academic Year. (Semester-III & IV)

SEMESTER – IV

SR. NO.	PAPER NO.	NAME OF THE PAPER	TOTAL MARKS EXT.+INT*= TOTAL	PASSING STANDARAD EXT.+INT = TOTAL	TOTAL TEACHING HOURS	EXAM HOURS	CREDITS
1	**1**	Paper ZOO-CC-403	**70+30=100**	**28+12=40**	**15 WEEKS** X 4 **HOURS =60**	**2.5**	**04**
2	**2**	Paper ZOO-CC-404	**70+30=100**	**28+12=40**	**15 WEEKS** X 4 **HOURS =60**	**2.5**	**04**
3	**3**	Paper ZOO-CC-405 **practical**	**100**	**40**	**15 WEEKS** X 9 **HOURS =135**	**09**	**06**

INTERNAL MARKS : 30

Test	15 Marks
Assignment/Presentation:	10 Marks
Seminar/Attendance	05 Marks
TOTAL	**30 Marks**

DETAILED CURRICULUM B.Sc. Sem. IV ZOOLOGY

Paper no. : ZOO-CC-403 Code:21013

Title of the paper: Invertebrate, economic zoology, genetic and Animal ecology

Credit: 4 **Marks:** 70

Semester end Examination: 70 marks

Internal : 30 marks

UNIT	Detailed Syllabus	Teaching hours	Marks Weight age
Unit-1	**Diversity of Life** Classification of the following Animals up to the class 1.1 Phylum : Annelida Class : (i) Oligochaeta (ii) Polychaeta (iii) Hirudinea 1.2 Phylum : Arthropoda Class : (i) Crustacea (ii) Myriapoda (iii) Insecta (iv) Arachnida 1.3 Phylum : Mollusca Class : (i) Amphineura (Placophora) (ii) Lamellibranchiata (Bivalvia) (Pelecypoda) (iii) Gastropoda (iv) Cephalopoda (v) Scaphopoda 1.4 Phylum : Echinodermata Class : (i) Asteroidea (ii) Echinoidea (iii) Ophiuroidea (iv) Holothuroidea (v) Crinoide **Cockroach :** (i) External character (ii) Mouth Parts (iii) Digestive system (iv) Nervous system (v) Reproductive System	15	18
Unit-2	**General morphology and functional anatomy of Pila :-** (a) Habit & Habitat (b) External Morphology and Mantle Cavity (c) Digestive System (d) Circulatory System	15	18

	(e) Respiratory System (f) Nervous System (g) Sense Organs (i) eyes (ii) Statocyst (iii) Ospharadium (iv) Tentacles (v) Radulla (h) Reproductive system & Development		
Unit-3	**A Economic Zoology** 3.1 Pearl culture 3.2 Economic importance of Mollusca 3.3 Insects effecting Human health (a) House flies (b) Human louse (c) Bed bug (d) Fleas 3.4 Brief account of the following industries. (a) Leather (b) Fur (c) Wool B **Animal ecology:** a. Biotic factors : Producer, Consumer and Decomposer b. Abiotic factor of ecology: Water, O_2, CO_2 ,Temperature, Light, Soil. **C Animal Relationships:** a. Commensalism b. Mutualism c. Competition d. Predation e. Parasite. D **Forestry:** a. Importance b. Conservation & Management. c. Social forestry. d. Deforestation.	15	17
Unit-4	**Genetics :** 2.1 Sex linked inheritance : Hemophilia in Human 2.2 Crossing over (i) Mechanism of crossing over (ii) Crossing over in Drosophila 2.3 Linkage (i) Linkage in Drosophila (ii) Linkage in sweet pea (*lathyrus odoratous*) 2.4 Human Genetics (i) Human Karyotype	15	17

	(ii) Non Disjunction (iii) Klinefelter's syndrome. (iv) Turner's syndrome. (v) Down's syndrome. (vi) Twins		

DETAILED CURRICULUM B.Sc. Sem. IV ZOOLOGY

B.Sc. Sem -IV

TITLE OF ZOOLOGY PAPER: ZOO-CC-404 [Chordates, Physiology and Environmental biology]

Credit: 4 **Code:** 21014 **Marks:** 70

Semester end Examination: 70 marks

Internal : 30 marks

UNIT	Detailed Syllabus	Teaching hours	Marks Weightage
Unit-1	**General characters and classification.** 1. General characters and Classification of Reptilia up to subclass with example. 2. General characters and Classification of Aves up to sub class with example. 3. General characters and Classification of Mammals up to sub class with example. **Fisheries:** (a) Fresh water fishes - Major carps:- *Catla catla, Labeo rohita,* Cirrhins mrigala, Cat fish :- *Wallago attu, Clarias batrachus , Anabas testudineus.* (b) Fish by product:- Liver oil, Extraction of liver oil, Fish meal, Fish fertilizer.	15	18
Unit-2	2. The study of organizational and functional anatomy of the Calotes: **2.1 External character.** **2.2 Digestive system.** **2.3 Arterial System.** **2.4 Brain and their functions.** **2.5 Male Urinogenital system.** **2.6 Female Reproductive system.** General topics: **(a) Adaptation of feet in birds** **(b) Adaptation of beak in birds** **(c) Identification of poisonous and nonpoisonous snake** **(d) Study of some poisonous and nonpoisonous snake:** **Cobra, Krait, Saw scaled viper, Russell's viper, Rat snake, Banded Racer, Trinket.**	15	18
Unit-3	**Current Environment Issues** - Global Warming	15	17

	- Climate Change - Possible impact of global warming. - IPCC - Future Emissions scenario of Greenhouse gases. - Acid Rain. - Pesticide - Types of pesticide - Effect of pesticide on Environment.		
Unit-4	**Physiology:** **Metabolism of carbohydrate** (i) Glycogenesis (ii) Glycogenolysis (iii) Glycolysis (iv) Krebs cycle **Metabolism of Fat** (i) Fat stores (ii) Break down (Oxidation) of Fat a. Oxidation of Glycerol b. Oxidation of Fatty acids • Activation • Desaturation • Hydration • Oxidation • Thiolytic cleavage Metabolism of Proteins **(i) Deamination** **(ii) Oxidative Deamination** **(iii) Transamination** **(iv) Decarboxylation** **(v) Transmethylation** **(vi) Formation of Urea** **(vii) Formation of ammonium salts** **(iii) Ketosis**	15	17

DETAILED CURRICULUM B.Sc. Sem. IV ZOOLOGY

Title of zoology paper: ZOO-CC-405 [PRACTICALS] Code: 21015
Credits: 9
Uni. Semester Examination Marks: 100 marks

Dissection is not performed in ref. to: UGC's D.O. Letter No.:F.1-80/2006 (cir.) dated: 31/10/06 All the topics of the practicals are being taught by Models, Charts, Figures and Slides.

