

**GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)
BEGUMPET, HYDERABAD-16**

Affiliated To Osmania University, Re-Accredited With 'B+' Grade by NAAC



**DEPARTMENT OF ZOOLOGY
SYLLABUS (2020-21)**

**GOVERNMENT COLLEGE FOR WOMEN (A), BEGUMPET,
HYDERABAD**

DEPARTMENT OF ZOOLOGY

Choice Based Credit System (CBCS) 2020-21

| S.No | Paper | Module (Paper) | Hours | IA | Sem End Exam | Credits |
|-------------------|----------------|------------------------------------|-------|----|--------------|---------|
| Semester I | | | | | | |
| 1 | Paper I (Core) | Animal Diversity- Invertebrates | 04 | 40 | 60 | 04 |
| 2 | Practical-I | Animal Diversity- Invertebrates | 03 | | 50 | 01 |

| Semester II | | | | | | |
|--------------|-------------------------|---|----|----|----|----|
| 3 | Paper II (Core) | Animal Diversity- Vertebrates | 04 | 40 | 60 | 04 |
| 4 | Practical-II | Animal Diversity- Vertebrates | 03 | | 50 | 01 |
| Semester III | | | | | | |
| 5 | Paper III (Core) | Animal Physiology | 04 | 40 | 60 | 04 |
| 6 | Practical-III | Animal Physiology and Animal Behaviour | 02 | | 50 | 01 |
| 7 | SEC – I | Sericulture | 02 | 10 | 40 | 02 |
| 8 | SEC – II | Public Health & Hygiene | 02 | 10 | 40 | 02 |
| Semester IV | | | | | | |
| 9 | Paper IV (Core) | Cell Biology, Genetics and Developmental Biology | 04 | 40 | 60 | 04 |
| 10 | Practical-IV | Cell Biology, Genetics and Developmental Biology | 03 | | 50 | 01 |
| 11 | SEC – I | Vermiculture | 02 | 10 | 40 | 02 |
| 12 | SEC – II | Aquaculture | 02 | 10 | 40 | 02 |
| Semester V | | | | | | |
| 13 | Paper V (Core) DSCI | Animal Physiology | 03 | 25 | 75 | 03 |
| 14 | Practical-V | Animal Physiology | 02 | | 50 | 01 |
| 15 | General Elective - I | Nutrition & Dietetics | | | | |
| 16 | Paper-VI DSE-IA | Applied Zoology | 03 | 25 | 75 | 03 |
| 17 | Practical DSE-IA | Applied Zoology | 02 | | 50 | 01 |
| 18 | Paper-VI DSE-IB | Entomology | 03 | 25 | 75 | 03 |
| 19 | Practical DSE-IB | Entomology | 02 | | 50 | 01 |
| 20 | Paper-VI DSE-IC | Sericulture * | 03 | 25 | 75 | 03 |
| 21 | Practical DSE-IC | Sericulture * | 02 | | 50 | 01 |
| 22 | SEC - III | Biotechniques | 02 | 10 | 40 | 02 |

| Semester VI | | | | | | |
|-------------|-----------------------|--------------------------------------|----|----|----|----|
| 23 | Paper VII (Core)DSCII | Immunology & Animal Biotechnology | 03 | 25 | 75 | 03 |
| 24 | Practical-V | Immunology & Animal Biotechnology | 02 | | 50 | 01 |
| 25 | SEC - IV | Perspectives of Food Safety in India | 02 | 10 | 40 | 02 |
| 26 | General Elective - II | Clinical Science | 02 | 10 | 40 | 02 |
| 27 | Paper-VIII DSE-IIA | Aquatic Biology * | 03 | 25 | 75 | 03 |
| 19 | Practical DSE-IA | Aquatic Biology * | 02 | | 50 | 01 |
| 20 | Paper-VIII DSE-IIB | Public Health & Hygiene | 03 | 25 | 75 | 03 |
| 21 | Practical DSE-I | Public Health & Hygiene | 02 | | 50 | 01 |
| 22 | Paper-VIII DSE-IIC | Poultry Science | 03 | 25 | 75 | 03 |
| 23 | Practical DSE-IIC | Poultry Science | 02 | | 50 | 01 |
| 24 | Project Work | On the given topic | | | 50 | 02 |

GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), BEGUMPET, HYDERABAD.
SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2020-21
SEMESTER –I
Module –I /Core-I

Animal Diversity - Invertebrates

Periods: 60

Max. Marks: 60

COURSE OUTCOMES

After completion of the course the student is able to:

CO1. Knowledge about the Diversity and Phylogeny of Invertebrate Phyla

CO2. Discuss the Diversity Of Invertebrate and their Economic Significance

CO3. Know about some of the important and common Protozoans and Helminthes of parasitic nature causing diseases in human beings.

CO4. Understood the diversity and classification and functional aspects of different systems of Arthropoda, Mollusca and Echinodermata.

CO5. Identify the resemblance and evolutionary significance of larval forms of Echinoderms

UNIT – I

(15 Periods)

1.1 Protozoa.

- 1.1.1 General characters and classification of Protozoa up to order levels with examples
- 1.1.2 Type study – *Elphidium*
- 1.1.3 Locomotion and Reproduction in Protozoa.
- 1.1.4 Epidemiology of Protozoan diseases - Amoebiasis; Giardiasis; Leishmaniasis and Malaria.

