

Syllabus for Lab Assistant Examination (Zoology) -2014

General account of Non chordate body plan
Protozoa: General characters and classification
Detailed Study: Paramecium
General account of porifera: Cell-types, canal system, skeleton, reproduction
Detailed study: Leucosolenia
General account of Cnidarian body plan
Detailed study: Hydra
Coral reefs and their significances Polymorphism in cnidaria
Triploblastic body plan: types and formation of coelom
Detailed study: Planaria-Dugesia
Nematoda general account
Detailed study: Ascaris
General account of different classes of mollusca, torsion
Detailed study: Unio and Pita
Chordata: General characters
Protochordata: General characters
Detailed study: Ascidia and Amphioxus.
Vertebrata: General characters
Cyclostomata: Lamprey - Petromyzon
Pisces: General characters
Detailed study: Dog fish-Scoliodon
1) General Account of the Body Plan in Animals
2) Classification of non chordate phyla up to their order
Protozoa, Porifera, Cnidaria, Platyhelminthes, Nematoda and Mollusca
3) Classification of Protochordata with examples
4) Classification of Vertebrata up to Pisces with their examples
5) Study of locomotion of representative animals
6) Field studies
General account of Annelida and Metamerism
Detailed study: Nereis
General account of Arthropoda
Detailed study: Prawn
General account of Echinodermata Detailed study: Starfish
Hemichordata: Balanoglossus General account of Lophophorates
Amphibia: General characters
Detailed study: Indian Bull Frog-Hoplobatrachus tigerinus
Reptilia: General characters
Detailed study: Common Garden Lizard-Calotes versicolor
Aves: General characters
Detailed Study: Blue Rock Pigeon-Columba livia
General account of Flightless Birds and their distribution Migration in birds
Flight adaptations in birds
Mammalia: General characters
Detailed Study: Rabbit

General account on Aquatic mammals

Placenta in mammals

1) Classification of Non chordate phyla: Annelida, Arthropoda, Hemichordata and Lophophorates

2) Anatomical study of Prawn

3) Classification of vertebrate classes Amphibia, Reptilia, Aves

4) Study of appendages of representative animals

5) Field studies

Echinodermata, and Mammalia

1. Protection, Support, and Movement

2. Circulation and Gas Exchange

1. Nervous and Sensory Systems

2. The Endocrine System and Chemical Messengers

1. Temperature and Body Fluid Regulation

2. Nutrition and Digestion

1. Origin of life on earth — Physical Evolution and Chemical Evolution

2. Organic Evolution and Origin of Metabolism - Anaerobism to Aerobism

3. Origins of Darwinian Evolutionary Theory

4. Pre-Darwinian Ideas and Neo-Darwinism

5. Theory of Natural Selection

6. Molecular Evolution and Carbon Dating Technique

1. Microevolution; Genetic Variation and change within Species

2. Macroevolution: Major Evolutionary Events — Speciation & Extinction

3. Tetrapod Evolution from Fishes: Significance of Dipnoids & Cyclopothoidea, Evolution of Reptiles and exit success as true land vertebrates

5. Evolution of Birds and Mammals — need for Homeothermism

6. Hominid Evolution

1. Comparative study of various organ systems of animals through slides, charts, models and multimedia

2. General anatomy, digestive system, brain, cranial nerves etc. of edible fish — Tilapia

3. Mounting of scales, gill raker & blood smear preparation and staining of edible fish

4. Study of larval forms of different animal phyla

5. fossils and process of fossilization

6. Darwin Great Voyage of Discovery (Documentary Film)

7. Homologous and Analogous Organs

a. Convergent and Divergent Evolution; Co-evolution and Parallel Evolution

9. Study of Adaptive Radiations, Extinct and Living Fossils

10. Whole mount preparation of animals or animal materials (Submission of 5 slides)

1. Scope of Ecology and Concepts of Ecosystem

2. Ecosystem Energetics

3. Abiotic components and Biogeochemical cycles

4. Organization at community level

1. Aquatic Biome: Freshwaters, Intertidal Zones, Marine & Wetlands

2. Terrestrial Biomes: Tropical, Temperate & Boreal Forests, Savannah & Temperate Grasslands, Arid Scrubs & Deserts, Tundra & Mountains