Study of living animals are replaced by Computer Animation/Chart/Model.

Students will have to prepare their Practical journals as a part of Laboratory work and they will have to submit certified journals in the University practical exam.

Students shall not be allowed without certified journals in the University practical examination.

There shall be Local Excursion/Camp to bring awareness for the conservation of biodiversity.

Paper	ZOO-CC-405 **Detailed Syllabus**	Teaching hours	Marks Weightage
SEC.-A	**Based on theory Zoo-cc-401** CLASSIFICATION OF THE FOLLOWING ANIMALS UP TO THE CLASSES: **Practical-1** Classification of Phylum Annelida : Sabella, Aphrodite, Chaetopterus, Arenicola, Polynoe, Eurithroe, Neries, Tubifix, pontobdella. **Practical-2** Classification of Phylum Arthropoda : Peripatus, Centipede (Scolopendra), Millipede (julus) Lepas, Lobster (palinurus), Prawn (Palaemon) Hermit crab (Eupagurus), Dragon fly, Spider, Mite (Sarcoptes) **Practical-3** Classification of Phylum Mollusca : Chiton, Conch, Cypraea, Applysia (Sea horse), Loligo (Squid) Octopus (devil fish), Mytilus (Sea mussel), Pearl Oyster (Pinctada), Dentalium (Tusk shell) **Practical -4** Classification of Phylum Echinodermata. Star fish (Asterias), Brittle star (Ophioderma) Sea cucumber (Cucumaria), Sea-lily, Sea urchin, Cake urchin (Clypeaster) **Practical -5** To study external characters of Cockroach by chart. **Practical -6** To study Digestive System of Cockroach by chart. **Practical -7** To study Nervous System of Cockroach by chart. **Practical -8** To study Reproductive System of Cockroach by chart. **Practical -9** To study Mountings of Cockroach by chart. **Practical -10** To study external characters of Pila by chart. **Practical -11** To study Digestive system of Pila by chart.		

	Practical -12 To study Nervous system of Pila by chart. **Practical -13** To study Reproductive system of Pila by chart. **Practical -14** To study Economic importance of Mollusca. Pearl oyster, Edible oyster, Sepia, Loligo, Cyprea, Conch, Octopus. **To study temporary mountings from class work materials.** **Practical -15** prepare Temporary mountings from class work materials – Anopheles Egg, Larva and Pupa. **Practical -16** prepare Temporary mountings from class work materials – Culex Egg, Larva and Pupa. **Practical -17** prepare Temporary mountings from class work materials -Pila redular teeth **Practical- 18** To study life history of silkmoth (*Bombax mori).* **Practical- 19** Insects effecting animal health and house hold insect – House fly, Mosquito, Beetle, Human Louse, Bed bug, Flea, Tick. Practical -20 **To Solve the problems of sex linked inheritance: linkage,** Hemophilia in Human. Practical -21 **Study of human Karyotype by slides / charts.** Practical -22 **Study of human Karyotype(non dis junction- Klinefelter's** **Turner's and Down's syndrome) by slides / charts.**		
SEC. B	Based on theory Z-cc-402 CLASSIFICATION OF THE FOLLOWING ANIMALS UP TO THE SUB CLASSES: Practical -1 Classification of Reptilia (up to order). Chelon, Tortoise, Turtle, Varanus, Draco, Chamaeleon, Mabuya (Skink), Rat snake, Alligator. Practical -2 Classifications of Aves. Weaver Bird, Wood pecker, king fisher, vulture, Parakeet, Hoopoe, Common myna, Crane, Quail, Babbler, Pigeon, Green bee eater. Practical -3 Classifications of Mammals (up to sub-classes). Hedgehog, bat, scaly Anteater, Guinea pig, Squirrel, Loris Mongoose, Platypus, Spiny anteater. Practical -4 Study of Fresh water fishes. (a) Catla catla , (b) Labeo rohita , (c) Cirrhins mrigala, (d)Wallago attu,(e) Clarias batrachus, (f) Anabas testudineus. Practical -5 To Study byproducts of fish.		

	Practical - 6 To Study External character & Digestive system of the Calotes. Practical -7 To Study Arterial system of the Calotes. Practical -8 To Study Brain and their functions in the Calotes. Practical -9 a. To Study male Urinogenital system of the Calotes. b. To Study female reproductive system of the Calotes. Practical -10 To Study poisonous and non poisonous snakes. Cobra, Krait, Saw scaled viper, Russell's viper, Rat snake, Racer, Trinket. Practical -11 To Study adaptation of feet in birds. Practical -12 To Study adaptation of beak in birds. **Practical -13 To Study mitotic cell division from onion root tip (Squash tech.).** Practical -14 Local excursions. Practical -15 Bird watching in university campus.		

TEXT BOO

KS RECOMMENDED

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19.Genetics.	-P.K.Gupta.
20. Ecology	- R.L.Kotpal.
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28. Utkrushtha Aprushthvanshi Praniyo	- U.M.Rawal.
29.Laboratory manual in biochemistry	- J Jayaraman.
30.Environmental science	-S.C. Santra
31.Manual of prac. zoology vol.- I,II,III	-P.K.G.Nair

The course content has been designed on **Semester pattern: Two semesters (V & VI)** in an Academic Year.

The work load for theory : There shall be **four lectures** per CC - paper in a week and **three lectures** for SEC - paper in a week set up by the department.

The work load for Practical: There shall be **four Practical (each having 03 hrs)** in a week set up by the department.

