B.Sc. Semester 1
Theory

Govt. College for Women,Parade,Jammu
Syllabi and Course of Study in Zoology for the Examination to be held in the Year 2015, 2016 and 2017.

There shall be one written paper of 100 marks and one practical paper of 50 marks. Theory paper shall be of three hours duration and the practical paper shall be of four hours duration. 20% of the marks shall be reserved for internal assessment in theory paper and 50 % in the practical paper. Theory paper will be set for 80 marks and the practical paper for 25 marks.

1.	Course/Paper Title	:	**Life and Diversity of Invertebrates**
2.	Total Contact Hours	:	90 hrs.
3.	Maximum Marks	:	100
	i) External	:	80
	ii) Internal Assessment	:	20
4.	Minimum Pass Marks		
	i) External	:	29
	ii) Internal	:	07
5.	Duration of Exam	:	3 Hrs

OBJECTIVES

The paper is meant to unfold the magnitude of diversity as it exists in the non- chordate world from microscopic protozoa to macroscopic but fascinating marine 'Echinodermata'. Besides introducing animal diversity to beginners in Zoology, it is expected that the student, will appreciate the streaks of unifying biological principles common to all these diverse organisms. It is also expected that as the teaching of this syllabus progresses, a student will start appreciating the advent and evolutionary sequence from a cellular protozoa, through loose cell-aggregate in parazoa (sponges) to tissue grade organization in metazoa, The syllabus exposes students to the adaptive modifications fixed by specific habitats inhabited by diverse organisms.

SYLLABUS

UNIT –I Protozoa and Porifera

1.1 Introduction to kingdoms of organisms (Five kingdom system -a brief overview viz Monera, Protista. Fungi, Plantae & Animalia).

1.2 Protozoa

1.2.1 Salient features and classification (upto class level)

1.2.2 Structure, Locomotion, Osmoregulation, Nutrition and reproduction of the following types:

1.2.2,1 *Paramecium*

1.2.2.2 *Amoeba*

1.2.2.3 *Euglena*

1.3 Porifera

1.3.1 Salient features and classification (upto class level)

1.3.2 Sycon

1.3.2.1 Structural and functional morphology of Sycon

1.3.2.2 Reproduction of Sycon

1.3.2.3 Histological elements of Sycon

1.3.3 Canal system in Porifera

UNIT II Coelentrata and Helmintlies

2.1 Coelentrata

2.1.1 Salient features and classification (upto class level)

2.1.2 Structure, Histology and life-cycle of the following types:

2.1.2.1 *Metridium* (Sea Anemone)

2.1.2.2 *Obelia*

2.2 Helminthes

2.2.1 Salient features and classification of Platyhelminthes (upto class level)

2.2.2 Structure, reproduction, life cycle and pathogenesis of the following types

2.2.2.1 *Fasciola hepatica*

2.2.2.2 *Taenia saliwn*

UNIT III Annelida

3.1. Salient features and classification (upto class level)

3.2. Structural and functional morphology with special reference to locomotion, digestive system, circulatory system, excretory system, reproductive system and nervous system of Earthworm

3.3. Structural and functional morphology with special reference to digestive system, excretory system, and nervous system of *Neries*.

3.4. Metamerism in Annelids.

3.5. Concept of Coelom.

3.6. Significance of Trochophore larva and *Heteroneries*.

UNIT IV Arthropoda

4.1 Salient features and classification (upto class level)
4.2 Structural and functional morphology with special reference Nervous system, reproduction system, circulatory system and respiratory system of the following types
- 4.2.1.Prawn
- 4.2.2.Grasshopper

4.3.Crustacean Larva
- 4.3.1. Nauplius
- 4.3.2. Zoea
- 4.3.3. Mysis
- 4.3.4. Megalopa

4.4. Metamorphosis in Insects.

UNIT V Mollusca and Echinodermata

5. 1 Mollusca
- 5.1.1 Salient features and classification (upto class level).
- 5.1.2 Structure, digestive, respiratory, nervous and reproductive system in *Pila.*
- 5.1.3 Shell in Mollusca.
- 5.1.4 Torsion in Mollusca.

5. 2 Echinodermata
- 5.2.1 Salient features and classification (upto class level)
- 5.2.2 Structure, water vascular, digestive, circulatory and reproductive system of star fish
- 5.2.3 Life Cycle of star fish.

Note for Paper Setter
Section A: This section comprises of 10 short answer type questions, two from each unit. The maximum length of the answer shall be 20 words. Each question will carr 02 marks, total weightage being 20 marks. All questions are compulsory.
Section B: This section will comprise of 10 long answer type questions, two from each unit. Student has to attempt 05 questions selecting 01 question from each unit. Each question will carry 12 marks and the total weightage being 60 marks.

Books Recommended

1. Text book of Zoology-Hymen series McGraw Hills.
2. Protozoology-Kudo, Books & Periodicals Corporation (India)
3. Text-book of Zoology-Sedwick series. Central Book Depot.

4 Text-book of Zoology-Parker and Has well Vol. 1. Mac Millan & Co. 1986, New York.
5 Proto^oology-Mackinen and Hawez, Canb University.
6 Treatise in Zoo logy -Lankes ter series.
7 Parasitic protozoa-Baker. Allen & Unwin, Inc. USA.
8 Antropod Analomy-Siiod,.Grass. Principles of insect morphology (1935) Snodgrass, R.E. McGraw Hill London, New York.
9. Invertebrate- Bordale and Potts. C.L.
10. Medical & Veterinary Entomology. Roy D & Broman A W A (1970). Banglore Printing & Publishing Co. Ltd.
11. Integrated principles of Zoology by Hickman, C.P. Jr., F.M. Hickman & L.S. Roberts. (Mosby College Publ.St. Louis.).
12. Manual of Zoology Vol. I (invertibrata) part 1 and II. Ayyar, E.K. & T.N. Ananlha-Krishrian (S. Vishwanathan, Printers & Publ. Pvt. Lid. Madras).
13. Invertebrate Zoo logy-Jordan, KL. & P.S. Verma (S. Charid & Co. Ltd. Madras)

B.Sc. Semester 1 LABORATORY COURSE/Practical 25 MARKS

Syllabi and Course of Study in Zoology for the Examination to be held in the Years 2015, 2016 and 2017.

Practical related to Non-chordates:

1. Study of external features of the following:

1.1 *Nereis:* External features with special emphasis on Head & Parapodia and *Heteronereis* phase.

1.2 Leech: External morphology.

1.3 Prawn: External morphology & Appendages.

1.4 Cockroach: External features.

1.5 Scorpion: External morphology & mouthparts.

1.6 *Pila, Unio:* External morphology of Shell.

1.7 Starfish: External features.

2. Distinguishing characters & classifications of Protozoa to Echinodermata upto class only:

2.1. *Euglena, Trypanosoma, Amoeba, Vorticella, Monocystis, Plasmodium*

2.2 Sycon, Euspongia, Euplectella, Hyalonema

2.3 Hydra, Obelia, Companularia, Stylester, Millipora, Tubitlaria, Sertularia, Plutnularia, Physalia, Velella, Porpita, Aurelia, Rhizostome, Heliochystis, Seacmemone, Corals

2.4 Beroe, Plane/net, Fasciola, Dicrocoelium, Polystomum, Diplozoon, Schislosoma, Caryophyllus, Taenia, Echinococcus

2.5 Ascaris, Enlerobtus, Ancylostoma, Gordius, Echinorhynchus, Branchiolus,

2.6 Nereis, Heteronereis, Aphrodite, Tubicola, Chaeiopterus, Pofygordius, Terebella, Serpula, Arenicola. De.ro, Nats, Allolobophora, Entypheas, Lumbricus, Pheretitna, Hirudinaria, Gephyreas, Sipunculus, Bonellia, Bugula, Saquitta, Pontobdella, Glossiphonia, Hirudo

2.7 Balanus, Lepas, Crayfish, Prawn, Squilla, Hermit-crab Sacculina, Common insects, Scorpion, spider, Limulns, Millipede, Centipede

2.8 Chiton, Mytillus, Unio, Pecten, Lamdlidens,, Anodonta, a pearl Oyster, Nucula, Paramye solar, Teredo, Proleonetna, dentalium, Patella, Haliotus, Murex, Buccinum, Aplysia, Doris, Centrums, Helix, Lymnaea, Planorbis, Loligo, Sepia, Octopus, Nautilus

2.9 Antedon, Asterias, Tentaceros, Astropecten, Holothuria, Echinus, Echinarchinus, Ophiothrix.

3. Dissection of the following animals to expose and study the various systems:-

3.1 *Nereis:* Alimentary Canal, Nervous system.

3.2 Earthworm: Alimentary canal, Reproductive system

3.3. *Palaemon:* Alimentary canal, Nervous system

3.4 *Pila:* General anatomy, Nervous system.

4. Preparation of permanent stained mounts of the following:

Obelia, Dicrocoelium, Parapodium of *Neries,* Nephridium of Earth worm, Ovary of Earthworm, Statocyst of Prawn, Mouthparts and trachea of Cockroach, mouth parts of mosquito and radula of *Pila*

5. Viva - voce.

B.Sc. Semester II
Theory

Govt College for Women Parade Jammu
Syllabi and Course of Study in Zoology for the Examination to be held in the Years 2015, 2016 and 2017.

There shall be one written paper of 100 marks and one practical paper of 50 marks. Theory paper shall be of three hours duration and the practical paper shall be of four hours duration. 20% of the marks shall be reserved for internal assessment in theory paper and 50 % in the practical paper. Theory paper will be set for 80 marks and the practical paper for 25 marks.

1.	Course /Paper Title	:	**Cell Biology Genetics and Evolution**
2.	Total Contact Hours	:	90 hrs.
3.	Maximum Marks	:	100
	i) External	:	80
	ii) Internal Assessment	:	20
4.	Minimum Pass Marks		
	i) External	:	29
	ii) Internal	:	07
5.	Duration of Exam.	:	3 Hrs.

OBJECTIVES

This paper deals with nuclear cytology, introducing students to various aspects of mitosis, meiosis, chromosome structure type and changes, This study along with the study of genetics gives the student an idea of raw material of evolution. The paper also exposes students to history of evolutionary though, pre and post Lamarckian, besides the process of natural selection and specialization. Biogeography and paleontology are the two important facts of life through which a student is made to understand past and present distribution of animals and also understand the importance of evidences (geological) supporting the idea of evolution.

SYLLABUS

UNIT -I Cell Structure and Functions

1.1 Introduction to cell, cell theory: Prokaryotic and Eukaryotic cell
1.2 Organizaton of cell
1.2.1 Structure of cell membrane with special emphasis on 'Fluid mosaic Model
1.2.2 Cytoplasmic organelles

1.2.2.1 Mitochondria, Endoplasmic reticulum, Golgi apparatus, Ribosomes, Microbodies, Centrioles.

1.2.3 Nuclear organization

1.2.3.1 Cell nucleus, nuclear membrane, nuclear matrix and nucleolus.

1.3 Concept of Plasmids and Transposons

UNIT II Chromosome structure and cell reproduction

2.1 Chromosome structure and types

2.1.1 Morphology including matrix, chromonema, chromomere and telomere

2.1.2 Primary and secondary constrictions, chromatids and arms ratio

2.1.3 Types of chromosomes

2.1.3.1 Specialized chromosomes a) Lampbrush b) Polytene and c) Supernumerary chromosomes

2.1.4 Chromosomal models

2.2 Cell Reproduction

2.2.1 Cell cycle

2.2.1.1 Interphase

2.2.1.2 Mitosis (M-Phase), Process, phases and significance

2.2.1.3 Structure and function of spindle apparatus

2.3 Meiosis

2.3.1 Process, phases and significance

2.3.2 Synapsis and synaptonemal complex

2.3.3 Crossing over-mechanism and significance

2.4 Deregulation of cell cycle and cancer

UNIT III Structural and numerical changes in chromosomes and their significance

3.1 Structural changes

3.1.1 Deficiencies/deletions

3.1.2 Duplication

3.1.3 Translocation

3.1.4 Inversions.

3.2 Numerical changes in chromosomes

3.2.1 Aneuploidy

3.2.2 Euploidy

3.2.2.1 Haploidy

3.2.2.2 Polyploidy

U NIT IV Genetic material and inheritance

4.1 Mendelian law of inheritance; Neomendelism - An elementary idea

4.2 Nature and function of DNA & RNA

4.3 Sex linked inheritance (eye colours in *Drosophila* and hemophilia in man.)

4.4 Cytoplasmic inheritance

4.4.1 Maternal effect on shell coiling in snails *(Lymnaea).*

4.4.2 Kappa particles in *Paramecium.*

4.5 Sex determination system: chromosomal (e.g. Grasshopper), ploidy (e.g. Honey bee) and Environmental (e.g. *Bonelia)*

UNIT V Paleontology and Evolution

5.1 Paleontology

5.1.1 Fossil formation and types.

5.1.2 Living fossils with special emphasis on *Latimeria* and *Sphenodon.*

5.2. Evolution

5.2.1 Origin of life

5.2.2. Concepts and evidences of organic evolution

5.2.2. 1 Morphological evidences

5.2.2.2 Embryological evidences

5.2.2.3 Palaentological evidences

5.2.2.4 Physiological and biochemical evidences

5.2.2.5 Biogeographical evidences

5.3 Neo-darwinism-Modern concept of organic evolution and speciation.

5.3.1 Variations and their types

53.2 Mutation -gene mutations.

5.3.3 Isolating mechanisms

Note for Paper Setter

Section A: This section comprises of 10 short answer type questions, two from each unit. The maximum length of the answer shall be 20 words. Each question will carr 02 marks, total weightage being 20 marks. All questions are compulsory.

