

**SARDAR PATEL UNIVERSITY**  
**Programme: B.Sc. (ZOOLOGY)**  
**Semester: V**  
**Syllabus with effect from: June 2020**

<b>Paper Code:</b> US05CZOO21	<b>Total Credit: 4</b>
<b>Title Of Paper:</b> Invertebrate	

Unit	Description in detail	Weightage (%)
1	History of Animal Taxonomy Types of Classification Taxonomic Hierarchy Binomial nomenclature Modern trends in animal taxonomy: <ul style="list-style-type: none"> <li>• Taxonomy, Systematic &amp; Biosystematics</li> <li>• Neo taxonomy</li> </ul> Type: Paramecium	25%
2	Origin of Metazoan Coral and coral reefs Type: Aurelia (Jelly fish) Evolution of Parasitism in Platyhelminthes Parasitic Adaptations of Flatworms Helminthes & Diseases: <i>Schistosoma Mansoni</i> , <i>Ancylostome duodenale</i> , <i>Trchuris trichiura</i> , <i>Enterobius vermicularis</i> , <i>Dranculus medinensis</i>	25%
3	Type: Ascaris Coelomoducts and Nephridia in Annelids Trochophore larva and its significance Regeneration & Asexual reproduction in Polychetae Type: Scorpion	25%
4	Larvae of crustaceans Crustacean Parasites Type : Sepia Type: Starfish	25%

**Basic Text & Reference Books:**

Zoology phylum series [Protozoa to Echinodermata] by R L Kotpal  
 Invertebrate zoology by R L Kotpal  
 Invertebrate zoology by Dhami and Dhami and E. L. Jorden and verma

**Learning Outcome:**

- Classical Zoology, History of Classification and Taxonomy of Invertebrate
- Detail study of Animal types
- Detail study of topics related to Different phyla



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**Syllabus with effect from: June 2020**

<b>Paper Code:</b> US05CZOO22	<b>Total Credit: 4</b>
<b>Title Of Paper:</b> Physiology	

Unit	Description in detail	Weightage (%)
<b>1</b>	<ul style="list-style-type: none"> <li>• Types of Muscle tissue (structure &amp; Functions of all types)</li> <li>• Properties of Muscle tissue</li> <li>• Types of Muscle protein</li> <li>• Mechanism of Muscle Contraction</li> <li>• Muscle metabolism</li> <li>• Regeneration of muscle tissue</li> <li>• Disorders: Brief account of Myasthenia Gravis, Muscular Dystrophy, Fibromyalgia,</li> <li>• Abnormal contraction of Skeletal muscles</li> </ul>	25%
<b>2</b>	<ul style="list-style-type: none"> <li>• General organization of nervous system</li> <li>• Histology of nervous tissue</li> <li>• Types of neurons</li> <li>• Conduction of nerve impulse</li> <li>• Neurotransmitters</li> <li>• Human brain structure &amp; function</li> <li>• Human cranial nerve</li> </ul>	25%
<b>3</b>	<ul style="list-style-type: none"> <li>• Spinal nerves</li> <li>• Autonomous nervous system</li> <li>• Reflex action</li> <li>• The special senses: <ul style="list-style-type: none"> <li>Olfaction</li> <li>Gustation</li> <li>Vision</li> </ul> </li> <li>• Hearing &amp; equilibrium</li> <li>• Aging &amp; the special senses</li> <li>• Disorders: Brief account of Cataracts, Glaucoma, Deafness, Otitis media</li> </ul>	25%
<b>4</b>	<ul style="list-style-type: none"> <li>• Comparison of control by the Nervous &amp; Endocrine system</li> <li>• Endocrine glands: Histology &amp; functions of Pituitary gland, Thyroid gland, Parathyroid gland,</li> <li>• Adrenal gland, Pancreatic Ilets, Pineal gland</li> <li>• Hormone activity</li> <li>• Mechanisms of hormone action,</li> <li>• Control of hormone secretion</li> <li>• Hormonal Disorders of above glands</li> <li>• Other endocrine tissues &amp; organs, Eicosanoids</li> </ul>	25%