1.2 Porifera

- 1.2.1. General characters and classification of Porifera up to order levels with examples
- 1.2.2 Type study – *Sycon*
- 1.2.3 Canal system in sponges and Spicules.

UNIT – II

(15 Periods)

2.1. Cnidaria

- 2.1.1 General characters and classification of Cnidaria up to order levels with examples
- 2.1.2 Type study - *Obelia*
- 2.1.3 Polymorphism in Siphonophora
- 2.1.4 Corals and coral reef formation

2.2 Platyhelminthes

- 2.2.1 General characters
- 2.2.2 Classification of Platyhelminthes up to classes with examples
- 2.2.3 *Schistosoma* structure and lifecycle

2.3 Nematelminthes

- 2.3.1 General characters
- 2.3.2 Classification of Nematelminthes up to classes with examples
- 2.3.3 *Dracunculus* structure and lifecycle
- 2.3.4 Parasitic Adaptations in Helminthes

UNIT – III

(15 Periods)

3.1 Annelida

- 3.1.1. General characters
- 3.1.2. Classification of Annelida up to classes with examples
- 3.1.3. Type study: *Hirudinaria granulose*
- 3.1.4 Evolutionary significance of Coelome and Coelomoducts and metamerism

3.2 Arthropoda

- 3.2.1 General characters
- 3.2.2 Classification of Arthropoda up to classes with examples
- 3.2.3 Type study: Prawn
- 3.2.5 Insect metamorphosis
- 3.2.6 *Peripatus* – external features and affinities

UNIT – IV

(15 Periods)

4.1 Mollusca

- 4.1.1 General characters
- 4.1.2 Classification of Mollusca up to classes with examples
- 4.1.3 Type study: *Pila*.
- 4.1.4 Pearl formation
- 4.1.5 Torsion and detorsion in gastropods

4.2 Echinodermata

- 4.2.1 General characters
- 4.2.2 Classification of Echinodermata up to classes with examples
- 4.2.3 Water vascular system in star fish
- 4.2.4 Echinoderm larvae and their significance

PRACTICALS SEMESTER –I

Module –I /Core-I

Animal Diversity - Invertebrates

1. Study of museum slides / specimens / models (classification of animals upto orders)

i. Protozoa: Amoeba, Paramecium, Paramecium- binary fission & conjugation, Vorticella, Entamoeba histolytica, Plasmodium vivax.

ii. Porifera: Sycon, Spongilla, Euspongia, Sycon- TS & LS, Spicules, Gemmule.

iii. Coelenterata: Obelia- colony & medusa, Aurelia, Physalia, Velella, Corallium, Gorgonian, Pennatula

iv.Plathyhelminthes: Planaria, Fasciola hepatica, Fasciola larval forms – miracidium, redia, cercaria, Echinococcus granulosus, Taenia solium, Schistosoma haematobium.

v.Nemathelminthes: Ascaris (male & female), Dracunculus, Ancylostoma, Wuchereria.

vi. Annelida: Nereis, Aphrodite, Chaetopteurs, Hirudinaria, Trochopore larva.

vii. Arthropoda: Cancer, Palaemon, Scorpion, Scolopendra, Sacculina, Limulus, Peripatus, larva-naupilus, mysis, zoea, Mouth parts of male & female Anopheles and Culex, mouth parts of Housefly and Butterfly.

viii.Mollusca: Chiton, Pila, Unio, Pterodo, Murex, Sepia, Loligo, Octopus, Nautilus, Glochidium larva

ix.Echinodermata: Asterias, Ophiothrix, Echinus, Clypeaster, Cucumaria, Antedon, Bipinnaria larva.

2.Dissections:

- **Prawn: appendages, digestive system, nervous system, mounting of statocyst.**
- **Insect mouth parts.**

3.laboratory record work shall be submitted at the time of practical examination.

4.An “ animal album” containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

5.Computer aided techniques should be adopted- show virtual dissections.

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SEMESTER –II

Module –II /Core-II

Animal Diversity- Vertebrates

Periods: 60

Max. Marks: 60

COURSE OUTCOMES

After completion of the course the student is able to:

CO1. Knowledge about the Diversity and Phylogeny of Vertebrates Phyla

CO2. Understand the Nomenclature and Classification of the Major Vertebrate Phyla

CO3. Describe the Morphology and Anatomy of various Vertebrates through type Study

CO4. Understand the Evolutionary importance of Temporal Fossae in Reptiles

CO5. Knowledge about the significance of various types of Adaptations in different Phyla

UNIT – I (15 Periods)

1.1. Hemichordata

- 1.1.1 General characters
- 1.1.2 Classification of Hemichordata up to classes with examples
- 1.1.3 *Balanoglossus* - Structure and affinities
- 1.1.4. General characters and classification of Chordata upto orders with examples.

1.2. Urochordata, Cephalochordata, Cyclostomata

- 1.2.1. Salient features of Urochordata
- 1.2.2. Retrogressive metamorphosis and its significance in Urochordata
- 1.2.3. Salient features and affinities of Cephalochordata
- 1.2.4. General characters of Cyclostomat. Comparison of the *Petromyzon* and *Myxine*

UNIT – II (15 Periods)

2.1. Pisces

- 2.1.1. General characters of Fishes
- 2.1.2. Classification of fishes up to order level with examples
- 2.1.3. *Scoliodon* – Respiratory, Circulatory and Nervous system.
- 2.1.4. Types of Scales and types of Fins

2.2. Amphibia

- 2.2.1. General characters of Amphibians
- 2.2.2. Classification of Amphibians up to orders with examples.
- 2.2.3. *Rana tigrina* - Respiratory, Circulatory and Nervous system.