Section B: This section will comprise of 10 long answer type questions, two from each unit. Student has to attempt 05 questions selecting 01 question from each unit. Each question will carry 12 marks and the total weightage being 60 marks.

Books recommended:

1. The - C.P. Swanson. Prentice- Hall of India Pvt. Ltd., New Delhi.
2. Cytology and Cytogenetics -C.P, Swanson. Prentice-Hall of India Pvt. Ltd., New Delhi.
3. Fundamental concepts of Cell biology -K.G. Purohit,
4. Gene & Genetic Code -the chemical basis of Life- I.D.Ctierayil.
5. Chemical background for biological Science- E.H.White,
6. Cellular physiology and Biochemistry- W.D Mcelvey.

7. Gene Action -P.E. Hartman, S.R. Susldnd
8. Evolution -Lull. Organic Evolution, Richard Swanson, Light & Life Publishers,
9. Genetics-Verma, P.S. & V.K. Agarwal, S; Chanel and Co.
10. Biology of Genetics-Lewis, CD. & Lewin, R. McGraw Hill, Toppan Co. Ltd.
11. Molecular Genetics -Gunther S, Stcn Mcmilliah Pub. Co. Inc.
12. Genetics -Goodenough, V ."N. Y. Holt, Rinchavt & Winston.
13. Principles of Genetics -Gradner, Wiley Easten (P) Ltd. John Willey & Sons, Inc.
14. Genetics -Stickberger, Ayala, Stebbins & Valentine (W.H. Freeman). MacMillan Press.
15. Genetics and Origin of species -Dobzhansky (Columbia Univ. Press).
16. Animal cytology and evolution- White, M.I.D. Cambridge Univ. Press. 1973.

B.Sc. Semester II LABORATORY COURSE **PRACTICAL** **25 MARKS**

Syllabi and Course of Study in Zoology for the Examination to be held in the Years 2015, 2016 and 2017

1. Study of mitosis from prepared slides
   - 1.1 Prophase
   - 1.2 Metaphase
   - 1.3 Anaphase
   - 1.4 Telophase
   - 1.5 Cytokinesis

2. Study of meiosis from prepared slides

meiosis I

- 2.1 Prophase
  - 2.1.1 Leptotene
  - 2.1.2 Zygotene
  - 2.1.3 Pachytene
  - 2.1.4 Diplotene
  - 2.1.5 Diakinesis
- 2.2 Metaphase I
- 2.3.Anaphase I
- 2.4 Telophase I
- 2.5 Meiosis II
  - 2.5.1 Prophase II
  - 2.5.2 Metaphase II
  - 2.5.3 Telophase II

3. Preparation of different chemicals studied for cytological studies
4. Preparation of slides for study of mitosis from onion root tips
5. Preparation of slides for the study of meiosis from grasshopper
6. Preparation of slides of polytene chromosomes from *Chironomus* larva
7. Ultra structure of cell
8. Study of mendelian and non mendelian ratio through count of bean seeds
9. External morphology of male and female *Drosophila*
10. Study of evolution of horse and man through chart/ model
11. Study of living fossils through specimens (*Latemaria*)
12. Study of models and their significance of the following
    - 12.1 *Archyopteryx*
    - 12.2 Dinosaurs
13. Zoogeographic study (through maps)

14. Study of Human Genetic syndromes through charts/photographs
15. Study of Barr body through cheek squamous Epithetical cells;
16. Study of Drum stick though blood smear
17. Viva - voce

B.Sc. Semester III
Theory

Govt College for Women Parade Jammu
Syllabi and Course of-Study in Zoology for the Examination to be held in the Years 2015, 2016 and 2017.

There shall be one written paper of 100 marks and one practical paper of 50 marks. Theory paper shall he of three hours duration and the practical paper shall be of four hours duration. 20% of the marks shall be reserved for internal assessment in theory paper and 50 % in the practical paper. Theory paper will be set for 80 marks and the practical paper for 25 marks.

1.	Course /Paper Title	:	**Chordate Life, Diversity and Function**
2.	Total Contact Hours	:	90 hrs.
3.	Maximum Marks	:	100
	i) External	:	80
	ii) Internal Assessment	:	20
4.	Minimum Pass Marks		
	i) External	:	29
	ii) Internal	:	07
5.	Duration of Exam	:	3 Hrs.

OBJECTIVES

The paper deals with chordate diversity and in each group from fishes to mammals, evolutionary terminals along specific lines of evolution, indicating organizational perfection along such, specialized lines, can be recognized. Nevertheless, the converse, picture of emerging and continuing evolution can be appreciated in perfection to tetrapod through amphibia from fishes and birds and mammals from reptiles. The diversity of these large animals adds to the fascinations of the biosphere.

SYLLABUS

UNIT I

1.1 Chordates - Origin of chordates
1.2 General characters and classification of chordates upto class level.
1.3 Hemichordata
  1.3.1 External morphology *ofBalanoglossus*
  1.3.2 Affinities and systematic position of *Balanoglossus*
1.4 Urochordnta (type: *Herdmania)*
  1.4.1 External morphology
  1.4.2 Digestive system
  1.4.3 Circulatory system

1.4.4 Reproductive system
1.4.5 Affinities

1.5 Cephalochordata (type: *Amphioxus)*
1.5.1 External morphology
1.5.2 Digestive system
1.5.3 Circulatory system
1.5.4 Nervous system
1.5.5 Affinites *of Amphioxus*

UNIT II Agnatha and Pisces

2.1 General characters and outline classification of Agnatha and Pisces upto order level.

2.2 Type: *Petromyzon*
2.2.1 External features
2.2.2 Digestive system and feeding
2.2.3 Reproductive system
2.2.4 *Ammocoete* larva

2.3 Type: *Scoliodon*
2.3.1 External characters
2.3.2 Digestive system
2.3.3 Respiratory system
2.3.4 Urinogenital system
2.3.5 Central nervous system

UNIT III Amphibians and Reptilia

3.1 General characters and classification of amphibians and reptiles upto order level

3.2 Amphibia (Type: Frog)
3.2.1 External features
3.2.2 Digestive system
3.2.3 Respiratory system
3.2.4 Circulatory system
3.2.5 Urinogenital system
3.2.6 Central nervous system

3.3 Reptile (Type : *Calotes)*
3.3.1 External features
3.3.2 Digestive system
3.3.3 Respiratory system
3.3.4 Circulatory system
3.3.5 Urinogenital system
3.3.6 Central nervous system

UNIT IV Aves and Mammalia

4.1 General characters and classification of Aves and Mammalia upto order level

4.2 Aves (Type : Pigeon)

- 4.2.1 External features
- 4.2.2 Digestive system
- 4.2.3 Respiratory system
- 4.2.4 Circulatory system
- 4.2.5 Urinogenital system
- 4.2.6 Central nervous system

4.3 Mammalia (Type: Rabbit)

- 4.3.1 External features
- 4.3.2 Digestive system
- 4.3.3 Respiratory system
- 4.3.4 Circulatory system
- 4.3.5 Urinogenital system
- 4.3.6 Central nervous system

UNIT V

5.1 Types of scales and fins in fishes

5.2 Migration in fishes

5.3 Parental care in fishes

5.4 Parental care in Amphibians

5.5 Migration in birds

5.6 Flight adaptation **in** birds

5.7 Skin, its derivatives and uses in mammals (Horns, digital tips and antlers)

5.8 Jaw suspension in vertebrates,

Note for the paper setters:

Section A: This section comprises of 10 short answer type questions, two from each unit. The maximum length of the answer shall be 20 words. Each question will carr 02 marks, total weightage being 20 marks. All questions are compulsory.

Section B: This section will comprise of 10 long answer type questions, two from each unit. Student has to attempt 05 questions selecting 01 question from each unit. Each question will carry 12 marks and the total weightage being 60 marks.

Books Recommended

1. Chordate Zoology- N. Arumugam, Vol. 2. Saras Plublication
2. Text book of Zoology-Hymen series McOraw Hills

3. Chordate Zoology-E.L.Jordan & P.S. Verirm. S. Chand Limited
4. Chordate /.oology- P.S. Dhami & J.K. Dbami (1981) (R. Chand & Co.)
5. Principles of anatomy and physiology-G.J.Tortora & N.P. Anagnostakos (1984) (Harper & Row Publ., N.Y.).
6. Textbook of zoology, Vertebrates-A. J. Marshall (1995) (The McMillan Press Ltd., UK).
7. Chordate zoology- EX. Jordan & P.S. Verma (1998) (S. Chand & Co.)
8. Modern textbook of Zoology (Vertebrates) -R.L.Kotpal (2000). (Rastogi Publ., Meerut),
9. Functional Anatomy of the Vertebrates; An Evolutionary Perspective- Liem, Karel F., William E. Bemis, Warren F. Walker, Lance Grande (2001). Brooks Cole.
10. Advanced Chordate Zoology-Gurdarshan Singh & H, Dliaskar (2002). Campus Books.

B.Sc. Semester III **LABORATORY COURSE Practical** **25 MARKS**

Syllabi and Course of Study in Zoology for the Examination to be held in theYears 2015, 2016 and 2017

1. Study of external features of the following types:

Amphioxus: With special reference to oral hood, Velum, branchial wall, section through various regions.

Herdmania: with special reference to test, test spicules, branchial basket neural gland.

Balanoglossus: With particular stress on anterior region through sagittal sections.

Cyclostoma: *Petromyzon, Myxine*

Elasmobrancli: *Scoliodon*

Teleostomi: *Cyprinus carpio*

Ampliibia: Frog, Salamander

Reptiles: *Uromastix*, turtle

Birds: *Columbia*, Fowl

Mammals: Rabbit, Squirrel

2. Distinguishing characters and classifications of protochordate through chordate (upto orders only) examplified through following animal types:

2.1 *Pyrosoma, Botryllus, Salpa,* Ammocoetus larva

2.2 *Zygaena, Stegostoma, Dasylis, Heptanchus, Charchardon, Pristis, Tarpedo, Rhinobatis, Chimera*

2.3 *Protopterus, Acipenser, Lepidosteus, Amia*

2.4 *Salmo, Barbus, Cyprinus, Schzothorax, Glorias, Heteropneustes, Glyptothorax, Botia, Nemachueilus, Ophiocephalus, Exocoetus, Pleuronectus, Anguilla, Gambusia Anabas, Pterois, Echineis*

2.5 *Ichthyophis, Oerotyphlus, Ambryostoma, Axolotl larva, Amphiuma, Salamander Siren, Pipa, Hyla, Bufo, Racophorus*

2.6 *Chelona, Trionyx, Kachuga, Testudo, Sphenondon, Hemidaclylus, Chameleon, Draco, Heloderma, Caloles, Phynosome, Ophisaurw, Typhlops, Python, Bungarus, Naja, Viper, Hydrophis, Crotalus, Zamenis, Crocodilus, Gavialis*

2.7 *Archaeopteryx, Penguin, Stntthio, Apteryx,, Milvus, Eudynamys, Psittacula, Buba, Coracias, Dinopium, Passer, Carvus, Ardaa, Anas, Pavo, Cotumix, Pheasants*

2.8 *Echidna, Didelphis, Macrophus, Talpa, Echinosorex, Pteropus, De.smod.us, Lampur, Tersius, Armadiles, Manis, Rabbit, Rattus rattus, Funadamulus hystrix, Whale, Dolphin, Hyaena, Panthera, Civet, Cat, Canis, Vulpes, Herpestes, Phoca, Otario, Elephus, Halicore, Mantiees,*

Equas, Rhinoceros, Sus, Hippopotamus, Dicotyles, Cow, Buffalo, Sheep, Goat

3. Dissect the following animals to study the various systems: - -

Scoliodon/Carp:

1.1 Aortic arches
1.2 Urinogenital system
1.3 Cranial nerves
1.4 Taking out pituitary

4. Preparation of permanent mounts of the following;

4.1 Velum, Oral hood and Pharyngeal of *Amphioxus*
4.2 Ampullae of Lorenzini, Placoid scale, Ctenoid scale of fish,

5. Study of types of feet and claws, feathers and beaks in birds.
6. Viva-voce

B.Sc. Semester IV
Theory

Govt College for Women Parade Jammu
Syllabi and Course of Study in Zoology for the Examination to be Held in the Years 2015, 2016 and 2017.

There shall be one written paper of 100 marks and one practical paper of 50 marks. Theory paper shall be of three hours duration and the practical paper shall be of four hours duration. 20% of the marks snail be reserved for internal assessment in theory paper and 50 % in the practical paper. Theory paper will be set for 80 marks and the practical paper for 25 marks.