3. Ecological Succession

4. Man & Nature: Agroecosystems & Urban Biomes

1. Wildlife — an Integral Component of our Cultural Heritage

2. Wildlife of Indian Subcontinent — glimpse into the glorious past & rich diversity
3. Important Wildlife of India and its Status & Distribution
 - 1, Important Protected Areas in India and Gujarat
 2. Conservation Laws & Policies — WPA 1972, CITES & TRAFFIC
 3. Concept of Zoological Gardens; their significance and management
 4. Major Conservation Projects viz. Project Tiger, Project Elephant & others
1. Principles and pattern of Animal Distribution
 2. Role of Barriers in distribution
 3. Continental Drift Theory
 4. Major Zoogeographic Realms in the world & their faunal peculiarities
1. Study of General Anatomy, Appendages, Digestive & Nervous System in Prawn
 2. Field visits to various Freshwater Ecosystems
 - i) Lentic Ecosystem — Natural and Man-made Ponds and Lakes; Wetlands
 - ii) Lotic Ecosystem — Vishwamitri and Mahi Rivers
 3. Field visits to various Terrestrial Ecosystem
 - i) Dry Deciduous Forest ii) Scrubland iii) Grassland
 4. Visits to Zoo/s to study Status of animals in Captivity
 5. Mapping some of the important Protected Areas of India
 - i) National Parks ii) Wildlife Sanctuaries iii) Biosphere Reserves
6. Study of Conservation Status of some Important Wild animals & Map their distribution
7. Mapping of various Zoogeographical Realms in the world
8. Mapping some of the peculiar fauna of each of the Zoogeographical Realms
 1. Principles of animal systematics and nomenclature
 2. Species concept and speciation
 3. Taxonomic procedures and macromolecular taxonomy
 4. Cladistic classification of animals
1. History and overview of ethology -"Cr
 2. Behavioral Patterns
 3. Hormones and behavior
 4. Biological rhythms _
 5. Orientation behavior
 6. Social organization of Lion, Deer, Monkey and Honeybees
1. Basic concepts in dairy science: Semen collection & preservation; artificial insemination; multiple ovulation and embryo transfer
 2. Poultry science: Maintenance and management
 3. Economic Entomology: Apiculture, Lac culture & Sericulture
 4. Study of aquaculture profile of fresh water carps and fish farm layout.
1. Prokaryotic and Eukaryotic organization
 2. Cell membrane — Structure and Function
 3. Cellular interaction
 4. Cytoskeleton and cell mobility
1. Endoplasmic reticulum and protein segregation
 2. Golgi complex and cell secretion
 3. Lysosomes
 4. Mitochondria
 5. Cell cycle, Mitosis and Meiosis
- i. The Atmosphere: Layers of atmosphere & atmospheric circulation