UNIT – III (15 Periods)

3.1 Reptilia

- 3.1.1. General characters of Reptilia
- 3.1.2. Classification of Reptilia up to orders with examples
- 3.1.3. *Calotes* – Respiratory system, Circulatory and Nervous system.
- 3.1.4. Temporal fosse in reptiles and its evolutionary importance
- 3.1.5. Distinguished characters of Poisonous and Non poisonous snakes.

3.2. Aves

- 3.1.1. General characters of Aves
- 3.1.2. Classification of Aves up to orders with examples.
- 3.1.3. *Columba livia* -, Digestive system, Circulatory systems, Respiratory system and Nervous system.

UNIT – IV (15 Periods)

4.1. Mammalia

- 4.1.1. General characters of Mammalia
- 4.1.2. Classification of Mammalia up to orders with examples
- 4.1.3. Rabbit –Digestive, Respiratory, Circulatory and Nervous system.
- 4.1.4. Dentition in mammals.

4.2. Adaptations in Vertebrates

- 4.2.1. Parental care in amphibian, neoteny and paedogenesis.
- 4.2.2. Migration in Birds.
- 4.2.3. Flight adaptation in Birds
- 4.2.4. Aquatic adaptations in Mammals

B.Sc. I Year

ZOOLOGY PRACTICAL SYLLABUS FOR II SEMESTER

ZOOLOGY - CORE PAPER – II : Animal Diversity- Vertebrates

Periods: 45 Max. Marks: 50

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

1. **Hemichordata:** *Balanoglossus*, Tornaria larva
2. **Protochordata:** *Amphioxus*, *Amphioxus* T.S. through pharynx
3. **Cyclostomata:** *Petromyzon*, *Myxine*, *Ammocoetus* larva
4. **Pisces:** *Sphyrna Pristis*, *Torpedo*, *Channa*, *Pleuronectes*, *Hippocampus*, *Exocoetus*, *Echieneis*, *Labeo*, *Catla*, *Clarius*, *Auguilla*, *Protopterus*, Scales: Placoid, Cycloid, Ctenoid
5. **Amphibia:** *Ichthyophis*, *Amblystoma*, *Siren*, *Hyla*, *Rachophous*, *Bufo*, *Rana*, Axolotal larva
6. **Reptilia :** *Draco*, *Chamaeleon*, *Gecko*, *Uromastix*, *Vipera russelli*, *Naja*, *Bungarus*, *Enhydrina*, *Typhlops*, *Testudo*, *Trionyx*, *Crocodilus*, *Ptyas*.
7. **Aves:** *Archaeopteryx*, *Passer*, *Psittacula*, *Bubo*, *Alcedo*, *Columba*, *Corvus*, *Pavo*; Collection and study of different types of feathers: Quill, Contour, Filoplume, Down
8. **Mammalia:** *Ornithorhynchus*, *Tachyglossus*, *Pteropus*, *Funambulus*, *Manis*, *Loris*, Hedgehog

Histology: T.S. of Liver, Pancreas, Kidney, Stomach, Intestine, Lungs Artery, Vein, Bone T.S., Spinal cord.

Osteology :

1. Rabbit – Axial skeleton system (bones of Skull and Vertebral Column)
2. Varanus, Pigeon and Rabbit – Appendicular skeleton system (bones of limbs and girdles)

Dissections of *Labeo/Tilapia*:

1. Digestive system.
2. Brain, Weberian ossicles
3. V, VII, IX, X cranial nerves

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

An “**Animal album**” containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

Computer aided virtual dissections.**Suggested manuals**

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

**GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), BEGUMPET, HYDERABAD.
SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2020-21
SEMESTER –III
Module –III /Core-III**

ANIMAL PHYSIOLOGY AND ANIMAL BEHAVIOUR

Periods: 60 Max. Marks: 60 M

COURSE OUTCOMES

After completion of the course the student is able to:

CO1. Understand the composition of food and mechanism of digestion absorption and assimilation.

CO2. Describe the mechanism of circulation and composition and functions of blood

CO3. Knowledge of Neuromuscular coordination, Osmoregulation in animals and Endocrine system and their functions

CO4. Understand the process of respiration and excretion and the mechanism of transport of gases

CO5. Analyze various types of Animal Behaviour and their significance in their Learning, Memory, Social Behaviour and Communication

UNIT – I (15 Periods)

1.1 DIGESTION

- 1.1.1 Enzymes: Definition, Classification, Inhibition and Regulation.
- 1.1.2 Digestion of Carbohydrates, Proteins, Lipids and Cellulose.
- 1.1.3 Absorption and Assimilation of digested food;
- 1.1.4 Role of Gastrointestinal hormones in digestion.

1.2 EXCRETION

- 1.2.1 Classification of Animals on the basis of excretory products- Ammonotelic, Uricotelic, Ureotelic
- 1.2.2 Structure and function of Nephron.
- 1.2.3 Urine formation, Counter current mechanism.