There shall be **four Course Core- theory paper (CC)**, **one subject elective core paper (SEC)** and **one practical paper** in Semester end Examination.

Each theory paper shall be of **2.5 hours** duration and carry 70 **marks**.

Internal Marks: 30

Practical Examination: **12** Hours (in 02 days, 6.00 hours for each day)

Practical paper: **200 Marks**

SEMESTER V

Sr. No	PAPER No.	Total Marks (Ext.+ Int.*) = Total	Passing Standard (Ext.+ Int.*)=Total	Total Teaching Hours	University Exam hours	Credits
1	ZOO-CC-503 Theory	70+30*=100	28+12*=40	15 weeks x 4 hours= 60	2.5	04
2	ZOO-CC-504 Theory	70+30*=100	28+12*=40	15 weeks x 4 hours= 60	2.5	04
3	ZOO-CC-505 Theory	70+30*=100	28+12*=40	15 weeks x 4 hours= 60	2.5	04
4	ZOO-CC-506 Theory	70+30*=100	28+12*=40	15 weeks x 4 hours= 60	2.5	04
5	ZOO-SEC-501 Theory	70+30*=100	28+12*=40	15 weeks x3hours= 45	2.5	03
6.	ZOO-CC-507 Practical	200	80	15 weeks x 4 day x 03hours= 180	12	12
	TOTAL	**550+ 150=700**	**220+60= 280**			**31**

SEMESTER VI

Sr. No	PAPER No.	Total Marks (Ext.+ Int.*) = Total	Passing Standard (Ext.+ Int.*)=Total	Total Teaching Hours	University Exam hours	Credits
1	ZOO-CC-603 Theory	70+30*=100	28+12*=40	15 weeks x 4 hours= 60	2.5	04
2	ZOO-CC-604 Theory	70+30*=100	28+12*=40	15 weeks x 4 hours= 60	2.5	04
3	ZOO-CC-605 Theory	70+30*=100	28+12*=40	15 weeks x 4 hours= 60	2.5	04
4	ZOO-CC-606 Theory	70+30*=100	28+12*=40	15 weeks x 4 hours= 60	2.5	04
5	ZOO-SEC-601 Theory	70+30*=100	28+12*=40	15 weeks x3hours= 45	2.5	03
6.	ZOO-CC-607 Practical	200	80	15 weeks x 4 day x 03hours= 180	12	12
	TOTAL	**550+ 150=700**	**220+60= 280**			**31**

There shall be Local Excursion and a Zoological study tour to study habitat, biodiversity and scientific research institute of our country, including visit to Forest, Desert, Sea cost, Zoological park, Nature Park, Animal science based Research institutes, and government institutions. Study tour shall be arranged during the academic year. Students shall have to submit field report / Tour report in their Journal.

B.Sc. Sem. V Zoology

PAPER: ZOO-CC-503: [INVERTEBRATE] Code: 21493

Credits: 4

Semester end Examination: 70 marks

Internal : 30 marks.

UNIT	**Detailed Syllabus**	Teaching hours	Marks Weightage
Unit-1	**PROTOZOA** General characters of phylum Protozoa. Reproduction in protozoa. a. Sexual reproduction b. Asexual reproduction Locomotion Nutrition Parasitism Economic importance **PORIFERA** General characters of phylum Porifera Canal system Spicules Asexual reproduction Sexual reproduction Economic importance	15	18
Unit-2	**COELENTERATA** General characters of phylum Coelenterata. Polymorphism Formation of Corals Types of coral reefs Economic importance **PLATYHELMENTHES** General characters of phylum Platyhelminthes. Parasitic adaptations. Platyhelminthes as Parasities. Parasitic adaptations. **NEMATODA** General characters of phylum Nematode Nematode as Parasites	15	18
Unit-3	**GENERAL ANATOMY OF NERIES** External features, Body wall, Digestive system, Reproductive system, Trochophore larva, Nervous system. **STRUCTURE & PHYSIOLOGY OF ASCARIS**	15	17

	LUMBRICOIDES Structure Body wall Digestive system Excretory system Nervous system Reproductive system		
Unit – 4	General anatomy of Taenia solium (Pork tape worm). -Habit and habitat -External morphology -Body wall - Reproductive system - Life history and development **MINOR PHYLA** **ENDOPROCTA** (eg. Pedicellina loxosoma) External features of minor phylum Endoprocta. Affinities General anatomy: Digestive system, Reproductive system, Nervous system, Excretory system.	15	17

B.Sc. Sem. V Zoology

PAPER: ZOO-CC-504 [CHORDATE, COMPARATIVE ANATOMY,FISHERIES BIOLOGY]

Credits: 4 **Code:** 21494

Semester end Examination: 70 marks

Internal : 30 marks

UNIT	**Detailed Syllabus**	Teaching hours	Marks Weight age
Unit-1	**Diversity of Life** **Hemichordate** Salient features of hemichordata, Affinity. **Cephalochordate:** **Salient features of Cephalochordate, Affinity.** **Urochordata:** **Salient features of Urochordata , Retrogressive Metamorphosis, Affinity.** **General Anatomy of Amphioxus** **External character, Digestive system, Circulatory system Excretory system, Larva** **Cyclostomata:** **General Characteristics** **Affinity**	15	18
Unit-2	**Diversity of Life** **Pisces:** **General character, Classification,** **General Character of different classes.** **Accessory respiratory organs of Fishes :** **Air (swim) bladder of fishes, Parental care,** **Migration in fish (anadromous, catadromous) ,** **Placoderm.** **Amphibia:** **Origin of Amphibia,** **Three major groupings of Amphibians.** **Anurans, Urodeles Gymnophions(Apoda)** **Unsuccessful terrestrial vertebrates,** **Aestivation and hibernation,** **Parental care,** **Neoteny,** **Metamorphosis.**	15	18
Unit-3	**Comparative Anatomy of anamniota vertebrate animals.** **Digestive system,** **Heart,** **Aortic arches** **Brains,** **Kidney**	15	17

Unit – 4	**Mammalian histology and endocrinology.** **Pituitary** **Thyroid** **Adrenal** **Pancreas** **Testis** **Ovary**	15	17