1.	Course /Paper Title	:	**Comparative Physiology of animals**
2.	Total Contact Hours	:	90 hrs
3.	Maximum Marks	:	100
	i) External	:	80
	ii) Internal Assessment	:	20
4.	Minimum Pass Marks		
	i) External.	:	29
	ii) Internal	:	07
5.	Duration of Exam .	:	3 Hrs.

OBJECTIVES

It deals broadly with animal functions, embryology and environmental biology. The student is introduced to some important functional aspects of endocrinology and reproductive biology. Some topics on the developmental biology have also been included in the course to acquaint the students with different patterns of development in animals. This paper also introduces a student to the emerging and all important concepts of environmental biology so that he/she develops not only environmental awareness and understands hazards of depleting environment but also carry this message for the society in general. For this reason the student is exposed to a syllabus which aims at projecting the ecosystem concept magnifying the wholesomeness, its homeostasis and delicate balance that exists therein.

SYLLABUS

UNIT I

1.1 Nutrition, feeding and digestion

1.1.1 Types of nutrition and Feeding mechanisms (Microphagy ; macrophagy, Filter feeding)

1.1.2 Digestion - extracellular and intercellular types.

1.1.3 Enzymatic digestion
1.1.4 Hormonal control of digestion
1.1.5 Symbiotic digestion.

1.2 **Respiration**

1.2.1 Transport of Gases
1.2.2 Respiratory pigments and their role in gas transport
1.2.3 Regulation of respiration in mammals

UNIT II

2.1 **Circulation**

2.1.1 Closed and open circulatory systems
2.1.2 Types of circulation and cardiac cycle
2.1.3 Pace maker, myogenic and neurogenic type of heart
2.1.4 Thermoregulation

2.2 **Excretion and Osmoregulation**

2.2.1 Excretory organs in animals and nitrogenous wastes
2.2.2 Urine formation in Mammals
2.2.3 Osmoregulation in fresh water, marine and terrestrial environment

2.3 **Neuromuscular system**

2.3.1 Nerve impulse conduction
2.3.2 Muscle contraction
2.3.3 Neurotransmitter

UNIT III Endocrinology of Reproduction

3.1 General organization of pituitary gland in mammals
3.2 Hypothalamo-hypophyseal axis
3.3 Pituitary hormones
3.4 Pituitary-gonadial) axis
3.5 Gonadial hormones and their functions
3.6 Menstruation in primates
3.7 Oestrous cycle in primates

UNIT IV Developmental Biology

4.1 Gametogenesis (Spermatogenesis and Oogenesis), Types of eggs.
4.2 Fertilization: Egg sperm interaction, Acrosome reaction activation and polarity of egg Cleavage: Types and patterns; Elementary concepts of inner cell mass and stem cells
4.3 Process of Blaslulation and fate-map construction in frog
4.4 Gastrulation in Frog upto the formation of three germinal layers
4.5 Development of *Amphioxus* upto formation of coelom
4.6 Extra embryonic membrane of chick
4.7 Placentation in mammals

4.8 Retrogressive metamorphosis in Ascidians *(Herdmania)*

UNIT V Ecology: Ecosystem concept and energetic

5.1 Ecology - its definition and relation to humanity

5.2 Ecological niche, habitat, biosphere, biome, ecotone

5.3 Ecosystem concepts and Homeostasis

5.3.1 Energy flow in ecosystem

5.4 Primary productivity

5.5 Food chains: grazing food chains and detritus food chains

5.6 Food webs

5.7 Trophic structure and ecological pyramids such as pyramids in number, biomass and energy.

5.8 Analysis and evaluation of an ecosystem

5.8.1 Abiotic and biotic factors

5.8.2 Population and community structure

5.8.3 Ecological succession

5.9 **Human activity and natural resources**

5.9.1 Eutrophication and Biomagnification

5.9.2 Deleterious influence on wildlife resources and its conservation

5.9.3 Endangered Species (Overview)

5.9.4 Conservation of natural resources (Overview)

Note for the paper setters:

Section A: This section comprises of 10 short answer type questions, two from each unit. The maximum length of the answer shall be 20 words. Each question will carr 02 marks, total weightage being 20 marks. All questions are compulsory.

Section B: This section will comprise of 10 long answer type questions, two from each unit. Student has to attempt 05 questions selecting 01 question from each unit. Each question will carry 12 marks and the total weightage being 60 marks.

Books recommended:

1. Text book of zoology - Parker and Haswell Vol. II
2. Chordate Zoology and Elements of Animal Pliysiology -E.L. Jordon and Verma, P.S.
3. Zoology and Choi-dates by H.C. Migam, Vislml Publications, Jallandhar
4. Comparative Anatomy- M.D.L. Srivastava
5. Comparative Anatomy - Kingley
6. Life of Mammals - J.Z. Young
7. Fundamentals of Ecology - Odum

8. Ecology by Kermondy
9. Field Biology - Benten and Wegner
10. Wildlife of India - Sahasia
11. Animals and Environment - Vemberg
12. Wildlife Ecology -Aeron
13. Wildlife Management - Dasmarm
14. Manual of Zoology Vol II Chordala - Ayyar, E.K,, T.N. Anorthakrishnari
15. Chordate structure and function - Waterman, A.N. and Others
16. General and Comparative Physiology - W.S. Hoar
17. Principles of Animal Physiology - Wood, D.W.
18. Animal physiology -Eckert
19. An Introduction to Embryology -Balinsky
20. Biology of Developing System - Grant
21. Developmental Biology - Gilbert.

B.Sc. Semester IV **LABORATORY COURSE Practical** **25 MARKS**

Syllabi and Course of Study in Zoology for the Examination to be Held in theYears 2015, 2016 and 2017

This paper deals with practicals pertaining to

1. Study of following skeleton:
   - 1.1 Skull of frog and Varanus, Fowl and Rabbit
   - 1.2 Axial and Appendicular skeleton of fowl, rabbit, frog and Varanus
2. Study of types of eggs (Frog, Reptiles and Birds)
3. Study of chick embryology through stained mounts (18 Mrs.; 24 Hrs.; 36 Hrs.; 48 Hrs.;72Hrs.)
4. Simple lab. Tests for detection of protein carbohydrate, fats
5. Action of Enzymes (Amylase and Pepsin)
6. Blood smear, Irishman's stain, prepared slides for making different leucocyte count through Arneth's count methods
7. Study of histology of different endocrine glands from prepared slides (pituitary and Gonads)
8. Demonstration of different types of Placenta in mammals through models or preserved specimens.
9. To observe the coagulation of blood
10. To determine the clothing time of blood.
11. To study the effects of different born ones secacted by following glands:
    a) Thyroid
    b) Adrenal
    c) Pancreas
    d) Gonads.
12. To estimate the amount of Haemoglobin.
13. To estimate the amount of blood sugar with the help of Glucometer.
14. Viva - voce

GOVERNMENT COLLEGE FOR WOMEN, PARADE, JAMMU(J&K)
SYLLABUS OF ZOOLOGY
FOR BSC SEMESTER (VI) FOR THE EXAMINATION TO BE HELD IN THE YEARS 2016, 2017 AND 2018.

The course would be of 150 marks. theory and practical would carry 100 and 50 marks respectively. There shall be one written paper of 80 marks. the duration for which would be three hours: 20 marks would be for internal assessment in theory including 5 marks for attendance. Practical internal and external would carry 25 marks each and duration of practical paper shall be of three hours. In case of the regular students internal assessment received from the college will be added to the marks obtained by them in the final examination and in case of private candidates marks obtained by them in the final examination shall be increased proportionately in accordance with the statues / regulation.

Economics Zoology **80 Marks**

Objective

The course deals broadly with Economics zoology besides providing an insight into the relative usefulness of animals as human food. The course introduces the students to some important economic aspects of zoology .a line which they may ultimately choose to develop for their self –employment (whole time or part time).

DETAILED SYLLABUS

UNIT I-: AQUACULTURE

1.1 Status and scope of Aquaculture
1.2 Monoculture
- 1.2.1 Prawn culture
- 1.2.2 Pearl culture
- 1.2.3 Crap culture
- 1.2.4 Trout culture
- 1.2.5 Crab culture

1.3 Polyculture (Composite fish culture)
1.4 Induced Breeding in fishes
1.5 Economic importance of fishes .

UNIT II: APICULTURE SERICULTURE AND LAC CULTURE

2.1 Apiculture :

- 2.1.1 General morphology of honey bees. with special reference on mouth parts and appendages of workers
- 2.1.2 Life cycle of Honey –bee
- 2.1.3 Composition of honey . Uses of honey & Bee – Wax:
- 2.1.4 Methods use in Apiculture
- 2.1.5 Predators and Parasites of honey bee
- 2.1.6 Bee Venom as medicine

2.2 Sericulture :

- 2.2.1 Silk producing insects in India and kinds of silk fibers produced
- 2.2.2 Life Cycle of silk worm (*Bombyx mori)*
- 2.2.3 Economic Importance of Silk worm
- 2.2.4 Mulberry cultivation for sericulture
- 2.2.5 Principles of silk worm rearing
- 2.2.6 Pebrine Disease. Its Genesis Pathogensis And Prophylaxis
- 2.2.7 Status of sericulture in J&K.

2.3 Lac Culture

- 2.3.1 Life Cycle of Lac Insect
- 2.3.2 Lac Cultivation . Formation and Uses

UNIT III Poultry and cattle farming

3.1 Poultry farming

- 3.1.1 Breeds of Poultry birds and their characteristics: Rhode island red : white- Leghorn: Black Minorca: Aseel . Chittagong
- 3.1.2 Poultry breeding and rearing
- 3.1.3 Poultry feed and quality food
- 3.1.4 Poultry diseases: causes. symptoms. pathogenesis. mode of transmission and prophylaxis of the following poultry diseases. Ranikhet. Coccidiosis and Avian tuberculosis.

3.2 Cattle Farming

- 3.2.1 Breeds of dairy cattle and their characteristics Red sindhi sahiwal . Red Dane Haryana . holstien – Friesian Jersy
- 3.2.2 Feeding and fodder .
- 3.2.3 Cattle diseases : mastitis . anthrax . Foot and mouth diseases

UNIT –IV : Animal Pests

4.1 Overview of Nematode parasite of potato, tomato and wheat.

4.2 Insect Pests:

4.2.1 Insect pests of stored food : diagnostic features, extent of damage and control measures.

4.2.1.1 *Sitophilous oryze* (Rice – Weavil)

4.2.1.2 *Tribolium castenum* (red – flour beetle)

4.2.1.3 Rhizopertha dominica

4.3 Insect Pests of standing crops

4.3.1 *Leptocorsia vericornis* (Rice- Gundhi Bug)

4.3.2 *Pectinophora gossypiella* (Pink- boll worm of Cotton)

4.4 Insects as vectors of human diseases

4.5 Ticks and mites: their harms, role and control

4.6 Snakes

4.6.1 poisonous snakes and venom

4.6.2 Role of snakes in rodent pest control

4.7 Birds :

4.7.1 Birds as pest

4.7.2 Role of birds in pest control (Self Study)

UNIT V : BIOTECHNOLOGY :

5.1 General concepts of biotechnology

5.2 Biotechnology in live stock:

5.2.1 in-vitro fertilization

5.2.2 Artificial insemination

5.2.3 Surrogate mothers : embryo transfer technology

5.2.4 Cloning (basic concept)

5.3 Applications of biotechnology

5.3.1 Biogas

5.3.2 Biofertilizers

5.3.3 Bioinsecticides

5.3.4. Antibiotics

NOTE FOR PAPER SETTING

Section A: 10 short answer question are to be set with at least two questions from each unit. The maximum length of answer shall be 20 words. All questions are compulsory. Each question will carry 2 marks, total weightage being 20 marks

Section B: This section will comprise of ten questions, with two questions from each unit students have to attempt 05 questions one from each unit. Each question will carry 12 marks and the total weightage being 60 marks.
Note for drawing well labeled diagrams where ever necessary must be mentioned in questioned paper.