1.3 OSMOREGULATION

- 1.3.1 Water and ionic regulation by freshwater,
- 1.3.2 Brackish water and marine water animals

UNIT-II

(15 Periods)

2.1 HOMEOSTASIS

- 2.1.1 Concept of Homeostasis
- 2.1.2 Mechanism of Homeostasis

2.2 RESPIRATION

- 2.2.1 Definition of Respiration, Respiratory mechanisms, External, Internal and cellular Respiration
- 2.2.2 Respiratory Pigments; transport of oxygen, Oxygen dissociation curves. Bohr's effect. transport of CO₂, Chloride shift;
- 2.2.3 Regulation of respiration – nervous and chemical mechanism

2.3 CIRCULATION

- 2.3.1 Types of circulation - Open and Closed circulation
- 2.3.2 Structure of Mammalian Heart, Types of hearts – neurogenic and myogenic;
- 2.3.3 Heart function – Conduction and regulation of heart beat, Regulation of Heart rate
- 2.3.4 Tachycardia and Bradycardia: Blood Clotting mechanism

UNIT – III

(15 periods)

3.1. MUSCLE CONTRACTION

- 3.1.1 Types of Muscles
- 3.1.2 Ultra structure of skeletal muscle fibre
- 3.1.3 Sliding Filament theory, muscle contraction mechanism. Biochemical changes during muscle contraction.
- 3.1.4 Twitch tetanus summation, Treppe fatigue.

3.2. NERVE IMPULSE

- 3.2.1 Structure of Neuron
- 3.2.2 Resting potential, action potential and conduction of nerve impulse
- 3.2.3 Transmission of nerve impulse
- 3.2.4 Synapse, Synaptic transmission neurotransmitters EPSP, IPSP

3.3 ENDOCRINE SYSTEM

- 3.3.1 Endocrine glands - Structure, secretions and functions of Pituitary, Thyroid, Parathyroid, Adrenal gland and Pancreas
- 3.3.2 Hormone action and concept of Secondary messengers
- 3.3.3 Male and Female Hormones, Hormonal control of Menstrual cycle in human beings.

UNIT – IV

(15 periods)

ZOOLOGY PRACTICAL SYLLABUS FOR III SEMESTER

ZOOLOGY - CORE PAPER – III

ANIMAL PHYSIOLOGY AND ANIMAL BEHAVIOUR

Periods: 30 Max. Marks: 50

1. Qualitative tests for identification of carbohydrates, proteins and lipids.
 2. Qualitative tests for identification of ammonia, urea and uric acid (Nitrogenous excretory products)
 3. Effect of pH and Temperature on salivary amylase activity.
 4. Study of permanent histological sections of Mammalian Endocrine glands - pituitary, thyroid, pancreas, adrenal gland.
 5. Estimation of Haemoglobin by Sahlis method.
 6. Estimation of total protein by Lowry's method.
- Laboratory Record work shall be submitted at the time of practical examination
 - Computer aided techniques should be adopted as per UGC guide lines.

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SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2020-21
SEMESTER –IV**

Module –IV /Core-IV

Cell Biology, Genetics & Developmental Biology

Periods: 60 Max. Marks: 60 M

COURSE OUTCOMES

After completion of the course the student is able to:

CO1. Describe the composition of prokaryotic and eukaryotic cells.

CO2. Understand the structure of cells and cell organelles in relation to their functional aspects.

CO3. Understand the Structure and functions of Nucleic acids and their role in Protein Synthesis

CO4. Apply the various concepts of Genetics in Problem Solving .

CO5. Understand the Process of Gametogenesis and its significance in the development of an Organism

UNIT – I (15 Periods)

1. Cell Biology

1.1. Cell theory, Differences of Prokaryotic and Eukaryotic cells

1.2. Structure and functions of plasma membrane: Structure, composition of Plasma membrane, fluid mosaic model.

1.3. Structure and functions of cell organelles –Endoplasmic reticulum, Golgi body, Ribosomes, Lysosomes, Mitochondria and Nucleus

1.4. Chromosomes – Structure, types, giant chromosomes

- 1.5. Cell Division - Mitosis, Meiosis.
- 1.6. Cell cycle and its regulation.

UNIT – II (15 Periods)

2. Molecular Biology

- 2.1 DNA (Deoxyribo Nucleic Acid) - Structure
- 2.2 RNA (Ribo Nucleic Acid) - Structure, types
- 2.3 DNA Replication (Prokaryotes)
- 2.4 Protein Synthesis – Transcription and Translation (prokaroytes)
- 2.5 Genetic Code; operon concept: Lac operon
- 2.6 Molecular Biology Techniques- Polymerase Chain Reaction and Electrophoresis.

UNIT – III (15 Periods)

3. Genetics

- 3.1 Mendals laws of Inheritance and Incomplete dominance,Co-dominance.
- 3.2 Human Karyotyping and amniocentesis.
- 3.3. Sex determination and sex-linked inheritance
- 3.4. Chromosomal Mutations- Deletion, Duplication, Inversion, Translocation.
- 3.5. Inborn errors of metabolism: Alkaptonuria, Phenylketonuria, Glycogen Storage disease.
- 3.6. Chromosomal disorders-Down syndrome, Patau’s syndrome, Klinefelter’s syndrome and Turners syndrome.