B.Sc. Sem. V Zoology

PAPER: ZOO-CC-505 [CYTOLOGY, MOLECULAR BIOLOGY, GENETICS AND BIOTECHNOLOGY]

Credits: 4 **Code:** 21495

Semester end Examination: 70 marks

Internal : 30 marks

UNIT	**Detailed Syllabus**	Teaching hours	Marks Weight age
Unit-1	**CYTOLOGY** **Ultra-structure of following Cell organelles** **Cell membrane & its permeability** **Endoplasmic reticulum** **Golgi body** **Mitochondria** **Lyso some** **Nucleus and Nucleolus** **Chromosomes and Types** **Giant chromosomes**	15	18
Unit-2	**MOLECULAR BIOLOGY** **Deoxyribonucleic Acid (DNA)** **Watson and Crick model of DNA** **Replication of DNA** **Ribonucleic Acid RNA** **Messenger RNA(mRNA)** **Transfer RNA(t RNA)** **Ribosomal RNA(r RNA)** **Genetic code** **Protein Synthesis** **Transcription** Translation Regulation of gene expression in prokaryotes	15	18
Unit-3	**GENETICS** **DNA Genetic Material** **Transformation (Griffith Effect)** **Transduction.** **Life cycle of Phages** **Lytic cycle** **Lysogenic cycle** **MUTATIONS** **Types of Mutations** **Chromosomal aberrations.** **Gene mutations** **CYTOPLASMIC INHERITANCE.** **Kappa particles in Paramecium** Shell Coiling in Snail	15	17
Unit-4	**HUMAN GENETICS**	15	17

	Human chromosomes **Karyotype** **Non disjunction in Male and Female** **Syndromes (Turner's syndrome, Down's syndrome, Klinefelter's syndrome)** **Twins** **Inborn errors of Metabolism.** **BIOTECHNOLOGY** **Introduction of Biotechnology** **Construction of Recombinant DNA in vitro** **Preparation of Desired DNA** **Polymerase chain reaction (PCR)** **Bio-Fertilizers** **Bio-control** **Biogas** **Plant Tissue culture** **Human Genome Project**		

B.Sc. Sem. V Zoology

PAPER: ZOO-CC-506 [ANIMAL BEHAVIOR, EVOLUTION, WILDLIFE BIOLOGY, BIOSTATASTIC AND BIOTECHNICS]

Credits: 4 **Code:** 21496

Semester end Examination: 70 marks

Internal : 30 marks

UNIT	**Detailed Syllabus**	Teaching hours	Marks Weight age
Unit-1	**Animal Behaviour** **Social Behaviour** Advantages of social group. Disadvantage of social group Types of social groups The caste of social insects Territory in the social organization Mating system and social dominance Social dominance **Courtship behavior** Role of court ship Courtship in invertebrates Courtship in vertebrates **Learning behavior** Introduction Sensitization and habituation Associative learning The nature of memory **Communication in animals.** Essential Component of Communication Chemical Communication. Tactile Communication **Visual Communication** **Auditory Communication**	15	18
Unit-2	**Evolution** **Variation:** Types of variation Causes of variation **Isolation:** Mechanism of isolation Types of isolation Geographical isolation Reproductive isolation Pre zygotic isolation Post zygotic isolation Origin of isolation **Theory of Natural Selection.** Stabilizing Selection	15	18

	Directional Selection **Disruptive Selection**		
Unit-3	**Wild life biology** **Wild-Life Conservation** Present Status of wild life conservation in Gujarat. Importance of Wild Life conservation Causes of depletion of wild life Methods for wildlife conservation Reintroduction of wild fauna **Wild life protection Act 1972** **Introduction** Wildlife Advisory Board. Declaration of sanctuary, Restriction on entry in sanctuary Declaration of National Park, Restriction on entry in National Park. **Central Zoo Authority** Constitution of Central Zoo Authority Functions of Central Zoo Authority	15	17
Unit – 4	**A Biostatistics** Basic concept of biostatistics Data and Collection of data Types of data: (a)Primary data (b) Secondary data Classification of data Tabulation Frequency Distribution Measures of Central Tendency (Average) Mean deviation Standard deviation **B Bio techniques** Colorimeter Chromatography Centrifuge Electrophoresis	15	17

B.Sc. Sem. V Zoology

PAPER: ZOO-SEC-501 [ECONOMIC ZOOLOGY]

Credits: 3 **Code:** 20472

Semester end Examination: 70 marks

Internal : 30 marks

UNIT	**Detailed Syllabus**	Teaching hours	Marks Weight age
Unit-1	**Apiculture** Introduction Classification of Apis. Different species of honey bees. Castes in honey bee. Structure and functions of each caste of honey bees. A typical bee hive. Communication in honey bee. Life history of honey bee. Apiculture - Choice of flora. - Choice of bees. Enemies of Bee. Apiculture methods: Old and modern methods. Advances of Modern Method	15	18
Unit-2	**Apiculture** Honey. Economic importance of Honey. Beeswax. Economic importance of Beeswax.Termite **Termite** Introduction. Termite life history. Termite ecology. Control measure.	15	18
Unit-3	**Sericulture** Introduction Species of silkworm Classification of *Bombyx mori*. Introduction to different species of silkworms used for sericulture. External features and life cycle of *Bombyx mori*. Science of sericulture: Collection of egg, Incubation of eggs Rearing of larvae, Recovery of cocoons,	15	17

	Reeling and spinning of cocoons.		
Unit-4	**Sericulture** Sericulture industries: Requirement for sericulture. Mulberry. Rearing of silkworm: Grainage management. Post cocoon processing. Physical and Chemical properties of silk. Type of silk. Economic importance of silk. Status of sericulture industry in India. Sericulture industry and women welfare. Central Silk Board (CSB).	15	17