Books Recommended

1. Ullal S.R. and Narsimabanna
2. Technology of fishes . Acad. Press Londan
3. Singh V P and Ramachandran . V (1985). Fresh Water fish culture ICAR New Delhi
4. Stickney . R R (1979) Principle of warm water aquaculture . John Willey & Sons New Delhi
5. Jhingran. VP (1982) Fish and Fisheries of India Hindustan Pub. Corp. (India) New Delhi
6. Kurian C V and Sebastian V C . Prawns and prawn Fisheries of India Hindustan Publ Corp (India) New Delhi
7. Prave P Faust I sitting W & Sukatsch . D A (1987) fundamental Of Biotechnology VCH Pub Germany
8. Higgim . I J best DJ and Jones J (1985). Biotechnology Principle and Application Blackwell Scientific Publ. Oxtord
9. Banerjee. G C (1982). Poultry . Oxford and IBM Publ
10. Naik K K Anathakrishnan . T N and David B V. Poultry . Oxford and IBM Publ.
11. Matcalf C.L. and Flint. W.P. Useful and destructive insects. Tata McGraw hill Publ. New Delhi
12. Roberts. S.O. Veterinary Obaterries and genital diseases
13. Shukla and Upadhya Economic Zoology
14. Kovaleve .P.A. Silkworm breeding stocks Central Silk Broad. Marine . Drive Bombay
15. Roger . A Morse, The ABC and XYZ of Bee Culture A.I. Root & Co Medina . Ohia

LABORATORY COURSE **(PRACTICAL)**

1. Morphology of head , wing ,legs thorax and abdomen of honey –bee
2. study of mouth parts , sting apparatus and hind legs of honey –bee from prepared Slides
3. study of life history of honey –bee
4. Study of life history of *Bombyx mori* using preserved specimen
5. study of type of silk fibers from prepared slides
6. Candling of egg of fowl for differentiation of the fertilized eggs from The unfertilized eggs
7. study of the following insect pest i)Rice- weevil ii) Red flour beetle iii) Lesser Grain borer iv) Rice- Gundi bug v) Pink boll worm of cotton
8. Collection and preservation of insect pests
9. Identification and culture of fish food organism (protozoa and rotifers)
10. Identification of major and minor carps locally available (cat fish air- breathing fish)
11. A visit to sericulture farm for the study of life cycle of *Bobmyx mori*. different types of cocoons and silk spinning techniques.
12. A visit of apiculture farm.
13. A visit to poultry farm.
14. A visit to dairy farm
15. A visit to fish farm/aquarium
16. A visit to university Zoological Park
17. Study of common poisonous snakes from specimens
18. Aquaculture: identification of cultivable
    a) Prawn, crab, lobster
    b) Clams, mussel and oyster
    c) Food fishes
    d) Ornamental and exotic fishes
19. Viva-voce

GOVT COLLEGE FOR WOMEN PARADE JAMMU

AUTONOMOUS COLLEGE

B.SC. SEMESTER-I

Core Course No. : **UZOTC 101**
Core Course Title: **ANIMAL DIVERSITY(THEORY)**
CREDITS : **4**

Syllabi and Course of Study in Zoology
For the examination to be held in the years 2017, 2018
UNDER CHOICE BASED CREDIT SYSTEM

1. Course /Paper Title	:	Animal Diversity (Theory)
2. Maximum Marks	:	**100**
i) External	:	**80**
ii) Internal Assessment	:	**20**
3. Minimum Pass Marks		
i) External	:	**29**
ii) Internal	:	**07**
4. Duration of External Exam.	:	**3 Hrs.**

Unit 1: **Protista, Porifera and Cnidaria**

1.1 Introduction to kingdoms of organisms (Five kingdom system -a brief overview viz. Monera, Protista, Fungi, Plantae & Animalia).

1.2 Protista
- 1.2.1 General characters and classification up to class level
- 1.2.2 Locomotory Organelles and locomotion in Protozoa

1.3 Porifera
- 1.3.1 General characters and classification up to class level.
- 1.3.2 Canal System in Sponges

1.4 Cnidaria
- 1.4.1 General characters and classification up to class level.
- 1.4.2 Polymorphism in Cnidaria: Hydrozoa, Siphonophora
- 1.4.3 Corals & Coral reefs

Unit 2: **Helminthes and Annelida**

2.1 Helminthes

2.1.1 Platyhelminthes
- 2.1.1.1 General characters and classification up to class level.
- 2.1.1.2 Structure, reproduction, life cycle and pathogenesis of *Taeniasolium*

2.1.2 Nemathelminthes
- 2.1.2.1 General characters and classification up to class level.
- 2.1.2.2 Structure, reproduction, life cycle, parasitic adaptations and pathogenesis of *Ancylostomaduodenales*

2.2.1 General characters and classification up to class level.
2.2.2 Metamerism in Annelida

Unit 3: Arthropoda, Mollusca and Echinodermata

3.1 Arthropoda
- 3.1.1 General characters and classification up to class level.
- 3.1.2 Eye structure and Vision in Arthropoda
- 3.1.3 Metamorphosis in Insects

3.2 Mollusca
- 3.2.1 General characters and classification up to class level.
- 3.2.2 Torsion in gastropods
- 3.2.3 Shell in mollusca

3.3 Echinodermata
- 3.3.1 General characters and classification up to class level.
- 3.3.2 Water-vascular system in Asteroidea
- 3.3.3 Trochophore larval: Structure and Significance

Unit 4: Protochordates, Agnatha, Pisces and Ambhibia

4.1 Origin of Chordates

4.2 Protochordates: General features and Phylogeny.

4.3 Agnatha
- 4.3.1 General features of Agnatha and classification of cyclostomes up to class level.

4.4 Pisces
- 4.4.1 General features and Classification up to order level.
- 4.4.2 Osmoregulation in Fishes

4.5 Amphibia
- 4.5.1 General features and Classification up to order level.
- 4.5.2 Parental care in Amphibians

Unit 5: Reptiles, Aves and Mammals

5.1 Reptiles
- 5.1.1 General features and Classification up to order level.
- 5.1.2 Poisonous and non-poisonous snakes.
- 5.1.3 Biting mechanism in snakes

5.2 Aves
- 5.2.1 General features and Classification up to order level.
- 5.2.2 Flight adaptations in birds

5.3 Mammals
- 5.3.1 Classification up to order level.
- 5.3.2 Origin of mammals

Note: 1 There shall be one written theory paper of 100 marks 20% (20 marks) of the marks shall be reserved for internal assessment. Theory paper will be set for 80 marks.

One long answer type question of 10 marks and five short answer type questions of 2 marks each

Note 2: For paper setters:

External End Semester Exam.

Section A: 05 short answer type questions representing all units/syllabi i.e. at least one from each unit (without detail explanation) having 70 to 80 words and having 03 marks each.**(ALL COMPULSORY).**

Section B: 05 medium answers to the questions representing all units/syllabi i.e. at least one from each unit (with explanation) having 250 to 300 words and having 07 marks each.**(ALL COMPULSORY).**

Section C: 05 long answers to the questions (02 to be attempted) representing all units with detailed analysis/explanation/critical evaluation/solution to be stated within 500 to 600 words having 15 marks each.

Books Recommended

1. Text book of Zoology-Hymen series McGraw Hills.
2. Protozoology-Kudo, Books & Periodicals Corporation (India).
3. Text-book of Zoology-Sedwick series. Central Book Depot.
4. Text-book of Zoology-Parker and Haswell Vol. I. Mac Millan & Co. 1986, New York.
5. Protozoology-Mackinen and Hawez, Canb University.
6. Treatise in Zoology-Lankester series.
7. Parasitic protozoa-Baker. Allen & Unwin, Inc. USA.
8. Human Helminthology-Faust, E.C, Lee and Febiger, Philadelphia.
9. Medical Parasitology- K. D. Charterjee
10. Helminthology- Kotpal
11. Arthropod Anatomy-Snod,.Grass. Principles of insect morphology (1935) Snodgrass, R.E. McGraw Hill London, New York.
12. Invertebrale-Bordale and Potts. C.L.
13. Integrated principles of Zoology by Hickman, C.P. Jr., F.M. Hickman &L.S. Roberts. (Mosby College Publ. St. Louis.).
14. Manual of Zoology Vol. I (invertibrata) part I and II. Ayyar, E.K. &T.N. Ananlha-Krishnan (S. Vishwanathan, Printers & Publ. Pvt. Ltd. Madras).
15. Invertebrate Zoology-Jordan,E.L. & P.S. Vemla (S. Chand & Co. Ltd. Madras).
16. Chordate Zoology- N. Arumugam, Vol. 2. SarasPlublication
17. Chordate Zoology-E.L.Jordan& P.S. Verma. S. Chand Limited
18. Chordate zoology- P.S. Dhami&J.K. Dhami (1981) (R. Chand & Co.)
19. Principles of anatomy and physiology-G.J.Tortora&N.P. Anagnostakos (1984) (Harper & Row Publ., N.Y.).
20. Textbook of zoology, Vertebrates-A.J. Marshall (1995) (The McMillan Press Ltd., UK).
21. Modern textbook of Zoology (Vertebrates) -R.L.Kotpal (2000). (Rastogi Publ., Meerut).
22. Functional Anatomy of the Vertebrates: An Evolutionary Perspective- Liem, Karel F., William E. Bemis, Warren F. Walker, Lance Grande (2001). Brooks Cole.
23. Advanced Chordate Zoology-Gurdarshan Singh & H. Bhaskar (2002). Campus Books.

Core Course No. : **UZOPC 101**
Core Course Title: **ANIMAL DIVERSITY(PRACTICAL)**
CREDITS : **2**

1. **Study of external features of the following:**
   - 1.1 *Nereis*: External features with special emphasis on Head &Parapodia and Heteronereis phase.
   - 1.2 Prawn: External morphology & Appendages
   - 1.3 Cockroach: Mouthparts
   - 1.4 *Pila, Unio*: External morphology of Shell.
   - 1.5 Amphioxus: With special reference to oral hood, Velum, branchial wall, section through various regions.

2. **Distinguishing characters & classifications of the following animals:**
   - 2.1 *Euglena, Plasmodium, Paramecium*
   - 2.2 *Sycon, Hyalonema,* and *Euplectella.*
   - 2.3 *Hydra, Obelia, Millipora, Sertularia, Physalia, Velella, Porpita, Aurelia, Tubipora, Metridium.*
   - 2.4 *Planaria, Fasciola, Echinococcus, Taeniasolium, Ascarislumbricoides, Ancylostoma, Enetrobius*
   - 2.5 *Aphrodite, Tubicola, Chaetopterus, Serpula, Arenicola, Pheretima, Pontobdella,*
   - 2.6 *Balanus, Lepas, Cray fish, Palaemon, Cancer, Limulus, Palamnaeus, Scolopendra, Julus, Periplaneta, Apis.*
   - 2.7 *Chiton, Mytillus, Dentalium, Pila, Unio, Loligo, Sepia, Octopus*
   - 2.8 *Pentaceros, Ophiura, Echinus, Cucumaria*and *Antedon*
   - 2.9 *Balanoglossus, Herdmania, Branchiostoma*
   - 2.10 *Petromyzon, Myxine, Sphyrna, Pristis, Torpedo, Chimera, Protopterus, Amia, Salmo, Labeo, Exocoetus, Anguilla, Barbus, Cyprinus, Clarias, Heteropneustes, Ophiocephalus, Anabas, Echineis*
   - 2.11 *Ichthyophis/Ureotyphlus, Salamandra, Axolotl larva, Bufo, Hyla*
   - 2.12 *Chelone, Trionyx, Kachuga, Testudo, Sphenondon,Hemidactylus, Chamaeleon, Draco, Calotes, Typhlops, Python, Bungarus, Vipera, Naja, Crocodylus, Hydrophis, Gavialis,*
   - 2.13 Any six common birds from different orders,
   - 2.14 *Echidna, Macrophus,Manis, Sorex,* Bat, *Funambulus, Loris*

3. **Dissection of the following animals to expose and study the various systems:**
   - 3.1 Earthworm: Alimentary canal, Reproductive system
   - 3.2 *Palaemon*: Alimentary canal, Nervous system

4. **Preparation of permanent stained mounts of the following:**
   Obelia, Parapodium of *Neries,* Nephridium of Earth worm, Ovary of Earthworm, Mouthparts of Cockroach, mouth parts of mosquito and radula of *Pila.*

5. **Key for Identification of poisonous and non-poisonous snakes**

6. An **"animal album"** containing photographs, cut outs, with appropriate [illegible] mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

Note:

There will be one practical paper of 50 marks. 50% (25 marks) shall be reserved for internal assessment.

GOVT COLLEGE FOR WOMEN PARADE JAMMU
AUTONOMOUS COLLEGE

(7)

B.SC. SEMESTER-II

Core Course No. : **UZOTC 201**
Core Course Title: **COMPARATIVE ANATOMY AND DEVELOPMENTAL BIOLOGY OF VERTEBRATES**
CREDITS : **4**

Syllabi and Course of Study in Zoology
For the examination to be held in the years 2017, 2018
UNDER CHOICE BASED CREDIT SYSTEM

1. Course /Paper Title	:	Comparative anatomy and development biology of vertebrates (Theory)
2. Maximum Marks	:	**100**
i) External	:	**80**
ii) Internal Assessment	:	**20**
3. Minimum Pass Marks		
i) External	:	**29**
ii) Internal	:	**07**
4. Duration of External Exam.	:	**3 Hrs.**

Unit 1: **Integumentary Skeletal System** **13 Hrs**

1.1 Integument System
- 1.1.1 Integument: Structure and Function
- 1.1.2 Derivatives of integument:
  - 1.1.2.1 Glands
  - 1.1.2.2 Scales and Scutes
  - 1.1.2.3 Digital Cornifications
  - 1.1.2.4 Horns
  - 1.1.2.5 Feathers

1.2 Skeletal System
- 1.2.1 Evolution of visceral arches
- 1.2.2 Jaw suspension in vertebrates.

Unit 2: **Digestive and Respiratory System** **13 Hrs**

2.1 Digestive System
- 2.1.1 Comparative account of alimentary canal and digestive glands in vertebrates with special reference to *Scoliodon*, Frog, *Calotes*, Pigeon and Rabbit.