UNIT – IV

(15 Periods)

(15 Periods)

4. Developmental Biology and Embryology

- 4.1 Gametogenesis (Spermatogenesis and Oogenesis), Fertilization, Types of eggs, Types of cleavages
- 4.2 Development of Frog up to formation of primary germ layers
- 4.3 Formation of Foetal membrane in chick embryo and their functions
- 4.4 Types and functions of Placenta in mammals
- 4.5 Regeneration in Turbellaria and Lizards

ZOOLOGY PRACTICAL SYLLABUS FOR III SEMESTER

ZOOLOGY Core Paper – IV

Cell Biology, Genetics and Developmental Biology

Periods: 30 Max. Marks: 50

I. Cytology

1. Preparation and Identification of slides of Mitotic divisions with onion root tips
2. Preparation and Identification of different stages of Meiosis in Grasshopper Testes

3. Identification and study of the following slides
 - i). Different stages of Mitosis and Meiosis
 - ii) Lamp brush and Polytene chromosomes

II. Genetics

1. Problems on Genetics - Mendelian inheritance, Linkage and crossing over, Sex linked inheritance

III. Embryology

- 1.. Study of T.S. of Testis and Ovary of a mammal
2. Study of different stages of cleavages (2, 4, 8, 16 cell stages); Morula, Blastula
3. Study of chick embryos of 18 hours, 24 hours, 33 hours and 48 hours of incubation

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

An “**Album**” containing photographs, cut outs, with appropriate write-up about Genetics and Evolution.

Computer aided techniques should be adopted as per UGC guide lines.

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SEMESTER –V

DSC/Module –V /Core-V/PAPER-V

ANIMAL PHYSIOLOGY

Periods: 60 Max. Marks: 75

COURSE OUTCOMES

After completion of the course the student is able to:

CO1. Understand the composition of food and mechanism of digestion absorption and assimilation.

CO2. Describe the mechanism of circulation and composition and functions of blood

CO3. Knowledge of Neuromuscular coordination and the mechanism of Osmoregulation in animals.

CO4. Understand the process of respiration and excretion and the mechanism of transport of gases

CO5. Identify the occurrence of various types of disorders in man in relation to the secretions of Endocrine glands

UNIT – I (15 Periods)

1.1 DIGESTION

- 1.1.1 Digestion definition and extra and intracellular digestion.
- 1.1.2 Digestion of Carbohydrates, Proteins, Lipids and Cellulose.
- 1.1.3 Absorption and Assimilation of digested food; role of Gastrointestinal hormones in digestion.
- 1.1.4 Disorders of Alimentary canal.

1.2 RESPIRATION

- 1.2.1 Definition of Respiration and Respiratory mechanisms – External, Internal and cellular.
- 1.2.2 Respiratory Pigments; Transport of oxygen, Oxygen dissociation curves. Bohr's effect.
- 1.2.3 Transport of CO₂, Chloride shift; Regulation of respiration – nervous and chemical.
- 1.2.4 Disorders of respiratory tract

UNIT-II

(15 periods)

2.1 CIRCULATION

- 2.1.1 Types of circulation - Open and Closed circulation
- 2.1.2 Structure of Mammalian Heart, Types of hearts – Neurogenic and Myogenic; Heart function –Conduction and regulation of heart beat.
- 2.1.3 Regulation of Heart rate – Tachycardia and Bradycardia,
- 2.1.4 Blood Clotting mechanism

2.2 EXCRETION

- 2.2.1 Classification of Animals on the basis of excretory products- Ammonotelic, Uricotelic, Ureotelic
- 2.2.2 Internal structure of kidney and Nephron.
- 2.2.3 Urine formation, Counter current mechanism.

UNIT – III

(15 periods)

3.1. MUSCLE CONTRACTION

- 3.1.1 Types of Muscles
- 3.1.2 Ultra structure of skeletal muscle fibre
- 3.1.3 Sliding Filament theory, muscle contraction mechanism. Biochemical changes during muscle contraction.

3.2. NERVE IMPULSE

- 3.2.1 Structure of Neuron
- 3.2.2 Nerve impulse - Resting potential and Action potential and Conduction of Nerve impulse
- 3.2.3 Synapse, types of synapses and Synaptic transmission.

UNIT – IV

(15 periods)

4.1 ENDOCRINE SYSTEM

- 4.1.1 Endocrine glands - Structure, secretions and functions of Pituitary, Thyroid, Parathyroid, Adrenal gland and Pancreas
- 4.1.2 Hormone action and concept of Secondary messengers
- 4.1.3 Male and Female Hormones, Hormonal control of Menstrual cycle in humans.

4.2. HOMEOSTASIS AND ENZYMES

- 4.2.1 Concept and Mechanism of Homeostasis
- 4.2.2 Osmoregulation - Water and ionic regulation by freshwater, brackish water and marine animals
- 4.2.3 Enzymes: Definition, Classification, Inhibition and Regulation.

ZOOLOGY PRACTICAL SYLLABUS FOR V SEMESTER

ZOOLOGY Core Paper – V

ANIMAL PHYSIOLOGY

Periods: 30 Max. Marks: 50

1. Qualitative tests for identification of carbohydrates, proteins and lipids.
 2. Qualitative tests for identification of ammonia, urea and uric acid (Nitrogenous excretory products)
 3. Effect of pH and Temperature on salivary amylase activity.
 4. Study of permanent histological sections of Mammalian Endocrine glands - pituitary, thyroid, pancreas, adrenal gland.
 5. Estimation of Haemoglobin by Sahlis method.
 6. Estimation of total protein by Lowry's method.
- Laboratory Record work shall be submitted at the time of practical examination
 - Computer aided techniques should be adopted as per UGC guide lines.