B.Sc. Sem. V Zoology

PAPER: ZOO-CC-507 [PRACTICAL] **Code:** 21497

Credits: 12

Semester end Examination: 200 marks

SEC.-	Detailed Syllabus	Teaching hours	Marks Weightage
A	**Based on theory paper CC- Zoo - -501 (Nonchordates)** **Classification of following animals up to the order** **Practical -1** Protozoa: CeratiumTrypanosoma, Opalina, Nyctotherus, Entamoeba, Arcella, Diffugia, Plasmodium signet ring, Monocystic, Foraminifera ooze. **Practical -2** Porifera: Euplectella, Oscarella, Chalina, Leucosolenia, Sycon, Euspongia, Cliona, Pheronema. **Practical -3** Coelenterata: Pennaria, Porpita, Physalia, Rhizostoma, Alcyonium, Metridium, Tubipora, Pennatula, Renilla. **Practical -4** Platyhelminthes: Planaria, Amphilina, Bipalium Schistosoma, Liverfluke, Tapeworm, Polystoma. **Practical -5** Nemathhelminthis : Ascaris, Dracunculus, (Guinea worm) Filaria, Enterobius vermicularia. **Practical- 6** To Prepare slide from given culture(Euglena, Paramecium etc) **Practical -7** To study External features and digestive system of Neries. **Practical -8** To study Reproductive system of Neries. **Practical -9** To study Nervous system of Neries. **Practical -10** To study external features and body wall of Taenia solium. **Practical -11** To study nervous system Taeniasolium. **Practical -12** To study reproductive system of Taeniasolium. **Practical -13** To study life history of Taeniasolium. **Practical -14** Local excursions.	45	50
B	**Based on theory paper CC- Zoo - 502** Classification of following animals up to the order **Practical -1 Protochordata :** **Ascidia, Botrylus, Herdmania, Oikapleura, Pyrosoma, Doliolum, Salpa, Amphioxus, Balanoglosus.** **Practical -2 Cyclostomata** **Lamprey, Myxine, Amocoetus larva** **Practical -3 Pisces : Trygon, Raja, Lepidosteus, Polypterus, Protopterus,Tetradon, Anabus, Mudskipper, Exocoetus, Echineis, Rhinobatus(scate), Clarius Polyodon, Acipencer, Notopterus, Labeorohita,**	45	50

	Practical -4 Amphibia : Salamander, Necturus, Siren, Hyla, Bufo, Ichthyophis, Axolotal larva **Practical -5 Male Urinogenital system of Edible fish** **Practical -6 Female Urinogenital system of edible fish** **Practical -7 Arterial system of edible fish** **Practical -8 Mountings of Membranous labyrirnth of edible fish** **Practical -9 To study comparative anatomy of aortic arch of Anamniota.** **Practical- 10 To study comparative anatomy of brain of Anamniota.** **Practical -11 To study comparative anatomy of digestive system of Anamniota.** **Practical -12 To study comparative anatomy of kidney of Anamniota.** **Practical -13 To study comparative anatomy of heart of Anamniota.** **Practical -14 To study parental care in fish** **Practical -15 To study parental care in Amphibia.** **Practical -16 To study histology of the following endocrine organ Pituitary gland, Thyroid gland, Adrenal gland, Pancreas , Testis and Ovary** **Practical -17 Local excursions.**		
C	**<u>Based on theory paper CC- Zoo - 503</u>** **Practical -1** To study Ultra-structure of cell membrane and its permeability by chart/animation. **Practical -2**.To study Ultra-structure of endoplasmic reticulum and golgi body by chart/ animation. **Practical -3.**To study Ultra-structure of Mitochondria and Lysosome by Chart/ animation. **Practical -4**. To study Ultra-structure of Nucleus and Nucleolus by chart/ animation. **Practical -5.**To study Structure of chromosomes and its Types. **Practical -6.** Squash preparation of onion root tips. **Practical -7.** Study of meiotic division from Grasshopper testis/Tradenskensia bud. **Practical -8**.Mounting of salivary gland chromosomes from Chironomous Larva/drosophila. **Practical -9.**To study vital staining of Mitochondria. **Practical -10**. To study staining of Barr body. **Practical -11**. Isolation of DNA from onion. **Practical -12**. To study Human Karyotype. **Practical -13.** To solve the genetic problem related to non disjunction. **Practical -14** To study polymerase chain reaction by chart and	45	50

	animation **Practical -15** To study production of bio-gas by chart and animation. **Practical -16.** To Study plant tissue culture by chart and animation. **Practical -17**. To study techniques for the production of BT cotton by chart. **Practical -18** To study the information related to human genome project by using URL / bio-informatics tools.		
D	**<u>Based on theory paper CC- Zoo - 504</u>** **Practical -1** To study habitual learning behavior in animal **Practical -2 To study the antennal growing in cockroach.** **Practical -3 To study feeding behavior and food preference/Communication /court ship behaviour of Captive and wild animals.** **Practical -4 To study variation in reference to evolution by chart / Animation.** **Practical -5 To study types of isolation in reference to evolution by chart / Animation.** **Practical -6 To study the tools used in wildlife management: Binocular, Camera, Telescope.** **Practical -7 To study Faunal diversity of some protected areas in Gujarat** **Practical - 8 To study Faunal diversity of some important protected areas of India.** **Practical - 9 To prepare a table from given raw data.** **Practical -10 To Calculate standard deviation of the given data.** **Practical -11 Calculate the mean deviation and coefficient mean deviation of the given data.** **Practical -12** To Calculate central tendency and average of the given data. **Practical -13** To study centrifugation (Knowing the instrument). **Practical -14** Separation of blood serum by centrifugation. **Practical -15** To study colorimeter (Knowing the instrument). **Practical -16** To study electrophoresis tool ((Knowing the instrument). **Practical -17** SDS-PAGE discontinuous gel electrophoresis by chart. **Practical -18** To isolate amino acids by using paper chromatography.	45	50