2.2 Respiratory System

2.1.2 Structure of Gills (*Scoliodon*), lungs in Vertebrates(Frog, *Calotes*, Pigeon and Rabbit)

2.1.3 Accessory Respiratory Organs in Vertebrates

2.1.3.1 Swim Bladder

2.1.3.2 Air Sacs

13 Hrs

Unit 3: Circulatory and Urinogenital System

3.1 Circulatory System

3.1.1 Comparative account of heart in vertebrates with special reference to *Scoliodon*, Frog, *Calotes*, Pigeon and Rabbit.

3.1.2 Evolution and modifications of aortic arches in verte

3.2 Urinogenital System

3.2.1 Origin and types of Vertebrate Kidney

3.2.2 Evolution of Urinogenital ducts in vertebrates

13 Hrs

Unit 4: Nervous System and Sense Organs

4.1 Comparative account of vertebrate brain with special reference to *Scoliodon*, Frog, *Calotes*, Pigeon and Rabbit.

4.2 Types of receptors

4.2.1 Thermoreceptors in fishes

4.2.2 Tangoreceptors in amphibians

4.2.3 Chemoreceptors in reptiles

4.2.4 Photoreceptors in aves

4.2.5 Phonoreceptors in mammals

13 Hrs

Unit 5: Development Biology

5.1 Gametogenesis: Spermatogenesis and oogenesis in mammals.

5.2 Fertilization

5.2.1 Types of fertilization: External & Internal

5.2.2 Capacitation, Acrosome Reaction, Penetration and Activation of Ovum, Migration of Pronuclei and amphimixis.

5.3 Cleavage: Planes and patterns, Blastulation and fate maps in Frog

5.4 Gastrulation in Frog up to formation of three germ layers, types of morphogenetic movements

5.5 Extraembryonic membranes of chick

5.6 Placentation in mammals.

Note: 1 There shall be one written theory paper of 100 marks. 20% (20 marks) shall be reserved for Internal assessment and External theory paper will be set for 80 marks

Internal Assessment Test

One long answer type question of 10 marks and five short answer type questions of 2 marks each

Note 2: For paper setters:

External End Semester Exam.

Section A: 05 short answer type questions representing all units/syllabi i.e. at least one from each unit (without detail explanation) having 70 to 80 words and having 03 marks each.**(ALL COMPULSORY).**

Section B: 05 medium answers to the questions representing all units/syllabi i.e. at least one from each unit (with explanation) having 250 to 300 words and having 07 marks each.**(ALL COMPULSORY).**

Section C: 05 long answers to the questions (02 to be attempted) representing all units with detailed analysis/explanation/critical evaluation/solution to be stated within 500 to 600 words having 15 marks each.

Books recommended:

1. Text book of zoology – Parker and Haswell Vol. II
2. Chordate Zoology and Elements of Animal Physiology –E.L. Jordon and Verma, P.S.
3. Zoology and Chordates by H.C. Nigam, Vishal Publications, Jallandhar
4. Comparative Anatomy- M.D.L. Srivastava
5. Comparative Anatomy – Kingley
6. Manual of Zoology Vol II Chordata – Ayyar, E.K., T.N. Anorthakrishnan
7. Chordate structure and function – Waterman, A.N. and Others
8. General and Comparative Physiology – W.S. Hoar
9. Principles of Animal Physiology – Wood, D.W.
10. Animal physiology –Eckert
11. An Introduction to Embryology –Balinsky
12. Biology of Developing System – Grant
13. Developmental Biology – Gilbert.
14. Animal Physiology-Nagabhushnam
15. Chordate Zoology- N. Arumugam, Vol. 2. SarasPlublication
16. Chordate Zoology-E.L.Jordan& P.S. Verma. S. Chand Limited
17. Chordate zoology- P.S. Dhami&J.K. Dhami (1981) (R. Chand & Co.)
18. Principles of anatomy and physiology-G.J.Tortora&N.P. Anagnostakos (1984) (Harper & Row Publ., N.Y.).
19. Textbook of zoology, Vertebrates-A.J. Marshall (1995) (The McMillan Press Ltd., UK).
20. Modern textbook of Zoology (Vertebrates) -R.L.Kotpal (2000). (Rastogi Publ., Meerut).
21. Functional Anatomy of the Vertebrates: An Evolutionary Perspective- Liem, Karel F., William E. Bemis, Warren F. Walker, Lance Grande (2001). Brooks Cole.
22. Advanced Chordate Zoology-Gurdarshan Singh & H. Bhaskar (2002). Campus Books.

B.SC. SEMESTER-II

Core Course No. : **UZOPC 201**
Core Course Title: **COMPARATIVE ANATOMY AND DEVELOPMENTAL BIOLOGY OF VERTEBRATES** (PRACTICAL)

CREDITS : **2**

1. Preparation of permanent mounts of the following:
   - 1.1 Velum, Oral hood and Pharyngeal region of Amphioxus
   - 1.2 Ampullae of Lorenzini, Placoid scale, Ctenoid scale of fish
2. Study of following skeleton:
   - 2.1 Skull of Frog, Varanus, Fowl and Rabbit
   - 2.2 Axial and Appendicular skeleton of Frog, Varanus, Fowl and Rabbit
3. Frog - Study of developmental stages - whole mounts and sections through permanent slides – cleavage stages, blastula, gastrula, neurula, tail bud stage, tadpole external and internal gill stages.
4. Study of chick embryology through stained mounts (18 Hrs.; 24 Hrs.; 36 Hrs.; 48 Hrs.; 72 Hrs.)
5. Demonstration of different types of Placenta in mammals through models or preserved specimens.
6. Study of histological sections of mammalian placenta through permanent slides or photomicrographs.
7. Examination of gametes - frog/rat - sperm and ova through permanent slides or photomicrographs.
8. Study of types of feet and claws, feathers and beaks in birds.
9. Dissect a locally available fish to study the following systems:
   - 9.1 Digestive system
   - 9.2 Nervous System
   - 9.3 Taking out Pituitary and Weberian ossicles

NOTE: There will be one practical paper of 50 marks. 50% (25 marks) shall be reserved for internal assessment.

GOVT COLLEGE FOR WOMEN PARADE JAMMU
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B.SC. SEMESTER-III

Core Course No. : **UZOTC 301**
Core Course Title: **PHYSIOLOGY AND BIOCHEMISTRY**
CREDITS : **4**

Syllabi and Course of Study in Zoology
For the examination to be held in the years 2017, 2018
UNDER CHOICE BASED CREDIT SYSTEM

1. Course /Paper Title	:	**Physiology and Biochemistry (Theory)**
2. Maximum Marks	:	**100**
i) External	:	**80**
ii) Internal Assessment	:	**20**
3. Minimum Pass Marks		
i) External	:	**29**
ii) Internal	:	**07**
4. Duration of External Exam.	:	**3 Hrs.**

UNIT-I **13 hrs**

1.1 Nerve and Muscles

1.1.1Structure of neuron.
1.1.2 Resting membrane potential, graded potential.
1.1. 3 Origin of action potential and its propagation in myelinated and non-myelinated nerve fibres.
1.1.4 Molecular and chemical basis of muscle contraction.

1.2 Digestion

1.2.1Histology and function of gastro intestinal tract(GIT)
1.2.2 Physiology of digestion and absorption of carbohydrates, lipids and proteins in the alimentary canal.
1.2.3 Role of gastro intestinal hormones on the secretion and control of enzymes of GIT.

UNIT-II 13 hrs

2.1Respiration

2.1.1Pulmonary ventilation,
2.1.2Respiratory volumes and capacities.
2.1.3Transport of oxygen and carbon dioxide in blood.
2.1.4Nervous control of respiration

2.2.Excretion

2.2.1 Structure of kidney and nephron.
2.2.2 Mechanism of urine formation ; Counter- current mechanism

UNIT-III 13 hrs

3.1Cardiovascular System

3.1.1 Composition of blood and its function.
3.1.2 Coagulation of blood and Haemostasis.
3.1.3 Structure of mammalian heart.
3.1.4 Origin and conduction of cardiac impulse.
3.1.5 Functions of SA node and AV node.
3.1.6 Cardiac cycle.

UNIT-IV 13 hrs

4.1 Reproduction and Endocrine Glands

4.1.1Structure and function of male and female reproductive organs
4.2 Physiology of human reproduction.
4.2.1 Hormonal control of spermatogenesis
4.2.2 Harmonal control of oogenesis and menstrual cycle.
4.3 Structure and function of Endocrine glands
4.3.1Pituitary
4.3.2 Thyroid and Parathyroid
4.3.3 Adrenal gland

UNIT-V 13 hrs

5.1 Carbohydrate, Lipid and Protein metabolism

5.1.1 Glycolysis.
5.1.2 Kreb's cycle.
5.1.3 Electron transport chain.
5.1.4 Gluconeogenesis.
5.1.5 Glycogen metabolism.

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5.1.6 Biosynthesis and β oxidation of fatty acids.
5.1.7 Transamination.
5.1.8 Deamination.
5.1.9 Urea Cycle.

Note: 1 There shall be one written theory paper of 100 marks. 20% marks shall be reserved for internal assessment. Theory paper will be set for 80 marks.

Internal Assessment Test

One long answer type question of 10 marks and five short answer type questions of 2 marks each

Note 2 For paper setters

External End Semester Exam.

Section A: 05 short answer type questions representing all units/syllabi i.e. at least one from each unit (without detail explanation) having 70 to 80 words and having 03 marks each.**(ALL COMPULSORY).**

Section B: 05 medium answers to the questions representing all units/syllabi i.e. at least one from each unit (with explanation) having 250 to 300 words and having 07 marks each.**(ALL COMPULSORY).**

Section C: 05 long answers to the questions (02 to be attempted) representing all units with detailed analysis/explanation/critical evaluation/solution to be stated within 500 to 600 words having 15 marks each.

SUGGESTED READINGS

- Tortora, G.J. and Derrickson, B.H. (2009). Principles of Anatomy and Physiology, XII Edition, John Wiley & Sons, Inc.
- Widmaier, E.P., Raff, H. and Strang, K.T. (2008) Vander's Human Physiology, XI Edition, McGraw Hill
- Guyton, A.C. and Hall, J.E. (2011). Textbook of Medical Physiology, XII Edition, Harcourt Asia Pvt. Ltd/W.B. Saunders Company
- Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). Biochemistry.VI Edition. W.H Freeman and Co.
- Nelson, D. L., Cox, M. M. and Lehninger, A.L. (2009). Principles of Biochemistry. IV Edition. W.H. Freeman and Co.
- Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2009). Harper's Illustrated Biochemistry XXVIII Edition. Lange Medical Books/Mc-Graw Hill.
- Wood, D.W Principles of Animal Physiology
- Eckert –Animal physiology
- Nagabhushnam- A text book of Animal Physiology.

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B.SC. SEMESTER-III
PRACTICAL

Core Course No. : **UZOPC 301**
Core Course Title: **PHYSIOLOGY AND BIOCHEMISTRY**
CREDITS : **2**
Max. Marks : **50**

1. Study of permanent histological sections of mammalian pituitary, thyroid, pancreas, adrenal gland, testis and ovary.
2 Study of permanent slides of spinal cord, duodenum, liver, lung, kidney, bone and cartilage.
3. Simple lab. tests for detection of proteins, carbohydrates and fats.
4. Qualitative tests to identify functional groups of carbohydrates in given solutions (Glucose, Fructose, Sucrose, Lactose)
5. Estimation of total protein in given solutions by Lowry's method.
6. Preparation of hemin and hemochromogen crystals.
7. Preparation of blood smear to study Erythrocytes and leucocytes.
8. Examination of human blood groups.
9. Measurement of blood pressure.
10. Determination of bleeding time of blood.
11 Viva voce.

Note: There will be one practical paper of 50 marks. 50% (25 marks) shall be reserved for internal assessment.

~~B.Sc. SEMESTER III~~

GOVERNMENT COLLEGE FOR WOMEN
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(AN AUTONOMOUS COLLEGE)
Syllabi and Course of Study in Zoology
For the examination to be held in the years 2018, 2019 and 2020
UNDER CHOICE BASED CREDIT SYSTEM

SKILL ENHANCEMENT COURSE **CREDIT- 2**

Course No.