- ii. Temperature: Changes in temperature with latitude & season
- iii. Patterns of oceanic circulation & interactions of ocean with atmosphere
- iv. Weather & Climate (Precipitation, Tornadoes, Tropical Cyclones & Wildfires)
- 2. Water: A Fragile Resource
 - i. Importance of Water — Properties of water & Hydrologic Cycle
- 6ii. Global Water Problems
 - iii. Water Management & Conservation
- 3. Food Resources: A challenge for Agriculture
 - i. Nutritional Requirements & World Food Problems
 - ii. The Environmental Impact of Agriculture
 - iii. Solution to Agricultural Problems
- 4. Global Atmospheric Changes: Acid Deposition; Global Warming; Stratospheric Ozone Depletion; ENSO
 - 1. Biophysical properties of skeleton, joints and muscles
- Biophysics of Vision and Audition
- 3. Bioelectric properties of membranes
- 4. Biostatistics - Definition and Scope
- 5_ Sampling methods-collection and presentation of data
- 6. Measures of Central tendency
- 7. Measures of Dispersion
- 8. Introduction to testing of hypothesis
 - 1. Water
 - 2. Major groups of Biomolecules: Carbohydrates, Proteins, Lipids and Nucleotides'
 - 3. introduction to Enzymes, Enzyme kinetics and Regulation
 - 4. Carbohydrate metabolism: Glycolysis and Gluconateogenesis
 - 5. Lipid metabolism: β -oxidation and Biosynthesis of lipids
 - 6. Amino acid metabolism: Deamination, Transamination
 - 7. An overview of the integration of metabolic pathways: (TCA cycle at the centre)
- 1, Animal Systematics:
 - (1) Field visits to study the animals in their natural habitat; (2) Morphological basis of animal identification (3) Specimen collection, handling preservation, mounting and display techniques; (4) Use of descriptive and illustrative keys to classify animals; (5) Comparative Osteology — its significance in animal systematics; (6) Understanding and construction of cladogram: (7) Visit to a Natural History Museum.
- 2, Environmental Biology:
 - (1) Field visits to various environments (aquatic & terrestrial) & study the influence of environment on the organism; (2) Field, Visit to some of the polluted sites; (3) Qualitative & Quantitative Analysis of Soil and Water, (4) Study faunal indicators of environmental pollution; (5) Visit to environmental pollution monitoring units/ labs.
- 3. Cell Biology:
 - (1) Staining techniques - Cell staining, metachromatic (2) Study, of Mammalian histology through permanent slides & tissue processing, paraffin block preparation and HaematoxylinEosin staining; (3) Study of osmosis and plasmolysis; (4) Study of mitosis through permanent slides & in Onion Root tip: (5) Study of Meiosis through permanent slides; (6) Preparation of Neurosecretory cells from Cockroach-
- Physiological Chemistry
 - (1) Detection of protein, carbohydrate and lipids, (2) Estimation of protein, glucose and

glycogen. (3) Enzyme kinetic.

Biostatistics and Ethology:

(1) Measures of Central tendency and variability, (2) Data analysis and interpretations, (3) Application of computer in biosciences, (4) Study of different types of behavior, (5) Behavioral responses of earthworm, cockroach, mosquito and fish to different stimuli_

6. Economic Zoology;

(1) Study of various livestock & poultry breeds; (2) Visit to Poultry Farm; (3) Study of some of the selected livestock parasites - their lifecycles, management & precautionary measures.

1. History and milestones of Animal Biotechnology

2. Fermentation technology

3. Advances in vaccinology and vaccine delivery system

4. Reproductive Biotechnology

5. Enzymes in Biotechnology

6. Transgenic animals

1. Cells and organs of the Immune System

2. Antigens

3. Immunoglobulins: Structure and function

4. Antigens- Antibody Interactions -

5. Major Histocompatibility Complex

6. T-cell receptor

7. T-cell maturation, activation and differentiation

8. B-cell generation, activation and differentiation

1. Gametogenesis

2. Fertilization, Cleavage, Blastulation in non-chordates and chordates

3. Gastrulation: General processes in invertebrates and vertebrates

1. Axis specification in Drosophila and in Amphibia

2. Metamorphosis: The hormonal reactivation of development

3. Regeneration: Hydra, Salamander limb and mammalian liver

4. Developmental Biology and the future of medicine

5. Evolutionary developmental biology

1. Chromosomal Theory of inheritance

2. Sex determination & sex-linked inheritance

3. Linkage, Crossing over and Chromosome mapping

4. Heredity and environment

5. Mutation and Chromosomal aberrations

6. Population Genetics

7. Application of Genetics

1. Spectroscopic Techniques

2. Separation techniques

3. Centrifugation techniques

4. ELISA and PCR techniques

5. Application of computer in Biosciences

1. Integumentary System: Structure & functions of skin; Skin derivatives; Role of skin in Homeostasis; Kinds of wounds & wound healing mechanisms.

2. Skeletal System: Types of skeletal tissues; Functions of skeletal system; Structure of long bone; Role of skeletal system in calcium metabolism.