SEMESTER – VI

B.Sc. Sem. VI Zoology

PAPER: ZOO-CC-603 [Invertebrate] **Code:** 21853

Credits: 4

Semester end Examination: 70 marks

Internal : 30 marks

UNIT	Detailed Syllabus	Teaching hours	Marks Weightage
Unit-1	**ANNELIDA** General characters of phylum Annelida. Coelom Nephridia and Coelomoducts Reproduction **ARTHROPODA** General characters of phylum Arthropoda Mouth parts in Arthropoda. Different types of larvae in Arthropoda. Naupleus , Zoea larva, Megalopa larva, Alima larva. Metamorphosis in Insect. Social life in insecta. Hormonal control of metamorphosis Economic importance of Insect.	15	18
Unit-2	**MOLLUSCA** General characters of phylum Mollusca. Torsion and Detorsion in phylum Mollusca. Foot in phylum Mollusca. **ECHINODERMATA** General characters of phylum Echinodermata. Different types of larvae in phylum Echinodermata. Bipinaria larva, Ophio Pluteus larva, Echino Pluteus larva. Water vascular system in phylum Echinodermata (star fish).	15	18
Unit-3	**MINOR PHYLA – CHEATOGNATHA** (eg. Sagitta) External features of minor phylum Cheatognatha. Affinities of minor phylum Cheatognatha.. General anatomy of minor phylum Cheatognatha. Digestive system, Reproductive system, Nervous system, Excretory system etc. **GENERAL ANATOMY OF SEPIA** External features, Digestive system, Reproductive system, Nervous system.	15	17

Unit- 4	**GENERAL ANATOMY OF SCORPION** General anatomy of Scorpion: External features, Digestive system, Reproductive system, Nervous system. Circulatory system Book lung, Coxal gland Appendages of Scorpion Malpighian tubule	15	17

B.Sc. Sem. VI Zoology

PAPER: ZOO-CC-604 [CHORDATE, COMPARATIVE ANATOMY AND FISHERIES BIOLOGY]

Credits: 4 **Code:** 21854

Semester end Examination: 70 marks

Internal : 30 marks

UNIT	Detailed Syllabus	Teaching hours	Marks Weightage
Unit-1	**REPTILE** **General characters,** **General classification,** **Structure of plastron and carapace of Turtles.** **Living fossil Sphenodon** **Reptiles are successful terrestrial animal,** **Snake venom,** **Symptoms of snake bite,** **Cure of snake bite.**	15	18
Unit-2	**AVES** General characters General classification Archaeopteryx, Migration, Ratitae (Flightless birds). Different type of Feathers Synsacrum Pygostyle. **General Anatomy of Pigeon** **Digestive system, Reproductive system,** **Excretory system and Brain**	15	18
Unit-3	**Mammals** General characters General classification Egg laying mammals (Monotremes) **Pouched mammals (Marsupials)** **Placental mammals** **Aquatic Mammals, Dentition.** **General Anatomy of Rat** **Digestive system** **Reproductive system** **Excretory system and Brain.**	15	17
Unit - 4	**Comparative Anatomy of amniota vertebrate animals.** Digestive system Heart Aortic arches Brains	15	17

	Kidneys **Fisheries biology** Importance of Fishery Pomfret fishery Prawn fisheries. Fish Culture in freshwater Induced breeding Management of pond. Preservation of fish Processing of fish		

B.Sc. Sem. VI Zoology

PAPER: ZOO-CC-605 [BIOCHEMISTRY]
Credits: 4 **Code:** 21855
Semester end Examination: 70 marks
Internal : 30 marks

UNIT	Detailed Syllabus	Teaching hours	Marks Weight age
Unit-1	**Carbohydrates** **Introduction, Occurrence, Sources.** **Monosaccharides:** **Definition and Classification.** **Structures of Trioses.** **Structures of Tetroses.** **Structures of Pentoses.** **Structures of Hexoses.** **Asymmetry** **Isomerism.** **Disaccharides:** **Occurrence and formation.** **Maltose.** **Lactose.** **Sucrose.** **Importance of disaccharides.** **Polysaccharides :** **Definition and classification.** **Homopolysaccharides** **Starch, glycogen, cellulose, chitin.** **Heteropolysaccharides :** **A brief account of Muco-polysaccharides, Hyaluronic Acid, Chondroitin, Heparin, Agar- Agar.** **Functions of Carbohydrates.**	15	18
Unit-2	**LIPIDS** **Introduction, Occurrence, Sources,** **Components of Lipids :** **(a) Glycerol (b) Fatty acids.** **Classification of Fatty Acids** **Saturated :-Without double bonds** **Unsaturated :-with one or more double bonds** **Classification of lipid.** **(a) Simple Lipids(Homolipids) :** **Triglycerides – (Fats & Oils) and Waxes.** **(b) Compound Lipids :** **Phospholipids. Lecithins. Cephalins, Glycolipids** **Derived Lipids : Steroids:– Basic steroid Nucleus** **Biological Importance of lipids.**	15	18

Unit-3	**Proteins I** **Introduction, Sources and Nutritive Value** **Structure of Proteins:** **Amino acids, Peptide Bonds, Polypeptide Chains.** **Amino acids :** **Number of Amino acids,** **Structure of Amino acids,** **Classification (Based on the Structure of side chain)** **Classification of protein based on the increasing complexity of structure:** **Simple protein, Conjugated proteins, Derived proteins**	15	17
Unit – 4	**Configuration of Protein** **Primary structure** **Secondary structure** **Tertiary structure** **Quaternary structure** **Properties of Proteins :** **Physical, colour, Tests, Odour, Viscosity,** **Molecular weight, Hydrolysis, Hydration,** **Coagulation, Salting in and out of protein,** **Amphoteric nature of protein, oxidation.** **Biological functions of proteins:** **Enzyme Catalyst, Transport, Storage, Nutrients,** **Contraction and Movement, Mechanical** **Support, Immune Protection, Blood Clotting,** **Transmission of Nerve Impulses, Gene expression,** **Hormonal action, Thermoregulation.**	15	17

B.Sc. Sem. VI Zoology

PAPER: ZOO-CC-605 [ANIMAL PHYSIOLOGY, HISTOLOGICAL MICRO TECHNIQUES AND EMBRYOLOGY]

Credits: 4 **Code:** 21856

Semester end Examination: 70 marks

Internal : 30 marks

UNIT	Detailed Syllabus	Teaching hours	Marks Weightage
Unit-1	**Animal Physiology** **Introduction: Intracellular& Extracellular digestion.** **Mechanical process in digestion: Mastication, Swallowing, Motility [Gastric, small intestine, large intestine.]** **Role of Enzymes in Carbohydrate digestion.** **Role of Enzymes in Protein digestion.** **Role of Enzymes in Lipid digestion.** **Absorption (Carbohydrates, Protein and Lipids)** **Defecations.** **Physiology of blood composition (Blood cell and blood plasma) Respiration** **Exchange and transport of respiratory gases (O_2, CO_2).** **Muscle : Structure of smooth and skeletal muscle** **Physiology of muscle contraction.**	15	18
Unit-2	**Sexual cycle in human:** **Puberty, spermiation, ovulation.** **Estrous cycle** **Menstrual cycle** **Menopause** **Histology and histological Micro techniques.** **Liver** **Kidney** **General account of different type of fixatives** **Stains and preparation of different stains** **Conduction of Nerve Impulses** **Conduction of Nerve Impulses through nerve.** **Conduction of Nerve Impulses through synapse.**	15	18