Course Title: APICULTURE (Theory)

Unit 1: ~~Introduction to Aquarium Fish Keeping~~ Biology of Bees. **(13)**

1.1 Common Species of honey bee
1.2 Social organization of Bee colony
1.3 Morphology of honey bee with respect to mouth parts and appendages of worker bee
1.4 Life-cycle of honey bee

Unit 2: Rearing of Bees **(13)**

2.1 Artificial Bee rearing (Apiary), Beehives: Newton and Langstroth Bee Pasturage
2.2 Selection of Bee species for Apiculture
2.3 Bee keeping equipment
2.4 Method of extraction of honey (Indigenous and Modern)
2.5 Processing of Honey
2.6 Bee venom and Royal jelly

Unit 3: Bee enemies and diseases **(13)**

3.1 Bee enemies- wax moth, ants and wasps
3.2 Mite: Varroa Mite and disease caused
3.3 Bacterial disease-American Foulbrood
3.4 Viral disease-chronic bee paralysis virus
3.5 Fungal disease- Chalkboard
3.6 Nosema
3.7 Control Measures-Mechanical and Chemical

Unit 4: Bee economy **(13)**

4.1 Products of Apiculture Industry and its uses (Honey, Bee Wax, Propoles)
4.2 Uses of honey in Indian medicine
4.3 Other valuable by-products of honey bees

Unit 5: Entrepreneurship in Apiculture **(13)**

5.1 Bee keeping industry in India
5.2 Modern methods in employing artificial bee hives for cross pollination in horticultural gardens
5.3 Prospects of apiculture as self employment venture.
5.4 Preparing proposal for financial assistance and funding agencies

AUTONOMOUS COLLEGE

B.SC. SEMESTER-IV

Core Course No. : **UZOTC 401**
Core Course Title: **PRINCIPLES OF GENETICS AND EVOLUTIONARY BIOLOGY**
CREDITS : **4**

Syllabi and Course of Study in Zoology
For the examination to be held in the years 2017, 2018
UNDER CHOICE BASED CREDIT SYSTEM

1. Course /Paper Title	:	Principles of Genetics and Evolutionary Biology **(Theory)**
2. Maximum Marks	:	**100**
i) External	:	**80**
ii) Internal Assessment	:	**20**
3. Minimum Pass Marks		
i) External	:	**29**
ii) Internal	:	**07**
4. Duration of External Exam.	:	**3 Hrs.**

Unit-I

1.1 Cell Cycle

1.1.1Cell cycle; Mitosis and Meiosis
1.1.2 Regulation of cell cycle

1.2 Mendelian Genetics

1.2.1Mendelism and Neo-mendelism (Complementary, Supplementary ratios)
1.2.2Principles of inheritance
1.2.3Incomplete dominance and Co-dominance
1.2.4Multiple alleles, Lethal alleles, Epistasis, Pleiotropy.
1.2.5Extra chromosomal inheritance.

Unit-II

2.1 Linkage

2.1.1Linkage and linkage groups
2.1.2Complete and incomplete linkage.

2.2 Crossing over and mapping

2.2.1Cytological basis of crossing over
2.2.2Recombination frequency
2.2.3Two and three factor crosses, interference and coincidenc

Unit-III

3.1Mutations

3.1.1Chromosomal mutations: deletions, duplications, inversions and translocations
3.1.2Aneuploidy and polyploidy
3.1.3Gene mutations
3.1.4Induced versus spontaneous mutations
3.1.4DNA repair mechanisms.

3.2 Sex determination

3.2.1Chromosomal mechanisms of sex determination
3.2.2Sex-linked, sex-influenced and sex-limited characters
3.2.3Dosage compensation, Lyon's hypothesis and X-inactivation.

Unit-IV

4.1 History of life

4.1.1Major events in the history of life (chemogeny & biogeny).

4.2 Theories of evolution & extinction

4.2.1Lamarckism, Darwinism and Neo-Darwinism

4.2.2Mass extinction (major extinctions with special reference to K-T extinction).

4.3 Evidences of evolution

4.3.1Evidences of evolution
- 4.3.1.1Morphological evidences
- 4.3.1.2Embryological evidences
- 4.3.1.3Palaentological evidences
- 4.3.1.4Biochemical and Physiological evidences
- 4.3.1.5Biogeographical evidences

4.3.2Phylogeny of humans.

Unit-V

5.1 Population genetics

5.1.1Gene pool and gene frequencies
5.1.2Hardy-Weinberg equilibrium
5.1.3Genetic drift, mutation pressure and gene flow.

5.2 Species concept

5.2.1Isolating mechanisms
5.2.2Biological species concept (sibling, polymorphic, polytypic species), ring species
5.2.3Mode of speciation (allopatric and sympatric)

Note: 1 There shall be one written theory paper of 100 marks. 20% marks shall be reserved for internal assessment. Theory paper will be set for 80 marks

Internal Assessment Test

One long answer type question of 10 marks and five short answer type questions of 2 marks each

Note 2 For paper setters

External End Semester Exam.

Section A: 05 short answer type questions representing all units/syllabi i.e. at least one from each unit (without detail explanation) having 70 to 80 words and having 03 marks each.**(ALL COMPULSORY).**

Section B: 05 medium answers to the questions representing all units/syllabi i.e. at least one from each unit (with explanation) having 250 to 300 words and having 07 marks each.**(ALL COMPULSORY).**

Section C: 05 long answers to the questions (02 to be attempted) representing all units with detailed analysis/explanation/critical evaluation/solution to be stated within 500 to 600 words having 15 marks each.

Suggested readings:

- Cytology and Cytogenetics -C.P. Swanson. Prentice-Hall of India Pvt.Ltd., New Delhi.
- Fundamental concepts ofCell biology -K.G. Purohit.
- Gardner et al: Principles of Genetics (2006, John Wiley)
- Griffith et al: An Introduction to Genetic Analysis (2008, Freeman)
- Gene & Genetic Code -the chemical basis of Life- J.D.Cherayil.
- Hartl& Jones: Essential Genetics - A Genomic Perspective (2009, Jones &Bartlet)
- Pierce: Genetics – A Conceptual Approach (2012, Freeman)
- Russell: Genetics (2010, Benjamin Cummings)
- Snustad& Simmons: Principles of Genetics (2012, John Wiley)
- Moody: Introduction to Evolution (1978, Kalyani).
- Rastogi: Organic Evolution (2007, Kedarnath&Ramnath)
- Evolution -Lull. Organic Evolution, Richard Swanson, Light & Life Publishers.
- Genetics-Verma, P.S. & V.K. Agarwal, S: Chand and Co.
- Biology of Genetics-Lewis, C.D. &Lewin, R. McGraw Hill, Toppan Co. Ltd.
- Molecular Genetics -Gunther S, Sten Mcmillian Pub. Co. Inc.
- Genetics -Goodenough, V .N. Y. Holt, Rinchart& Winston.
- Principles of Genetlcs -Gradner, Wiley Easten (P) Ltd. John Willey & Sons, Inc.
- Genetics -Stickberger, Ayala, Stebbins & Valentine (W.H. Freeman). MacMillan Press.
- Genetics and Origin of species -Dobzhansky (Columbia Univ. Press).
- Animal cytology and evolution- White, M.J.D. Cambridge Univ. Press. 1973.

B.SC. SEMESTER-IV
PRACTICAL

Core Course No. : UZOPC 401
Core Course Title: GENETICS AND EVOLUTIONARY BIOLOGY

Credits : 2
Max. Marks : 50

1. Study of various stages of mitosis from permanent slides.
2. Study of various stages of meiosis from permanent slides.
3. Preparation of permanent slides of mitosis from onion root tip.
4. Preparation of permanent slides of meiosis from grasshopper.
5. To study the Mendelian laws and their verification by Chi-square analysis using suitable examples.
6. Study of Human Karyotypes (normal and abnormal).
7. Study of fossil evidences from plaster cast models and pictures.
8. Study of living fossil through specimen (*Latemeria* and *Sphenodon*)
9. Charts:
    a) Phylogeny of horse with diagrams/cut outs of limbs and teeth.
    b) Darwin's Finches with diagrams/cut outs of beaks of different species.
10. Zoogeographical study through charts/photographs.
11. Study of homology and analogy from suitable specimens/ pictures.
12. Preparation of geological time scale chart/ report with special reference to dominant species of each division.
13. Study of human evolution.
15. Evidences of evolution through models.
13. Viva-Voce.

Note:
There will be one practical paper of 50 marks. 50% (25 marks) shall be reserved for internal assessment.

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Syllabi and Course of Study in Zoology
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UNDER CHOICE BASED CREDIT SYSTEM

SKILL ENHANCEMENT COURSE **CREDIT- 4**

Course No. UZOTS 401
Course Title: AQUARIUM FISH KEEPING (Theory)

Unit 1: Introduction to Aquarium Fish Keeping (13)

1.1 History of fish keeping
1.2 The potential scope of Aquarium Fish Industry as a cottage industry
1.3 Introduction to aquarium and aquarium accessories
1.4 Types of aquarium- All glass aquarium, Framed aquarium, Perspex aquarium

Unit 2: Biology of Aquarium Fishes (13)

2.1 Exotic and Endemic species of Aquarium Fishes
2.2 Common characters and sexual dimorphism of fresh water and Marine Aquarium fishes
2.3 Important fresh water ornamental fishes- Guppy, Gold fish, Gourami, Black Mooly, Sword tail
2.4 Important marine ornamental fishes- Anemone (Clown) fish, Wrasses, Damsel, Angel fish, Butterfly Fish

Unit 3: Food and feeding of Aquarium fishes (13)

3.1 Live fish feed and its importance
3.2 Types of aquarium feed
3.3 Preparation and composition of formulated fish feeds
3.4 Feeding methods and schedule

Unit 4: Fish transportation (13)

4.1 Live fish transport-Conditioning packing, transport and quarantine methods
4.2 Factors and principles associated with live fish transport
4.3 Trade regulations and wildlife act in relation to ornamental fishes

5.1 Budget for setting up and maintenance of Aquarium
5.2 Cleaning of aquarium
5.3 Control of snail and algae
5.4 Water quality requirements: Maintenance and temperature control
5.5 Biofilters in aquarium
5.6 Visit to Aquariun

GOVERNMENT COLLEGE FOR WOMEN, PARADE, JAMMU(J&K)
SYLLABUS OF ZOOLOGY
FOR BSC SEMESTER (V) FOR THE EXAMINATION TO BE HELD IN THE YEARS 2016, 2017 AND 2018.

The course would be of 150 marks. theory and practical would carry 100 and 50 marks respectively. There shall be one written paper of 80 marks. the duration for which would be three hours: 20 marks would be for internal assessment in theory including 5 marks for attendance. Practical internal and external would carry 25 marks each and duration of practical paper shall be of three hours. In case of the regular students internal assessment received from the college will be added to the marks obtained by them in the final examination and in case of private candidates marks obtained by them in the final examination shall be increased proportionately in accordance with the statues regulation.

PARASITOLOGY

MAXIMUM MARKS : 80

OBJECTIVE
The Course is designed to introduce the student to the fundamental of parasitology so that the knowledge thus gained could be useful to them in the later walks of life as extension specialists or as scientific investigations. The course entails a broad view of morphology biology and bionomics of the parasites specific to man.

DETAILED SYLLABUS

UNIT I

1.1 Scope and definition of parasitology .
1.2 Symbiotic relationship and its types
1.3 Concept of susceptibility .
1.4 Immunity and its types
1.5 Vector and host types and interdependence.
1.6 Types of parasitic relationships in animal kingdom.
1.7 Parasitic adaptation and degeneration

UNIT II

2.1 Structure of virus with special reference to Bacteriophage.
2.2 Classification of viruses.
2.3 Study of following diseases caused by viruses in man. their symptoms. mode of transmission and preventive measures.
  2.3.1 AIDS
  2.3.2 RABIES
  2.3.3 MEASLES
2.4 Structure of Bacteria

2.5 Study of following bacterial diseases of man, their symptoms, mode of transmission and preventive measures.

2.5.1 Tuberculosis
2.5.2 Pneumonia
2.5.3 Cholera

UNIT III

Habit, Habitat, general morphology, specific adaptability, mode of transmission, life cycle, pathogenesis and prophylaxis of the following protozoan parasites of man

3.1.1 *Giardia*
3.1.2 *Trypanosoma*
3.1.3 *Entamoeba*
3.1.4 *Plasmodium*
3.1.5 *Leishmania*

UNIT IV

4.1 Habit, habitat, general morphology, specific adaptability mode of transmission, life cycle, pathogenesis and prophylaxis of the following parasites of the man.

4.1.1 Schistosoma
4.1.2 Fasciolopsis buski
4.1.3 Diphyllobothrium
4.1.4 Echinococcus
4.1.5 Filaria
4.1.6 Ancylostoma
4.1.7 Acanthocephala : General organization and economic Importance

UNIT V

5.1 Gastro – intestinal tract as habitat of protozoan and helminth parasites of man
5.2 Blood and lymph as habitat of nematode parasites of man.
5.3 Reticulo endothelial system as habitat of protozoan parasite of man
5.4 Host – parasite specificity
5.5 Evolution of parasitism

NOTE FOR PAPER SETTING

Section A: 10 short answer question are to be set with at least two questions from each unit. The maximum length of answer shall be 20 words. All questions are compulsory. Each question will carry 2 marks, total weightage being 20 marks

Section B: This section will comprise of ten questions, with two questions from each unit.students have to attempt 05 questions one from each unit. Each question will carry 12 marks and the total weightage being 60 marks.

Note for drawing well labeled diagrams where ever necessary must be mentioned in questioned paper.

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Books Recommended

1. Cemeron. D. Parasites and Parasitism
2. Kudo.P.R. Protozoology
3. Greal. K.G Protozoology. Springer- Variog. Budlin
4. Baker Parasitic Protozoa - Hutchinson Lib. Series
5. Hyman. H. The Invertebrate Protozoa Through Ctenophora
6. Gynab .L.H. (1951) the Invertebrates Planthyheminthes. Vol.III
7. Ben Daves (1968) The trematoda. Cambridge Univ. Press
8. Thomas Chang (1964) The Biology Of animal Parasites Toppan Co Ltd. Tokyo . Japan
9. Chitwood & Chitwood
10. The Biology of animal
11. Gaust. E.C. (1949) Human Helminthology. Lea & Febiger. Philadelphia
12 parasitology by noble
13 introduction to parasitology by chandler
14 parasitology by smith
15. helmenthology by Faust.
16 ecology of animal parasites by N. A. Gall

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DISCIPLINE SPECIFIC ELECTIVE COURSE **CREDIT- 4**

Course No.
Course Title: APPLIED ZOOLOGY (Theory)

UNIT- I SCOPE AND APPLICATION OF PARASITOLOGY.