3. Muscular System: Types of muscular tissues; Functions of muscular system; Structure of skeletal muscle; The mechanism of muscle contraction.
1. Nervous System: Cells of nervous system; Nerve impulses — membrane potential, resting membrane potential & action potential; Synaptic Transmission; Neurotransmitters; Mechanism of reflex action.
2. Sense Organs: Sensory receptors, their classification & distribution; Somatic senses; Special senses
3. Endocrine System: Cells & organs of Endocrine system; Hormones — Classification & Regulation of secretion; Selected Endocrine disorders.
1. Circulatory System: Structure & function of Mammalian Heart; Blood Vessels— Types, Maury & functions; Composition of Blood — formed elements & blood plasma; Mechanism of Blood clotting; Blood Pressure, Pulse & Myocardial Infarction.
2. Lymphatic System; Lymph & Interstitial fluid; Circulation of lymph & Lymph nodes.
3. Physiology of Reproduction: Male & Female Reproductive Organs; Accessory reproductive glands; Reproductive cycles in females.
1. Structure of Nucleic acids
2. Structure of prokaryotic and eukaryotic chromosomes
3. Fundamentals of DNA Replication and DNA Repair
4. Transcription in prokaryotes and its regulation in operons
5. Protein synthesis in prokaryotes
6. An introduction to recombinant DNA technology
- Developmental Biology and Animal Biotechnology
1. Study of whole mounts and sections of chick embryo at different stages, primitive streak, 24, 28, 33, 48, 72 and 96 hours.
2. Preparation of chick embryo whole mounts
3. Placenta in animals
4. Stages of regeneration in fish & Hydra
5. Study of different stages (Goon') of metamorphosis in frog
6. Study of Polynicnisz Chain Reaction (demonstration)
7. Hanging drop cell culture technique and tests for cell proliferation and viability using MTT(Trypan blue
8. Demonstration of fermentation
- Genetics, Molecular Iliolou and Instrumentation
1. Solving genetics problems using Punnett Square
2. Pedigree Emalysis for predicting inheritance pattern
3. Observation of common mutants of Drosophila
4. Permanent slides/images of salivary glands and lampbrush chromosomes, laggards, multivalents and bridges
5. Study of polytene chromosomes through temporary preparations
6. Study of the karyotype and idiogram by photographs
7. Study of-sex chromosomes, banding patterns, aneuploids and inherited characters through ,photographs and slides
8. Genomic DNA extraction and purity assessment using A260/A280 Ratios
9. Working principle and demonstration of pH meter, centr:ft:,,,-, spectrophotometer, electrophoretic unit (PAGE &Agarose gel)
- Physiology and Immunology
1. Total count of RBC and WBC
2. Differential count of WBC

3. Estimation of rate of respiration in cockroach
4. Demonstrate the function of Malpighian tubules in cockroach
5. Study of Blood Sugar
6. Urine Analysis — Physical Properties of Urine; Normal & Abnormal Contents of Urine
7. Immunoprecipitation using serum
8. Radial immunodiffusion (RID)
9. Tube agglutination test: Widal test
10. Antigen-Antibody reactions — Agglutination (Blood grouping testing)
12. Demonstration of primary and secondary immune organs in rat

General account of Non chordate body plan
 Protozoa: General characters and classification
 Detailed Study: Paramecium
 General account of porifera: Cell types, canal system, skeleton, reproduction
 Detailed study: Leucosolenia
 General account of Cnidarian body plan
 Detailed study: Hydra
 Coral reefs and their significance, Polymorphism in cnidaria Triploblastic body plan: types and formation of coelom Detailed study: Planaria-Dugesia
 Nematoda general account
 Detailed study: Ascaris
 General account of different classes of mollusca, torsion
 Detailed study: Unio and Pila
 Chordata: General characters
 Protochordata: General characters
 Detailed study: Ascidia and Amphioxus.
 Vertebrata: General characters
 Cyclostomata: Lamprey - Petromyzon Pisces: General characters
 Detailed study: Dog fish-Scoliodon

- 1) General Account of the Body Plan in Animals
- 2) Classification of Non chordate phyla up to their order Protozoa, Porifera, Cnidaria, Platyhelminthes, Nematoda and Mollusca
- 3) Classification of Protochordata with examples
- 4) Classification of Vertebrata up to Pisces with their examples
- 5) Study of locomotion of representative animals
- 6) Field studies