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SEMESTER –V
DSE/ PAPER-VI
SERICULTURE

Periods: 60 Max. Marks: 75

COURSE OUTCOMES

After completion of the course the student is able to:

- CO1. Knowledge about the Geographical distribution of different economic races of Silk worms
- CO2. Describe the Morphology and Anatomy of silk glands and the Composition of Silk
- CO3. Understand the culture methods of different varieties of mulberry plants.
- CO4. Identify the diseases and pests of B.mori and their control and management
- CO5. Apply the various aspects of Silkworm rearing to establish Sericulture as an Agro industry

UNIT-I: Introduction of Sericulture

15 (periods)

- 1.1. History of sericulture and present status of Sericulture industry in India.
- 1.2. Sericulture as agro-industry –perspectives and prospectus of Sericulture in India.
- 1.3. Geographical distribution of various species and economic races of silkworms- Mulberry, Tasar, Eri and Muga silkworm..
- 1.4. Types of silkworm host plants and their systematic position.

Unit-II: Biology of silkworms

15 (periods)

- 2.1. Morphology and anatomy of silk glands.
- 2.2. Properties and composition of silk.
- 2.3. Life cycle, external morphology and biology of Mulberry silkworm.
- 2.4. Internal morphology of silkworm- Digestive , Respiratory, Nervous, Excretory and Reproductive systems.

Unit-III: Diseases of Silkworm

15 (periods)

- 3.1. Influence of biotic and abiotic factors on the incidence of diseases.
- 3.2 Diseases of Bombyx mori and Philosomia ricini- viral and bacterial, Preventive and control measures.
- 3.3. Diseases of Bombyx mori and Philosomia ricini- fungal and protozoan,

Preventive and control measures.

3.4. Insect and vertebrate pests of silkworm and their management.

Unit-IV: Silkworm rearing

15 (periods)

- 4.1. Silkworm rearing house and rearing appliances.
- 4.2. Feeding and rearing methods of mulberry silkworms.
- 4.3 Mounting and harvesting of mulberry silk cocoons.
- 4.4. Commercial characters of cocoons and price fixation.

ZOOLOGY PRACTICAL SYLLABUS FOR V SEMESTER

ZOOLOGY – PAPER - VI

SERICULTURE

Time: 3 Hrs.

Max. Marks: 50

- I. Identification of different types of silkworms.
- II. Morphology of egg, larva, pupa and adult of different silkworm types.
- III. Life history of different silkworm types.
- IV. Dissection of digestive system and salivary gland of silkworm larva.
- V. Dissection of the nervous system of larva silkworm.
- VI. Rearing appliances.
- VII. Sex differentiation of larva, pupa and adult silkworms
- VIII. Calculation of shell ratio.

**GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), BEGUMPET, HYDERABAD.
SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2020-21
SEMESTER –VI**

**DSC/Module –VII /Core-VII/PAPER-VII
Immunology and Animal Biotechnology**

Periods: 60

Max. Marks: 75

Course Outcomes

After completion of the course the student is able to:

CO1. Understand the role of Immune System in maintaining Health

CO2. Knowledge of Structure and Function of major organs of Immune system

CO3. Apply knowledge of immunity in Clinical decision making through case studies

CO4. Understand the Animal cell culture and their Applications

CO5. Analyse the Pros and Cons of Various innovations in the field of Biotechnology

CO6. Apply the biotechnology techniques in the fields of medicine, diagnostics, pharmaceutical industry and Agriculture

Unit I: Immunology- Basic concepts: Antigens and Antibodies

1.1. Basic concepts of Immunology. Cells , Primary and secondary organs of immune system

1.2. Types of immunity- innate and acquired

1.3. Structure, function and types of antigens and antibodies. Epitopes, Haptens, adjuvants

Antigen-antibody reactions.

1.4. T cell and B cell activation. Monoclonal antibodies and their production

Unit II: Working of an Immune system :

2.1. Structure and functions of Major histocompatibility complex.

2.2. Basic properties and functions of Cytokines, Interferons and Complement proteins.

2.3. Humoral and cell mediated immunity.

2.4. Types of Hyper sensitivity, concepts of autoimmunity and immunodeficiency.

UNIT III: Animal Biotechnology

3.1. Concept and scope of Animal Biotechnology.

3.2. Cloning vectors – Plasmids, Cosmids , Lambda bacteriophage, YAC

3.3. Cloning – Cloning methods (cell, animal and gene cloning)

3.4. Animal cell culture- Equipment and materials for animal cell culture, and applications.

UNIT IV: Animal Biotechnology and Genetically modified organisms

4.1. Recombinant DNA technology and its application.

4.2. Transgenesis- Methods of Transgenesis. Application of transgenic animals in biotechnology

4.3. Stem cells- types and their applications.

4.4. Introduction to vaccines and types of vaccines.

B.Sc. III Year PRACTICAL SYLLABUS

SEMESTER - V, DSC - II

Paper – VII

IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

Periods: 30

Max. Marks: 50

I. Immunology

1. Identification of Blood groups
2. Histological study of spleen, thymus and lymph nodes (through prepared slides)
3. Enumeration of RBC & WBC from a given blood sample
4. Enumeration of Differential count of WBC from a given blood sample
5. Demonstration of
 - a. ELISA
 - b. Immunoelectrophoresis

II. Animal Biotechnology

1. Study the following techniques through photographs / virtual lab
 - a. Southern blotting
 - b. Western blotting
 - c. DNA sequencing (Sanger's method)
 - d. DNA finger printing
 - e. Identification of Vectors
 - f. Identification of Transgenic animals
 2. PCR demonstration /virtual lab
- Laboratory Record work shall be submitted at the time of practical examination
 - Computer aided techniques should be adopted as per UGC guide lines.

GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), BEGUMPET, HYDERABAD.
SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2020-21

Semester - VI , DSE- II (A) - PAPER- VIII

AQUATIC BIOLOGY

Periods: 60

Max. Marks: 75

COURSE OUTCOMES

After completion of the course the student is able to:

CO1. Knowledge about the various types of Aquatic Biomes

CO2. Understood the physicochemical characteristics of different fresh water bodies.

CO3. Learn about the origin, diversity and different ecological aspects of fresh water bodies

CO4. In depth knowledge regarding the various adaptations of Marine organisms

CO5. Apply the concepts of Aquatic Biology in Management and Conservation of Aquatic resources

UNIT – I Aquatic Biomes

(15 periods)

- 1.1 Brief introduction of the aquatic biomes
- 1.2 Freshwater ecosystem (lakes, wetlands, streams and rivers),
- 1.3 Estuaries, intertidal zones,
- 1.4 Oceanic pelagic zone, marine benthic zone.

UNIT – II Fresh Water Biology

(15 periods)

- 2.1 Coral reefs
- 2.2 Lakes: Origin and classification of lakes
- 2.3 Lake as an Ecosystem, Lake morphometry
- 2.4 Physico-chemical Characteristics of fresh water bodies: Light, Temperature, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity: dissolved gases (Oxygen, Carbon dioxide).

UNIT – III Marine Biology

(15 periods)

- 3.1 Nutrient Cycles and Lakes- Nitrogen, Sulphur and Phosphorous.
- 3.2 Streams: Different stages of stream development, Physico-chemical environment, adaptation of hill stream fishes.
- 3.3 Salinity and density of sea water; Continental shelf; Adaptation of deep sea organisms; Sea weeds.
- 3.4 Eutrophication

UNIT – IV Management of Aquatic Resources

(15 periods)

- 4.1 Aquatic pollution - Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills,
- 4.2 Management and conservation
- 4.3 Water pollution acts of India
- 4.4 Sewage treatment and water quality assessment – BO D and COD

GOVERNMENT DEGREE COLLEGE FOR WOMEN, BEGUMPET, HYD.

AUTONOMOUS (CBCS)

DSE- II (A)- PAPER- VIII

Semester VI Practical Syllabus

AQUATIC BIOLOGY

Periods: 30

50

Max.Marks.:

1. Study of the topography of a lake
2. Physico-Chemical and biological analysis of a lake
Physico-Chemical analysis of water - O₂, CO₂, BOD, COD
Biological– Zooplanktons – Identification and population density of Zooplanktons of a lake.
3. Determination 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 / Marine bioreserve/Fisheries Institutes.

GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), BEGUMPET, HYDERABAD.

SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2020-21

V - SEMESTER

Generic Elective- I, Paper – I

NUTRITION AND DIETETICS

Periods: 30

Max. Marks: 50

COURSE OUTCOMES

After completion of the course the student is able to:

CO1. Understand the importance of the good Nutrition and nutritional requirements in different kinds of people.

CO2. Understand the importance of balanced diet and benefits of good food habits.

CO3. Learn about the diet Obesity and important aspects of diet therapy.

CO4. Assess the nutritive values of different food materials.

CO5. Learn about improper food intake and the consequent health disorders.

UNIT – I

(15 Periods)

- 1.1. Nutrition of children, pregnant and lactating mothers.
- 1.2. Diet obesity and underweight, Principals of diet therapy.
- 1.3. Balanced diet and nutritional disorders.
- 1.4. Food allergy, food habits- health effects.

UNIT – II

(15 Periods)

- 2.1. Basic Macronutrients and Micronutrients.
- 2.2 Vitamins and Minerals, Significance of Water and fibre.
- 2.3 Nutritive value of Cereals, Grains, Fruits and Vegetables.
- 2.4. Malnutrition and their effects.

GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), BEGUMPET, HYDERABAD. SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2020-21

VI - SEMESTER

Generic Elective – II, Paper – II

CLINICAL SCIENCE

Periods: 30

Max. Marks: 50

COURSE OUTCOMES

After completion of the course the student is able to:

CO1. Learn about the Composition, functions and types of Blood groups

CO2. Understand the importance the process of Coagulation.

CO3. Knowledge about the different blood related disorders n human beings.

CO4. Understand the components involved in the immune system.

CO5. Learn about antibodies and antigens and their role in several health disorders.

UNIT – I: HAEMATOLOGY

(15 Periods)

- 1.1 Introduction of Haematology; Structure, Composition and functions of blood;

Origin of blood cells (RBC, WBC, PLATELETS)

- 1.2 Blood coagulation and theories of blood coagulation, anticoagulants
- 1.3 Blood groups and Rh factor; Blood Transfusion and Blood Banking
- 1.4 Blood associated disorders – Anaemia, Leucopaenia, Leucocytosis, Leukaemia and Haemophilia

UNIT – II: IMMUNOLOGY

(15 Periods)

- 2.1. Types of Immunity – Innate and Acquired; Antigens and Antibodies
- 2.2. Immunoglobulins – Classifications and significance; Complement system.
- 2.3. Lymphatic system and Lymphoid organs – Spleen, Thymus, Lymph nodes.
- 2.4. T-cells, B-cells and Macrophages.

**GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), BEGUMPET, HYDERABAD.
SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2020-21
Semester – IV**

Skill Enhancement Course-II – Vermiculture and Vermicomposting

PERIODS: 30

MAX. MARKS: 50

NO. OF CREDITS: 2

COURSE OUTCOMES

After completion of the course the student is able to:

- CO 1 Knowledge of composting
- CO 2 Describe the decomposing process and be able to compost in a limited space .
- CO 3 Apply the Knowledge to get self employment,
- CO 4 They can also generate employment for others,
- CO 5 They will also turn towards organic farming
- CO 6 Analyse the ways to maintain the environment pollution free
- CO 7 Knowledge of biodiversity of local earthworms.

UNIT: I

(15 periods)

- 1.1 Scope of Vermi-technology- Vermiculture and Vermi composting – difference between Vermiculture and Vermi composting –
- 1.2 Earthworm diversity – Ecological groups of earthworms, biology of composting earthworms – Eoisena foetida, Eudrilus lugeniae.
- 1.3 Soil – Physical, chemical and biological features

1.4 Types small and large scale pit method, heap method.

UNIT: II

(15 periods)

- 2.1. Vermiculture techniques – Vermi culture process – site selection - Selection and collection of species.
- 2.2. Essential parameters for Vermi culture – bedding. Methods of harvesting worms general manual methods, self harvesting method, mechanical method
- 2.3. Nutritive value of Vermi compost, storing and packing of compost
- 2.4. Applications of Vermi-composting.

**GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), BEGUMPET, HYDERABAD.
SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2020-21**

Semester – III

**Skill Enhancement Course-I
Paper – AQUACULTURE**

PERIODS: 30

MAX. MARKS: 50

NO. OF CREDITS: 2

COURSE OUTCOMES

After completion of the course the student is able to:

- CO 1 Describe the fisheries and fishery industries.
- CO 2 Understand the various types and methods of aquaculture practices.
- CO 3 Understand the control and management of diseases of important fishes.
- CO 4 Apply the modern techniques and methods of post harvest technology .
- CO 5 Attained knowledge about important cultivable fin fishes, shell fishes and importance of value added fishery products

UNIT-I

15 periods

- 1.1 Introduction and types of fisheries
- 1.2 Fishery resources- fresh water, brackish water and marine water
- 1.3 Construction and Management of fish pond
- 1.4 Fishing crafts and fishing gears.
- 1.5 Hatchery design, water quality and management

UNIT-II

15 periods

- 2.1. Induced breeding-importance of induced breeding
- 2.2 Seed production, Seed transport and Seed stocking
- 2.3 Fish products-primary and secondary products.
- 2.4 Common diseases - viruses, Bacteria and fungi.
- 2.5 Post harvest technology-preservation method of fishes

**GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), BEGUMPET, HYDERABAD.
SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2020-21**

**B.SC. III YEAR VI – SEMESTER
SEC-IV**

PERSPECTIVES OF FOOD SAFETY IN INDIA

PERIODS: 30

MAX. MARKS: 50

NO. OF CREDITS: 2

COURSE OUTCOMES

After completion of the course the student is able to:

CO 1 Understand the various aspects of food safety and quality control

CO 2 Practice Hygiene and Sanitation

CO 3 Knowledge about selection and purchase of food

CO 4 Detect food pathogens, aflatoxin, synthetic color, artificial sweeteners and preservatives by suitable methods and equipment.

UNIT1. FOOD SAFETY AND QUALITY CONTROL

15 periods

1.1 Selecting and purchasing food, Understanding food labels

1.2 Storing raw foods and cooked foods

1.3 Definition of food adulteration and common adulterants present in food

UNIT2. HYGIENE AND SANITATION

15 periods

- 2.1 Definition of hygiene and sanitation
- 2.2 Personal hygiene of food Handler
- 2.3 Pest control and garbage disposal

GOVERNMENT DEGREE COLLEGE FOR WOMEN BEGUMPET, HYDERABAD.

(AUTONOMOUS)

SYLLABUS FOR B.Sc. ZOOLOGY COURSE (CBCS) 2020-21

B.SC. III YEAR V – SEMESTER

SEC-III

PERIODS: 30

MAX. MARKS: 50

NO. OF CREDITS: 2

BIO-TECHNIQUES

COURSE OUTCOMES

After completion of the course the student is able to:

CO 1 Learn about the various tools and instrumentation used in a biological laboratory

CO 2 Knowledge about the different laboratory techniques

CO 3 Understand the various concepts involved in the Biotechniques

CO 4 Apply this Knowledge to detect and identify solutions in biological research.

UNIT1: Basic requirements in a biological laboratory

15 periods

- 1.1 Microscopy
- 1.2 Bioreactor
- 1.3 Hot plate stirrer
- 1.4 Ph meter
- 1.5 Spectrophotometer

UNIT2: Laboratory Techniques

15 periods

- 2.1 Staining
- 2.2 Centrifugation
- 2.3 Chromatography
- 2.4 Electrophoresis

2.5 PCR