Unit-3	**Embryology-I** Gamatogenesis: **Spermatogenesisi** **Oogenesis** **Types of eggs in animal.** **a. yolk amount b. yolk distribution** **Fertilization.** **Significance of fertilization** **External fertilization** **Internal fertilization.** **Cleavages in the eggs of animal** **Significance of cleavage** **Planes of cleavage.** **Development of foetal membrane in mammals.** **Placenta and its types.**	15	17
Unit – 4	**Embryology II:** **Chick embryology** **Chick egg structure** **Fertilization** **Cleavage** **Blastula** **Gastrulation** **Formation of endoderm** **Formation of primitive streak and mesoderm** **Development of chick embryo at 24 hours of incubation** **Development of chick embryo at 33 hours of incubation** **Development of chick embryo at 48 hours of incubation** **Development of chick embryo at 72 hours of incubation**	15	17

B.Sc. Sem. VI Zoology

PAPER: ZOO-SEC-601 [GENERAL ZOOLOGY]

Credits: 3 **Code:** 21832

Semester end Examination: 70 marks

Internal : 30 marks

UNIT	Detailed Syllabus	Teaching hours	Marks Weight age
Unit -1	**Important protected areas of India.** Corbett National park Kaziranga National Park. Keoladeo National Park (Bharatpur Birds Sanctuary). Sundervan National park. Kanha National Park. Bandipur National Park.	12	18
Unit -2	**Important protected areas of Gujarat state.** Blackbuck National park Marine National Park and Sanctuary Gir National Park and Sanctuary Wild ass Sanctuary. Nal Sarovar bird Sanctuary. Victoriya park reserve forest. **Important Reptiles of India** Marine turtles: Green turtle, Olive Ridley turtle. Fresh water terrapins: Indian Pond terrapins. Fresh water turtle: Flap – shell turtle. Land tortoise: Starred tortoise Lizards: Brook's Gecko, Snake Skink, common Skink.	11	18
Unit -3	**Organic evolution of Man** Man's place Place of human evolution Time of human evolution Ancestor of man Salient feature of Apes, our ancestor Salient feature of man Causes for human evolution Trends in human evolution Evolution of brain in human evolution Evolution of man as seen in the fossil record 1. Apes 2. Ape – men 3. Primitive men 4. Modern men Important fossils of human evolution	11	17
Unit -4	**Animal Behaviour** Sexual behavior and Parental care Mating system Monogamy	11	17

	Polygamy Polyandry Advantage to males of extra pair mating in monogamous species Extra pair mating in females Leks and Lek polygyny Cannibalistic behavior Predator- prey interaction Predation theory Dispersal behavior		

B.Sc. Sem. VI Zoology

PAPER: ZOO-CC-607 [PRACTICAL]

Credits: 12 **Code:** 21857

Semester end Examination: 200 marks

SEC.	Detailed Syllabus	Teaching hours	Marks Weightage
A	**Based on theory ZOO-CC-603** Classification of following animals up to the order **Practical -1** Annelida : Amphitrite , Eunice, Terebella, Spirorbis, serpulla, Liumbricus, Megascolex, Alanthobdella, Branchillion, Tubifix. **Practical -2** Arthropola : Balanus, Sacculina, Apus, Cyclops, Daphnia, Gammarus, Squilla, Hippa, Scutigera, Limulus, Argulus, Lepisma, Branchipus, Nebalia, Caprella, Oniscus, wolfspider , Buthus. **Practical -3** Mollusca : Patella, Doris, Onchidium, Pecten, Solen, Nautilus, Pearl oyster, Ariophanta, Ophiothrix, Tronchus, Murex, Terebra, Eolis, Pinna, Bulla. **Practical -4** Echinodermata : Echinus, Astropecten, Cucumaria, Synapta, Echinocardium, Astrophyton (Basket starfish), Heart urchin. **Practical -5** To study larva of Annelida and Arthropoda. Trochophore larva, Zoea larva, Megalopa larva, Alima larva. **Practical -6** To study larva of Mollusca and Echinodermata. Velliger larva, Bipinaria larva, OphioPluteus Larva, EchinoPluteus larva. **Practical -7 To study metamorphosis in insect by chart and animation.** **Practical -8** To study External features and digestive system of Scorpion. **Practical -9** To study Nervous system of Scorpion. **Practical -10** To study Reproductive system of Scorpion. **Practical -11** To study mountings of Scorpion. Pecten, Coaxal gland, Book lungs, Poison gland with sting, Appendages. **Practical -12 To study economic importance of insect by chart and Animation.** **Practical -13 To study insects of college campus.** **Practical -14 To study External features and digestive system of sepia.** **Practical -15** To study reproductive system of sepia. **Practical -16** To study nervous system of sepia.		