1.1 Pest, parasite and Host types.

1.2 Parasitism and evolution of parasitism.

1.3 Types of symbiotic relationship: Phoresis, commensalism, mutualism and parasitism.

1.4 Protozoan parasites: morphology, life history, pathogenecity, prophylaxis, mode of transmission and control of the following:

1.4.1 *Entamoeba histolytica.*

1.4.2 *Plasmodium vivex.*

1.5 Helminth parasites: morphology, life history, pathogencity, prophylaxis, mode of transmission and control of the following:

1.5.1. *Entrobius vermicularis.*

1.5.2 *Wuchereria bencrofti*

Unit –II: BIO- CONTROL MECHANISMS.

2.1 Concept of Bio-Pesticides.

2.2 Bio- control pests through:

2.2.1 Bacteria (Bacillus thuringenesis and B. penetrans).

2.2.2 Nematodes (Heterorabditis sps and Steinernematid sps) .

2.2.3 Fungi (Aspergillus sps and Trichoderma Sps),

2.2.4 Fishes, insects and birds

UNIT III ROLE OF ANIMAL BIOTECHNOLOGY IN ANIMAL WELFARE.

3.1 Concept of Transgensis.
3.2 Animal cloning.
3.3 Embryo Transfer Technology, Merits and Demerits.
3.4 Concept of Surrogacy
3.5 Concept of bio-fertilizers and their utility in agriculture.
3.6 Basic fermentation techniques; Concept and relevance.

UNIT-IV ANIMAL HUSBANDRY AND POULTRY

4.1 Breeds of diary cattle, their distinctive characteristics and economic importance: Red Sindhi, Sahiwal, Red dane, Holstein- Friesian, Jersey, Murrah
4.2 Traits of Economics Importance of Diary cattle Breeds
4.3 Maintenance of Reproductive Health and causes of Infertility in Animals; Examples cow / buffalo
4.4 Cattle diseases: causative agents, mode transmission, pathogenesis and control:
4.4.1 Mastitis
4.4.2Anthrax.
4.5 Breeds of Poultry Birds and their distinctive characteristics- Rhode Island Red, White Leghorn, Black Minorca, Aseel, Chitagong.
4.6 Management of Breeding Stock and Broiler quality.
4.7 Criteria of Selection of Hatching Eggs and care of Hatching Eggs
4.8 Maintenance of Reproductive Health and causes of Infertility in Animals; Examples cow / buffalo
4.9 Poultry Disease- Mastitis, Coccidiosis, Birds Flu (Causative agent, transmission, symptoms pathogenesis and control)

UNIT- V AQUACULTURE

5.1 Definition, Status and scope of Aquaculture

5.2 Induced Breeding Techniques
5.3 Criteria for selection of culturable species.
5.4 Types of culture:
5.4.1 Monoculture(trout and pearl)
5.4.2 Composite fish culture(Carp culture)
5.4.3 Prawn Culture
5.4.3.1 Fresh water
5.4.3.2 Marine

PRACTICALS

1. Study of Sea anemone and hermit crab as an example of commensalism.
2. Study of *Plasmodium vivax, Entamoeba histolytica, Giardia intestinalis, Enterobius vermicularis* and *Wuchereria bancrofti* and their life stages through permanent slides/photomicrographs or specimens.
3. Preparation of stained slides and identification of bacteria from the curd culture.
4. Study of arthropod vectors associated with human diseases: *Pediculus, Culex, Anopheles, Aedes and Xenopsylla.*
5. Study of insect damage to different plant parts/stored grains through damaged products/photographs.
6. Identifying feature and economic importance of *Helicoverpa (Heliothis) armigera, Papilio demoleus, Agrotis ipsilon, Callosobruchus chinensis, Sitophilus oryzae and Tribolium castaneum*
7. Morphometry and identification of locally available carp and cat fishes.
8. Visit to dairy farm and fish farm and submission of field visit report.

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DISCIPLINE SPECIFIC ELECTIVE COURSE (14) **CREDIT- 4**

Course No.
Course Title: INSECT VECTORS AND DISEASES (Theory)

Unit I INTRODUCTION TO INSECTS VECTORS (13 Hrs)

1.1 General Features of Class Insecta with outline classification upto order level.
1.2 Structure of:
  1.2.1 Head, Eyes and Types of antennae
  1.2.2 Wings and Legs
  1.2.3 Mouth parts (special reference to feeding habits)
1.3 Insects as Vectors both mechanical and biological
1.4 Host-vector relationship
1.5 Vectorial capacity
1.6 Adaptations as vectors

Unit II MOSQUITOES AND FLIES AS DISEASE VECTORS (13 Hrs)

2.1. Aetiological agent, symptoms, pathology, epidemiology, prevention and control of following Mosquito-borne diseases:
  2.1.1 Malaria
  2.1.2 Dengue
  2.1.3 Viral Encephalitis
2.2. Aetiological agent, symptoms, pathology, epidemiology, prevention and control of following Sand fly and Tsetse fly-borne diseases:
  2.2.1 Leishmaniasis
  2.2.2 Trypanosomiasis
2.3. Aetiological agent, symptoms, pathology, epidemiology, prevention and control of following (house fly) borne diseases:
  2.3.1 Myiasis
  2.3.2 Bacillary dysentery

Unit III BUGS AND FLEAS AS DISEASE VECTORS (13 Hrs)

3.1. Bugs as mechanical vector.
3.2. Aetiological agent, symptoms, pathology, epidemiology, prevention and control of following bugs- borne diseases
  3.2.1. Chagas disease

control of following Flea-borne diseases

4.1 Plague

4.2 Typhus fever

(13 Hrs)

Unit IV LOUSE AS DISEASE VECTORS

4.1. Human louse (Head, Body and Pubic louse) as important insect vector

4.2. Aetiological agent, symptoms, pathology, epidemiology, prevention and control of following lice-borne diseases:

4.2.1 Typhus fever

4.2.2 Relapsing fever

4.2.3 Trench fever

4.2.4 Vagabond's disease

4.2.5 Phthiriasis

Unit V INTRODUCTION TO VECTOR CONTROL

5.1. Vector control:

5.1.1 Aims, objectives, and importance

5.1.2 Alternatives to the use of insecticides (chemical & biological)

5.1.3 Types of vector control - Selective, integrated and comprehensive vector con

5.2. Principles of Integrated Vector Management (IVM)

5.2.1General introduction-concept and definition of IVM

feasibility, merits and limitations

5.2.2 Key elements of IVM - role of vector control in controlling/preventing vectc borne disease.

Books recommended:

1. Imms, A.D. (1977).A General Text Book of Entomology.Chapman & Hall, UK.
2. Chapman, R.F. (1998). The Insects: Structure and Function. IV Edition, Cambridge University Press, UK.
3. Pedigo L.P. (2002).Entomology and Pest Management. Prentice Hall Publication
4. Mathews, G. (2011). Integrated Vector Management: Controlling Vectors of Malaria and Other
5. Insect Vector Borne Diseases. Wiley-Blackwell5 Cemeron, D. Parasites and Parasitism
6. Kudo,P.R. Protozoology
7. Greal, K.G Protozoology, Springer- Variog, Budlin
8. Baker Parasitic Protozoa – Hutchinson Lib. Series
9. Hyman, H. The Invertebrate Protozoa ThroughCtenophora
10. Gynab .L.H. (1951) the Invertebrates Planthyheminthes, Vol.III
11. Ben Daves (1968) Thetrematoda, Cambridge Univ. Press
12. Thomas Chang (1964) The Biology Of animal Parasites Toppan Co Ltd. Tokyo

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· PRACTICALS

1. Study of different kinds of mouth parts of insects
2. Study of following insect vectors through permanent slides / photographs:
   Aedes, Culex, Anopheles, Pediculus humanus capitis, Pediculus humanus corporis, Phithirus pubis, Xenopsylla cheopis, Cimex lectularius, Phlebotomus argentipes, Musca domestica, through permanent slides/ Photographs
3. Study of some biological agents of insect vector control
4. Collection, identification and preservation of important insect vectors
5. Submission of a project report on any 5 of the insect vectors and diseases transmitted

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SKILL ENHANCEMENT COURSE **CREDIT- 4**

Course No.

Course Title: PUBLIC HEALTH AND HYGIENE (Theory)

Unit 1: INTRODUCTION TO PUBLIC HEALTH AND HYGIENE (13 hours)

1.1 Introduction, Definition, Significance, Goals and Objectives of Public health and Hygiene
1.2 Healthcare versus Medical Care
1.3 Balanced diet Nutrition and health
1.4 Major nutritional Deficiency diseases- Protein Energy Malnutrition (Kwashiorkor and Marasmus), Vitamin deficiency disorders, Iron deficiency disorders, Iodine deficiency disorders.
1.5 Introduction to National Health Policy, National Rural Health Mission (NRHM) and National Urban Health Mission (NUHM)

Unit 2: ENVIRONMENT AND HEALTH HAZARDS (13 hours)

2.1 Environmental degradation and Pollution:
  2.1.1 Sources, Causes, Impacts and treatments of Air, Water, Soil, Nuclear, and Solid and e-waste.
2.2 Development and Environmental issue:
  2.2.1 Environmental Ethics
  2.2.2 Global Warming
  2.2.3 Climate Change
  2.2.4 Ozone Depletion
  2.2.5 Acid Rain
2.3 Environmental and Health Impact Assessment- Concept, Steps and application
2.4 Personal and mental hygiene
2.5 Health destroying habits and additions

Unit 3: COMMUNICABLE DISEASES (13 hours)

3.1 General concept of communicable diseases
3.2 Causative agent, pathogenesis and their control measures of the following communicable diseases
  3.2.1 Viral disease: Dengue, Hepatitis B, AIDS, Swine flu
  3.2.2 Bacterial diseases: Tuberculosis, Measles, Leprosy, Chicken gunya

Unit 4: LIFE STYLE RELATED NON-COMMUNICABLE DISEASES (13 hours)

4.1 Different types of Life style related non-communicable diseases, causes and prevention through dietary and lifestyle modifications

4.1.2 Coronary Heart
4.1.3 Stroke
4.1.4 Diabetes mellitus
4.1.5 Obesity

4.2 Concept of Mental Health diseases and their management
4.2.1 Dipression
4.2.2 Schizophrenia
4.2.3 Bipolar syndrome

Unit 5: SOCIAL HEALTH PROBLEMS **(13 hours)**

5.1 Smoking, alcoholism, drug dependence and their de-addiction and rehabilitation.
5.2 Societal health and development.
5.3 Role of Voluntary organizations, self-help groups
5.4 Eco-friendly environmental practices.

FIELD VISIT: Visit to a sewage treatment plant.

Books recommended:

1 Oxford textbook of Public Health Ed. Roger Detels, James Mcewen, Robert Beaglehole, and Heizo Tanaka Oxford University Press (OUP) 4th Edition: 2002.28
2 Epidemiology and Management for Health Care: Sathe, P.V. Sathe, A.P., Popular Prakashan, Mumbai, 1991.
3 International Public Health: Diseases, Programs, Systems, and Policies by MichaelMerson, Robert E Black, Anne J Mills - Jones and Bartlett Publishers.
4 Preventive and Social Medicine, K Park, BansaridasBhanot Publishing House.
5 Textbook of Medical Parasitology: JayramPaniker, Jaypee Brothers, New Delhi, 1993 Global Handbook On Non-Communicable Diseases And Health Promotion By David V. Mcqueen, Springer Publication.
6 Education Of Commnunicable And Non-Communicable Diseases S.L. Goel Published By Deep & Deep Publications Pvt. Ltd., 2009
7 Burden Of Non Communicable Diseases (Paperback)By (Author) M D Richa, By (Author) GyanPrakash Singh, By (Author) C P Mishra Published By Lap Lambert Academic Publishing. 2012
8 Park's Textbook Of Preventive And Social Medicine 21 Edition By K. Park Published February 2011 By BanarsidasBhanotPublishers .
9 Environmental and Health Impact Assessment of Development Projects: A edited by Robert G. H. Turnbull, Elsevier Sciences Publication
10 Environmental Chemistry, B.K.Sharma, Krishna Prakashan Media.
11 Perspectives in Environmental Health -Vector and Water Borne Diseases MukhopadhyayAniruddha, De A K
12 Sociology Anthropology, and Development, Michael M. Cernea, The World Bank . Washington, D.C, 1994
13 Environment, Health And Sustainable Development by Landon, Megan McGraw-Hill International, 2006.
14 An Introduction to Sustainable Development By Peter P. Rogers, Kazi F. Jalal, John A. Boyd, Earthscan publication, UK, 2008
15 Advanced textbook on food and Nutrition: Dr. M Swaminathan, The Bangalore Publishing Co. Ltd. Bangalore, 1974
16 Nutritive value of Indian foods by C.Gopalan, B.V.RamaSastri& S.C. Balasubramanian, National Institute of nutrition, ICMR.