General account of Annelida and Metamerism
 Detailed study: Nereis
 General account of Arthropoda
 Detailed study: Prawn
 General account of Echinodermata Detailed study: Starfish
 Hemichordata: Balanoglossus General account of Lophophorates
 Amphibia: General characters
 Detailed study: Indian Bull Frog —Haplobatrachus tigerinus
 Reptilia: General characters
 Detailed study: Common Garden Lizard-Calotes versicolor
 Aves: General characters
 Detailed Study: Blue Rock Pigeon-Columba livia

General account of Flightless Birds and their distribution

Migration in birds

Flight adaptations in birds

Mammalia: General characters

Detailed Study: Rabbit

General account on Aquatic mammals

Placenta in mammals

1) Classification of Non chordate phyla: Annelida, Arthropoda, Hemichordata and Lopophorates and Mammalia

2) Anatomical study of Prawn

3) Classification of vertebrate. cla Amphibia, Reptilia, Ayes

4) Study of appendago cif representative animals

5) Field studies

1. Gas Exchange and Circulation in AniMals

2. Protection, support and movement

1. Animal sensory systems

2. The Endocrine systems & Chemical signals in animals

1. Water and Electrolyte Balance in Animals

2. Animal Nutrition -

1. -Introduction to Wildlife Conservation

2. Threatened species of India

3. Important Protected Areas in India and Gujarat

4. Species level conservation in India viz. Project Tiger, Project Elephant & others

1. Principles and pattern of Animal Distribution

2. Role of Barriers in distribution

3. Continental Drift Theory

4. Major Zoogeographic Realms in the world & their faunal peculiarities

1. Comparative study of various organ systems of animals through slides, charts, models and multimedia

2. General anatomy, digestive system, brain, cranial nerves etc. of edible fish — Tilapia

3. Mapping of various Zoogeographical Realms in the world

4. Mapping some of the important Protected Areas of India

1) National Parks ii) Wildlife Sanctuaries iii) Biosphere Reserves

5. Mapping some of the peculiar fauna of each of the Zoogeographical Realms

6. Mounting of scales, gill raker & blood smear preparation and staining of edible fish

7. Study of Conservation Status of some Important Wild animals & Mapping their distribution

8. Study of General Anatomy, Appendages, Div' give & Nervous System in Prawn

9. Study of larval forms of different animal phyla

10. Visits to Zoo/s to study Status of animals in Captivity

1. Development of behaviour

2. Neural basis of behaviour

3. Communication and animal signals

4. Reproductive strategies and parental care

1. Detection of Biomolecuies: Carbohydrates, Lipids and Proteins through various biochemical tests

2. Study of enzyme action on starch.

3. Hematology: (i) Preparation of Haemin Crystals (ii) Effect of osmotic gradients on blood

cells (iii) Estimation of Haemoglobin (iv) Vital Staining of Blood Smear — Giemsa Stain
(v) RBC and WBC Count using Neubauer's Counting Chamber

4. Field visits to various Freshwater Ecosystems
i) Lentic Ecosystem — Natural and Man-made Ponds and Lakes; Wetlands
ii) Lotic Ecosystem — Vishwamitri and Mahi Rivers

5. Field visits to various Terrestrial Ecosystem
i) Dry Deciduous Forest ii) Scrubland iii) Grassland

6. Thermoregulation studies in suitable animal models

7. Learning behaviour, Habituation and Instinctive behaviour studies in various animal models

8. Analysis of soil and water samples
(i) Estimation of soil pH (ii) Soil texture analysis (iii) Estimation of Hardness of water
(iv) Estimation of Acidity and Alkalinity of water (v) Estimation of Biological Oxygen Demand (BOD) of water

1. Physiology of Digestion and Nutrition
2. Physiology of Respiration
3. Physiology of Circulation

1. Physiology of Excretion and Osmoregulation
2. Thermoregulation
3. Physiology of Movement and Locomotion

1. Physiology of Nervous system and sense organs
2. Physiology of Reproduction
3. Hormones and their regulation

1. Ecological principles
2. Energy in ecological system
3. Population dynamics
4. Biological communities and species interactions