B	**Based on theory ZOO-CC-604** **Classification of following animals up to the order** **Practical -1 Reptiles : Pond Turtle, Starred tortoise, Draco, Hemidactylus, Chameleon, Uromastrix, Trinket, Echiscarinata (Saw scaled viper), Sea snake, Krait, Rattle snake. Sand boa. Gavialis.** **Practical -2 Aves : Parrot, House sparrow, Crow, Spotted owl, Hoopoe, Green bee eater, Gray babbler, Weaver bird, Quail, Vulture, Painted stork.** **Practical -3 Mammals: Rat, Rabbit, Guinea pig, Hedgehog, Jackal, Squirrel, Mongoose, Shrew, Fox and Flying fox.** **Practical -4 To study digestive system of Rat by chart and animation.** **Practical -5 To study female reproductive system of Rat by chart and animation.** **Practical -6 To study male reproductive system of Rat by chart and animation.** **Practical -7 To study excretory system of Rat by chart and animation.** **Practical -8 To study brain of Rat by chart and animation.** **Practical- 9 To study comparative anatomy of brain of Amniota.** **Practical -10 To study comparative anatomy of digestive system of Amniota.** **Practical -11 To study comparative anatomy of Amniota kidney.** **Practical -12 To study comparative anatomy of Amniota heart.** **Practical -13 To study comparative anatomy of Amniota aortic arch.** **Practical -14 To study various types of feathers in birds.** **Practical -15 To prepare a check list of birds from college campus.** **Practical- 16 To study dentition in Mammals.** **Cow, Goat, Dog, Lion, Cat, Camel, Pig** **Practical -17 To study various types of dinosaurs (by chart/models).** **Practical -18 To study economically important fishes of Gujarat : Mud skipper, Pomp fret, Bombay duck, prawn, lobster, Labeo rohita, Catla catla.** **Practical- 19 To prepare tour report.**	45	50
C	**Based on theory ZOO-CC-605** **Practical-1**. Test for qualitative analysis of Carbohydrates Molisch.s test, Iodine test , Benedict.s test, Fehling.s test , Cole's test, Barfoed's test, Seliwanoff's test, Rapid furfural test, Osazone test, Inversion test **Practical-2** Test for qualitative analysis of Proteins and Amino acid. Precipitation test of proteins, Mercuric nitrate test, Lead	45	50

	acetate test, Sulphosalicyclic test, Potassium ferricynide test, Tannic acid test, Alcohol test, Heller's test, Ammonium sulphate test, Colour reaction for amino acid, Biuret test, Ninhydrine test, Millon's test , Arginine test(Sakaguchi test), Xanthoproteic test , Hopkins- Cole test **Practical-3** To study configuration of protein by chart and animation. **Practical-4** To check properties of proteins by various bio chemical test. **Practical-5** To study biological functions of proteins by chart and Animation. **Practical-6** To study test for quantitative analysis of Lipids. Test for oil, Solubility test, Emulsion test, Absorption test, Glycerol test, Acid value of oil, Saponification test, Iodine test, Borax test, Liebermann- Burchard test for cholesterol **Practical-7** Biochemical test for normal constituent of Urine. **Practical-8** Biochemical test for abnormal constituent of Urine. **Practical-9** Determination of Saliva pH and Qualitative reaction for salivary amylase. **Practical-10** Determination of the pH optimum for Salivary amylase. **Practical-11** Thermolability of enzymes (with reference to variable temperature). **Practical-12** Estimation of Blood glucose by kit.		
D	**<u>Based on theory ZOO-CC-606</u>** **Practical-1** To study Haemin crystal. **Practical-2** To Estimate hemoglobin from own blood. **Practical-3** To Count R.B.Cs from own blood. **Practical-4** To Count W.B.C. (TC) from own blood. **Practical-5** To Count W.B.C. (DC) from own blood. **Practical-6** Measuring of own Blood pressure by sphygmomanometer. **Practical-7** Determination of pulse rate at rest and after exercise. **Practical-8 To Study various kind of fixatives : (Formalin Acetic acid Alcohol(FAA), Picric acid (Bouin's fluid)** **Practical -9 To Study various kind of fixation.** **Practical -10 To Study various kind of stains : Eosin, Haematoxylene, methylene blue, Toludine blue, Acetocarmine** **Practical- 11 To Study histological micro technique to prepare permanent slides.** **a. collection of tissue and fixation** **b. Washing by running tap water and Dehydration** **c. De-alcolization or clearing** **d. Block preparation** **e. Block cutting and spreading.**		

	Practical-12 To prepare permanent histological slides by double staining method. **Practical -13 To study development of chick embryo at various incubation period.** **Practical -14 To study development of chick embryo whole mount At 24 hours, 33 hours, 48 hours, 72 hours of incubation by permanent Slides.** **Practical -15 To study chick embryo L. S. at 16 hours 24 hours, 33 hours, 48 hours, 72 hours of incubation by permanent slides.**		

TEXT BOOK RECOMNDED

1. Text Book of Zoology – Phylum Series	-R.L.Kotpal.
2. Chordate Zoology	- Majupuria.
3. Chordate Zoology	- E.L Jordan & P. S. Verma.
4. Invertebrate Zoology	- E. L. Jordan & P. S. Verma.
5. Invertebrate Zoology	- Majupuria.
6. A Manual of Zoology Vol. I & II	- Ekambernath Ayar.
7. Text Book of Zoology	- Dalela and Verma.
8. Text Book of Zoology	- S.N. Prasad.
9. Invertebrate Zoology	- Veer Bala Rastogi.
10. Modern T.B. of Zoology – Invertebrates	- Kotpal, Agrawal, Khetarpal.
11. Chordate Zoology	- Agrawal and Dalela.
12. T. B. of Cytology	-Dalela & Verma.
13. Introductory Cytology	- V. B. Rastogi.
14. T. B. of Cytology	- Wilson and Morrison.
15. T. B. of Cytology	- Swanson.
16. T. C. Cell Biology, Genetics, Evolution and Ecology	-Verma & Agrawal.
17. Text book of Zoology	- R. D. Vidyarthi.
18. Animal Ecology	-S.P.Singh.
19.Genetics.	-P.K.Gupta.
20. Ecology	- R.L.Kotpal.
21. Pranishastra (Gujarati)	- Ravi Prakashan.
22. Jiv Vignan-2 (Gujarati)	- Nirav Prakashan.
23. A Text Book of General Biology	- Tomer & Singh.
24. Text Book of Zoology	- Sarus Publication.
25.Concept of Ecology	- N.Arumugam.
26. Economic Zoology	- G.S.Shukla & V.B.Upadhyay.
27.Pruthvanshi Praniyo ane Garbhvidya	- A.B.Vyas.
28. Utkrushtha Aprushthvanshi Praniyo	- U.M.Rawal.
29.Laboratory manual in biochemistry	- J Jayaraman.
30.Environmental science	-S.C. Santra
31.Manual of prac. zoology vol.- I,II,III	-P.K.G.Nair