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DISCIPLINE SPECIFIC ELECTIVE COURSE **CREDIT- 4**

Course No.

Course Title: AQUATIC BIOLOGY (Theory)

UNIT 1: FRESHWATER ECOSYSTEM — 13 HOURS

1.1 Brief introduction of the aquatic biomes: Freshwater (lakes, wetlands, streams and rivers).
1.2 Zonation of Lakes
1.3 Physical characteristics of lentic and lotic water bodies
  a. Temperature.
  b. Light
  c. Turbidity
1.4 Chemical characteristics of lentic and lotic water bodies
  a. CO_2.
  b. pH
  c. Carbonate, Bicarbonate
1.5 Thermal stratification of lakes.
1.6 Nutrient Cycles in Lakes-Nitrogen, Sulphur and Phosphorous.

UNIT 2: MARINE ECOSYSTEM — 13 HOURS

2.1 Water and its properties (Physical, Chemical)
2.2 Hydrological cycle
2.3 Zonation in ocean
  a. Pelagic
  b. Benthic
  c. Intertidal.
  d. Estuaries
2.4 Physico-chemical characteristics of marine ecosystem salinity
  a. density :
  b. Light,
  c. pH,
  d. Thermal stratification

UNIT 3: FRESHWATER BIOLOGY — 13 HOURS

3.1 Food chain and food web in Lake Ecosystem.
3.2 Energy flow through ecosystem.

3.4 Adaptations in fish ...

UNIT 4: MARINE BIOLOGY

13 HOURS

4.1 Marine Flora and fauna.
4.2 Adaptations of deep sea organisms.
4.3 Coral reefs as habitat of marine flora and fauna.
4.4 Sea weeds and significance.
4.5 Oil spills and impact on marine life.

UNIT 5: MANAGEMENT OF AQUATIC RESOURCES

13 HOURS

5.1 Causes of aquatic pollution and its impact: Agricultural, Industrial, Sewage and Radioactive waste
5.2 Eutrophication and levels of eutrophication.
5.3 Management and conservation (legislations)
5.4 Sewage treatment
5.5 Biomagnification

SUGGESTED READINGS:

1. B B Hosetti and Arvind Kumar Text book of Applied Aquatic Biology; Daya Publishing House New Delhi
2. S C Aggarwal; Limnology APH Publishing Corporation, New Delhi
3. Limnology A R Zafar, Atiya Khanum, K Satyamohan; Ukaaz Publication Hyderabad
4. Wetzel Limnology
5. Trivedi and Goyal Chemical and biological methods for water pollution studies
6. Welch Limnology Vols. I-II
7. Anathakrishnan :Bioresources Ecology 3rd Edition
8. Goldman : Limnology, 2nd Edition
9. Odum and Barrett : Fundamentals of Ecology, 5th Edition
10. Pawlowski : Physicochemical Methods for Water and Wastewater Treatment, 1st Edition

PRACTICALS

1. Determine the area of a lake/pond using graphimetric and gravimetric method.
2. Identify the important macrophytes, phytoplanktons and zooplanktons present in a lake/pond ecosystem.
3. Determine the amount of turbidity/transparency, Dissolved Oxygen, Free Carbon dioxide, alkalinity (carbonates & bicarbonates) in water collected from a nearby lake/ water body.
4. Instruments used in limnology (Secchi disc, Van Dorn Bottle, Conductivity meter, Turbidity meter, PONAR grab sampler) and their significance.
5. A Project Report on a visit to a Sewage treatment plant / Fisheries Institutes

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DISCIPLINE SPECIFIC ELECTIVE COURSE **CREDIT- 4**

Course No.
Course Title: IMMUNOLOGY (Theory)

UNIT I: Infections and vaccines (13 Hours)

1.1 Infections: classification, sources of infection in man,
1.2 Methods of transmission of infections
1.3 Types of infectious diseases
1.4 Vaccines, introduction and types
1.5 Sterilization and disinfections

UNIT II: Immunity, antigens and antibodies (13 Hours)

2.1 Immunity: Innate and acquired, measurement of immunity, local immunity, herd immunity
2.2 Antigens: Introduction of antigens. Basic properties of antigens, B and T cell epitopes, haptens and adjuvants
2.3 Antibodies: Structure of immunoglobulins, immunoglobulin classes, abnormal immunoglobulins, immunoglobulin specificities
2.4 Antigen and antibody interactions.
2.5 Components and pathways of complement system

UNIT III: Cells and organs of immune system (13 Hours)

3.1 Central lymphoid organs (thymus, bursa of fabricus)
3.2 Peripheral lymphoid organs (lymph nodes, spleen, MALT
3.3 Cells of lymphoreticular system

UNIT IV: Immune response – working of immune system (13 Hours)

4.1 Humoral immune response
4.2 Primary and secondary responses
4.3 Production of antibodies
4.4 Cellular immune response
4.5 Lymphokines and Interleukines

UNIT V: Immune system in health and diseases (13 Hours)

5.1 Brief description of types of hypersensetivities
5.2 Basic concepts of autoimmunity
5.3 Primary immunodeficiencies (Humoral, transient hypergammaglobulinaemia, variable , selective, cellular and combined immunodeficiency)
5.4 Secondary immunodeficiencies
5.5 Development of AIDS in HIV infection.

Suggested Readings:

1. R. Ananthanarayana and C K JayaramPaniker, Text Book of Microbiology, Orient Longman Ltd Chenai, India
2. Ajit Kr. Banerjee and Nirmalya Banerjee, Microbiology and Immunology, NCBA (P) Ltd Calcutta
3. R C Dubey and D K Maheshwari, A Text Book of Microbiology; S Chand and Company Ltd New Delhi
4. Kindt, T. J., Goldsby, R.A., Osborne, B. A. and by Kuby, J (2006). *Immunology*, VI Edition. W.H. Freeman and Company.
5. David, M., Jonathan, B., David, R. B. and Ivan R. (2006). *Immunology,* VII Edition, Mosby, Elsevier Publication.

6. Abbas, K. Abul and Lechtman H. Andrew (2003.) *Cellular and Molecular Immunology.* V Edition. Saunders Publication.

PRACTICALS

1. To examine the cells that comprise the immune system (counts and morphology)
2. To examine location of organs and tissues of immune system (primary and secondary)
3. To examine morphology of immune organs and tissues
4. Histological study of spleen, thymus and lymph nodes through slides/ photographs
5. Preparation of stained blood film to study various types of blood cells.
6. ABO blood group determination.
7. Blood clotting and formation of serum through videography
8. Haemoglobin testing

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CREDIT- 4

SKILL ENHANCEMENT COURSE

Course No.
Course Title: SERICULTURE (Theory)

(13 hours)

Unit 1: INTRODUCTION

1.1 Sericulture: Definition, origin and history.
1.2 Present status, Silk route and scope of sericulture.
1.3 Silkworms: Types and their distribution.
1.4 Exotic and Indigenous races.
1.5 Types of silk fibre produced in India.
1.6 Sericulture in traditional states of India and other countries.
1.7 Mulberry and non-mulberry Sericulture.

(13 hours)

Unit 2: SILKWORM BIOLOGY AND REARING

2.1 A brief introduction to mulberry cultivation and mulberry varieties.
2.2 Life cycle of *Bombyx mori*.L.
2.3 Structure of silk gland and secretion of silk.
2.4 Silkworm breeds: Univoltine, Bivoltine, Moultivoltine and Hybrids.
2.5 Silkworm rearing:
  2.5.1Rearing house
  2.5.2 Rearing equipment and its disinfection
  2.5.3 Young and late age silkworm rearing and their methods.

(13 hours)

Unit 3: MULBERRY AND SILKWORM DISEASES

3.1 Brief account of mulberry diseases and their control measures.
  3.1.1 Mulberry leaf diseases
  3.1.2 Mulberry stem diseases
  3.1.3 Mulberry root diseases
3.2 Causative agent, transmission,pathogenesis and their control measures of the following communicable diseases
  3.2.1 Pebrine
  3.2.2 Flacherie
  3.2.3 Grasserie
  3.2.4 Muscardine
3.3 Introduction to disinfectants; types and formulations.
3.4 A brief introduction to silkworm and production.

Unit 4: REARING OF SILKWORM

4.1 Selection of mulberry variety, and establishment of mulberry garden.
4.2 Rearing house and rearing appliances.
4.3 Disinfectants: Formalin, bleaching powder, RKO
4.4 Silkworm rearing technology: Early age and Late age rearing
4.5 Types of mountages
4.6 Spinning, harvesting and storage of cocoons.

Unit 5: SILKWORM REELING AND SERICULTURE ENTREPRENEURSHIP (13 hours)

5.1 Silk Reeling methods: Charkha, Cottage basin, multi-end, semi and fully automatics and improved CSRTI method.
5.2 Raw silk testing and grading and its types.
5.3 Brief introduction to silk throwing.
5.4 Silk weaving: Handloom and power loom weaving.
5.5 Sericulture Entrepreneurship:
5.4.1 Employment and income generation in sericulture; Role of women in sericulture; By products of Sericulture industry.
5.4.2 Economics of Silkworm rearing and silk reeling.
5.5.2 Introduction to extension activities.

FIELD VISIT: A Visit to Sericulture centre.

SUGGESTED READINGS

1 Sericulture manual-1 (Mulberry cultivation) (1972) Food and Agriculture Organisation of the United Nations, Rome.
2 Sericulture manual-2 (Silkworm rearing) (1972) Food and Agriculture Organisation of the United Nations, Rome.
3 Sericulture manual-3 (Silk reeling) (1972) Food and Agriculture Organisation of the United Nations, Rome.
4 Chaudhary S. N. (1981); Muga Silk Industry, Directorate of Sericulture and Weaving, Government of Assam, Gowhati, Assam.
5 Sarkar D. C. (1980); Ericulture in India, Central Silk Board, Government of India, Bangalore.
6. Tripurari Sharan (1984); Sericulture& Silk Industry, Published by Y.K.Sharma.
7.Akira Nakamura (2000) Fibre Science and technology, Oxford & IBH publications, New Delhi.
8. Eikichi Hiratsuka (2000) Silkworm breeding, Oxford & IBH publications, New Delhi.
9. Nobumasa Hojo (2000) Structure of Silk Yarn, Oxford & IBH publications, New Delhi.
10. Shankar M.A (1997); Hand book of mulberry nutrition, UAS- Multiplex, Bangalore.
11. Devaiah M. C et al. (2001); Advances in mulberry Sericulture. Dept. Of Sericulture, UAS, Bangalore.
12. Yasuji Hamamura (2001) Silkworm Rearing on artificial diet- Oxford &IBN Publishing Co. Pvt. Ltd. New Delhi & Calcutta.
13. S. Morohosi (2000) Development Physiology of Silkworms (Translated Japanese) Oxford & IBN Publishing Co. Pvt. Ltd. New Delhi & Calcutta.

14. Silk Dyeing and Finishing Handbook (2000) (translated from Chinese) compiled by silk Industry Corporation, China. Oxford &IBN Publishing Co. Pvt. Ltd. New Delhi & Calcutta.
15. Basavaraja, H.K., Aswath, S.K.., Suresh Kumar, N., Mal Reddy, N. And Kalpana, G.V. (2005) Silkworm Breeding and Genetics. Central Silk Board, Bangalore.
16. Kumaresan, P. and Srinivasa, G. (2005) Sericulture Extension Management and Economics. Central Silk Board, Bangalore.
17. Nataraju, B., sathyaprasad, K., Manjunath, D. And Aswani Kumar, C. (2005) Silkworm Crop Protection. Central Silk Board, Bangalore.
18. Govindaiah, Gupta, V.P., Sharma, D.D., Rajadurai, S and NishithaNaik (2005) Mulberry Crop Protection. Central Silk Board, Bangalore.

LABORATORY COURSE (PRACTICAL)

1. Study of Sea – anemone and hermit crab as an example of commensalism
2. Study of *Sacculina* and Crab as an example of hyperparasitism
3. Study of poly flagelates from gut of termites as an example of symbiosis
4. Study of structure of bacteria from the curd culture
5. Study of the following protozoan parasites through slides
   1) *Leishmania* 2) *Trypanosoma*
   3) *Entamoeba* 3) *Plasmodium*
6. Study of metazoan parasites of fish and poultry from live specimens
7. Study of ticks and mites from prepared slides
8. Study of different insects as vectors:
   a. House fly
   b. Mosquito
   c. Cockroach
9. Study of parasitic (bed bug and lice) and predatory insects (praying mantis and dragon fly) in relation to their adaptations.
10. Study of parasitic Platyhelmenthes
    a. *Tapeworm*
    b. *Fasciola*
    c. *Schistosoma*
    d. *Diplozoan*
    e. *Echinicocus*
    f. *Polystoma*
11. Study of parasitic Nematodes
    a. *Enterobius*
    b. *Encylostoma*
    c. *Ascaris*
    d. *Wuchereria*
    e. *Trichonella*
12. Viva-voce