General account of Non Chordate body plan
Protozoa: General characters
Detailed Study: Paramecium
General account of Porifera: Cell types, canal system, skeleton, reproduction
General account of Cnidarian body plan
Detailed study: Hydra
Coral reefs and their significance, Polymorphism in cnidaria
Triploblastic body plan:- types and formation of coelom
Detailed study: Planaria-Dugesia
Nematoda general account
Detailed study: Round worm — *Ascaris lumbricoides*
General account of different classes of Mollusca, Torsion
Detail study: *Unio* and *Pila globosa*
General characters of Chordata
Prochordata: General characters
Detailed study: *Ascidia* and *Amphioxus*
Vertebrata: General characters
Cyclostomata: Lamprey - *Petromyzon*
Pisces: General characters
Detailed study: Dog fish-*Scoliodon*

General account of Annelida and Metarnerism

Detailed study: Nereis

.General account of Arthropoda

Detailed study: Prawn

General account of Echinodermata Detailed study: Starfish '

Hemichordata: Balanoglossus General account of Lophophoratea

Amphibia: General characters

Detailed study: Indian Bull Frog *Haplobatrachus tigerinus*

Reptilia: General characters

Detailed study: Common Garden Lizard - *Calotes versicolor*

Ayes: General characters

Detailed Study: Blue Rock Pigeon - *Columba livia*

Mammalia: General characters

Detailed Study: Rabbit

General account on Aquatic mammals

Placenta in mammals

1. Structural & Functional Adaptations in Aquatic Animals

2. Structural & Functional Adaptations in Terrestrial Animals

3. Structural & Functional Adaptations in Aerial Animals

4. Structural Adaptations for the life in Arid Environment •

1. Animal — Plant Association: Pollination and Seed Dispersal Mechanisms

2. Animal — Animal Association: Mutualism; Commensalism, Ameasalism, Parasitism

3. Animal — Human Interaction — Livestock, Pests, Pets, Poultry & Pisciculture

4. Animal Migrations

Wildlife Biology

1. Wildlife in India

2. Wildlife Habitat

3. Management of Wildlife

4. Wildlife Trade & legislation

1. Biatfiversity extinction and conservation appronchas

2. Theory and analysis of conservation of populations

3. Nntiortal and international efforts for conservation

4. Conservation of Natural Resources

1. Phriiology of Digestion and Nutrition

2. Physiology of Revimtion and Circulation

3. Physiology of Reproduction sod Role of Hormones

2. Physiolo of Nervous System and Sense .Organs

3 Physiology of Excretion and Osmoregulation

1. Physiology of Movement and Locomotion

Applied Aquaculture

Industrial Entomology

1. History of aquaculture, Scope and importance. Significance of aquaculture compared to other agricultural systems and commercial fisheries.

2. Types of aquaculture, Freshwater brackish water and Mari culture. Shell fish culture, Finftsh culture, Monoculture, Polyculture.

3. Integrated farming: The concept of recycling of organic waste for maximum production.

Rice cum fish culture. Culture practices and economics of duck cum fish, poultry cum ,

fish and pig cum fish culture.

4. Site selection: study of topography of pond site. Soil quality parameters, physical, soil type, porosity, percolation, shear strength rate of compression etc. Chemical, salinity, pH, nutrients, toxic gases etc. Water quality parameters-Chemical salinity, pH, dissolved oxygen, pollution, Physical, suspended solids, availability. Biological parameters- presence of juveniles/seedlings, predators! competitor, introduction to plankton, nekton and important groups.

5. Pond construction: preparation of site plan. Measurements and calculation of area-total area and water area. Preparation of bunds and dykes. Calculation of earth works; sluice gates, types, fixing.

6. Pond preparation: Drying, elimination of pests and predators. Preparation of nursery and stocking ponds. Manuring, Production of plankton. Stocking -acclimatization. Stocking density. Harvesting-Harvesting methods.

7. Fresh water cultivable fishes and their aquaculture profile: Indian Major Carps (IMC), Exotic Carps (EC), Cat-fishes, Tilapia, Channa etc. Cultivable species of crustaceans and molluscs: Identification and aquaculture profile: Shrimps, freshwater prawn, crab, lobster, pearl oyster, edible oyster, mussel-clams etc.

8. Brackish water aquaculture-Introduction, the tidal range, salinity and the biota.

Mulberry sericulture: Cultivation of food plants, Bioecology of mulberry silkworms, Rearing of silkworms, Harvesting and processing of cocoons, Reeling appliances, Diseases of Bombyx mori, Predators and parasitoids of silkworm and their management

Non-Mulberry sericulture: Tasar sericulture, Cultivation of food plants,

4 Bioecology and rearing of tasar, silkworms, Pupation and cocoon formation, Stifling and reeling of cocoons.

3 Muga sericulture: Cultivation of food plants, Bioecology and rearing of muga silkworms, Pupation and cocoon formation, Grainage technology, Stifling and reeling of cocoons.

a Eri sericulture: Cultivation of food plants, Bioecology and rearing of tasar silkworms, Pupation and cocoon formation, Stifling and reeling of cocoons

2. Apiculture

Kinds of honeybees, Organization of bee colony, Life-history and behaviour of

S bees, Dance language of honeybees, Diseases of honeybees, Beekeeping methods, Equipment and tools.

Apiary management - Hiving a colony, Controlling swarming, Handling of bees,

S Extraction of honey and wax, Bee products.

3. Lac culture

a Propagation of lac insects. Lac crop management, Natural enemies of lac insects

Lac insect and its life history, Host plant management, Strains of lac insects, and their management, Lac extraction

1. Principles of chemical and physical sciences in biology

2. Body architecture of animals

3. Animal associations and general adaptations

4. Zoogeographic distribution of animals

5. Understanding animal behavior

1. Diversity of living system - Nonchordates: General characters of various important phyla and some representative species.

2. Diversity of living system - Chordates: General characters and some representative species.

1. Principles of animal systematics 7 Animal classification systems
3. Taxonomic procedures and macromolecular taxonomy
4. Cladistic classification of animals
5. International Code of Zoological Nomenclature
1. An overview of cell
2. Tools in cell biology
3. Chemistry of cells
4. Prokaryotic and Eukaryotic organization
5. Cell membrane - Structure and Function
6. • Cellular interaction
7. Cytoskeleton and cell mobility
1. Water
2. Chemistry of Carbohydrates
3. Chemistry of Lipids
4. Amino acids & peptides
5. Chemistry of Proteins
6. Carbohydrate metabolism
1. Spermatogenesis
2. Oogenesis
3. Fertilization
- 4, Cleavage, Blastulation and Gastrulation
5. Embryogenesis of Amphioxus and chick
- Biostatistics, Biophysics & Instrumentation Biostatistics - Definition and Scope
2. Sampling methods-collection and presentation of Data
3. Measures of Central tendency
4. Measures of Dispersion
5. Introduction to testing of hypothesis
6. Biophysics of Vision and Audition
7. Membrane biophysics
8. Spectroscopic Techniques
9. Separation techniques
10. Centrifugation techniques
11. ELISA and PCR techniques
12. Application of computer in Biosciences
1. History and Overview of Ethology
2. Behavioral Patterns
3. Hormones and Behavior
4. Biological clocks Orientation Behavior 6. Social organization of Lion. Dur. Monkey and Honeybees
1. Atmosphere: Stratification
2. Photoperiodism
3. Temperature as an environmental factor
4. Animal responses to atmosphere
5. Nutrients
6. Pollution (Air, Water, Noise): Causes, Impact anti Control measures
7. Global climatic change (Global warming, Ozone hole,, ENSO)
1. Dairy animals

2. Poultry
3. Piggery
4. Leather Industry
5. Verrniculture
6. Aquaculture (Prawns, Crabs, Mussels, Snails and Fishes)
7. Pearl culture
8. Economic importance of Insects: Sericulture, Apiculture and Lac culture
9. insects as vectors

1. Animals Systematics:

Field visits to study the animals in their natural habitat (2), Morphological basis of animal identification (2), Animal collection and preservation techniques (2). Use of descriptive and illustrative keys to classify animals (6), Understanding and construction of cladogram (1).

2. Environmental Biology:

Field visits to study the response of animals to the environmental stimuli (7), Visit aquatic and terrestrial polluted sites (2). Soil and water qualitative analysis (5), Study faunal indicators of environmental pollution (2), Visit to environmental pollution monitoring units. labs (2).

3. Cell Biology - I:

1. Staining techniques (1), Cell staining, metachromatia, Mammalian histology study by permanent slides and staining of paraffin sections (10), Osmosis and haemolysis (2).

4. Physiological Chemistry - I and Developmental Biology -):

Detection of protein, carbohydrate and lipids (4), estimation of protein (1).

Study of eggs of various animals through specimen, photographs. models (2). Study of spermatogenesis and oogenesis (2), Study of amphioxus, frog and chick embryology through specimen, slides, photographs, models (4).

5. Biostatistics, Instrumentation and Ethology:

Measures of Central tendency and variability (2). instrumentation and techniques (3), Application of computer in Biosciences (2). 1. Study of different types of behavior (3), Behavioral responses of various animals to different stimuli (3).

6. Economic Zoology:

Study of various animal breeds (3), visit to poultry (1), culture techniques and the animals used for culture practices (6), Visit to culture sites (3).

1. Endoplasmic reticulum and protein segregation

2. Golgi complex and cell secretion

3. Lysosomes

4. Mitochondria and electron transport system

5. Nucleus — DNA and Chromatin

6. Cell cycle, Mitosis and Meiosis

1. Enzymes: Mechanism of Action, Kinetics and Regulation.

2. Lipid metabolism

3. Amino acid metabolism

4. An overview of Nucleotide metabolism

5. Integration of all metabolism

3. Regeneration: Hydra.. Salamander liver and mammalian liver

4. Developmental Biology and the future of medicine

5. Evolutionary developmental biology

1. Structure of DNA

2. Fundamentals of DNA Replication and DNA Repair

3. Structure of Viral and Bacterial Chromosomes
4. Structure of Eukaryotic Chromosome
5. Protein synthesis in Prokaryote
6. DNA cloning
1. Chromosomal Theory of inheritance
2. Sex determination & sex-linked inheritance
- 3_ Linkage, Crossing over and Chromosome mapping
4. Heredity and environment
5. Mutation and Chromosomal aberrations
6. Population Genetics
7. Application of Genetics
1. Support & movement
- i) Integumentary system Skeletal system
- iii) Muscular system
2. Internal Communication & Integration
- i) Nervous system
- ii) Endocrine system
- iii) Sense organs
3. Fluid transport
- i) circulatory system
- ii) Lymphatic. system
1. History and milestones of Animal Biotechnology
2. Cell culture and fermentation technology
3. Advances in vaccinology and vaccine delivery system
4. Reproductive Biotechnology
5. Enzymes in Biotechnology
6. Hybridoma Technology
7. Gene Cloning
8. Transgenic animals
9. DNA fingerprinting in domestic animals
1. Cells and organs of the Immune System
2. Antigen
3. Intracellular and Extracellular and function
4. Antigen-Antibody Interactions
5. Major Histocompatibility Complex
6. T-cell receptor
7. T-cell maturation, activation and differentiation
8. B-cell generation, activation and differentiation
- Developmental Biology II and Animal Biotechnology
2. Preparation of chick embryo vitelline mounts
3. Placenta In animals
6. Study of Polymerase Chain Reaction (demonstration)
- 7- Hanging drop cell culture technique and tests for cell proliferation and viability using
8. Demonstration of fermentation Genetics and Molecular Biology
1. Solving genetics problems using Punnett Square
- Pedigree analysis for inheritance pattern
3. Observation of common mutants of Drosophila

4, Perrannell sildesliMage,4 'at salivary glands and lampbrush chromosomes. laggards,
milltivatents need brides

8. Genomic DNA extraction and purity assessment using A260/A280 Ratios

Physiology and Immunology

1. Demonstrate the function of Malpighian tubules in cockroach

2. Estimation of rate of respiration in cockroach

3. Study of Blood Sugar

4. total count of RBC and W BC

5. Differential count of WBC

6. Immunoprecipitation using serum

7. Radial imrqunodiffusion (RID)

8. Tube agglutination test: Widal test

9. Antigen-Antibddy reactions -- Agglutination (Blood groopint,, testing)

I 0, To demonstration of primary and secondary immune organs in rat