**Basic Text & Reference Books:**

- Animal physiology - A.K.Berry
- Principles of anatomy & physiology-Tortora
- Human physiology - C.C,Chattergi

**Learning Outcome:**

- Physiology of Muscle, Nervous and Endocrine Gland

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<b>Paper Code:</b> US05CZOO23	<b>Total Credit: 4</b>
<b>Title Of Paper:</b> Genetics & Biotechnology	

Unit	Description in detail	Weighting (%)
<b>1</b>	Epistasis & Non-Epistasis interaction Lethal genes Cytoplasmic or Extra nuclear inheritance: Kappa particle in paramecium, Shell coiling in Limnea Mitochondrial & Chloroplast DNA Sex linked & sex influenced genes Crossing over Gene linkage	25%
<b>2</b>	Mutation: classification Nature of mutation <b>Human genetics:</b> pedigree analysis, amniocentesis, twins, disorders due to Mutant genes, karyotyping of human chromosomes, banding techniques. <b>Eugenics:</b> positive and negative <b>Euphenics</b>	25%
<b>3</b>	Polymorphism in DNA Types of non genetic RNA Biosynthesis of protein, Component of protein synthesis [amino acid, DNA, RNA, Ribosome, and enzymes]. PCR Electron Microscopy Microtomy: fixation & Staining Cell fractionation Radioimmuno Essay HPLC	25%
<b>4</b>	Animal cell and tissue culture: disaggregation, isolation, slide, flask, organ Culture, whole embryo culture. In vitro fertilization [IVF]: types and causes of infertility, assessment of patient, treatment of patient for IVF, oocyte recovery, preparation of semen, oocyte Culture and IVF, fertilization, embryo transfer. Superovulation, IVF and embryo transfer Transgenic animals, Cancer: mutation of the tumor, morphology of cancer cells, carcinogenesis Oncogenesis.	25%

**Basic Text & Reference Books:**

Genetics: P S Verma.

Genetics: M.P.Arora.

Genetics: P.K.Gupta.

Cell biology, Genetics and Molecular biology: P.S.Verma.

Learning Outcome:

- Post Mendelian Genetics and Human Genetics Interaction
- Basic Biotechnology and In vitro Fertilization and its applications

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**Syllabus with effect from: June 2020**

<b>Paper Code:</b> US05CZOO24	<b>Total Credit: 4</b>
<b>Title Of Paper:</b> Ecology and Animal Behavior	

Unit	Description in detail	Weighting (%)
1	<b>Community Ecology:</b> <ul style="list-style-type: none"> <li>• Species richness, Dominance, Diversity, Abundance, Vertical Stratification, Ecotone and edge effect.</li> </ul> <b>Ecological Niches:</b> <ul style="list-style-type: none"> <li>• Parameters of the Neches, Parallel niches, Niche Separation, Niche overlap</li> </ul>	25%
2	<b>Biodiversity:</b> <ul style="list-style-type: none"> <li>• Measuring species diversity, Importance of Biodiversity, Loss of Biodiversity, Natural Biodiversity, Benefits of Biodiversity, Threatened of Biodiversity, Endangered species Management.</li> </ul> <b>Major anthropogenic Global environmental problems:</b> <ul style="list-style-type: none"> <li>• Acid rain, greenhouse effect</li> <li>• Ozone depletion</li> <li>• Eutrophication</li> <li>• Global warming &amp; climatic change</li> </ul>	25%
3	<b>Methods of studying behavior:</b> <ul style="list-style-type: none"> <li>• Naturalistic, Experimental, Statical</li> </ul> <b>Reproductive Behavior:</b> <ul style="list-style-type: none"> <li>• Introduction, Type of fertilization, Characteristics of courtship</li> <li>• Attention and courtship: Visual, Sound, Light, Tactile, Courtship on Stickle back fish.</li> </ul> <b>Sexual behavior:</b> <ul style="list-style-type: none"> <li>• Asymmetry of sex, Sexual dimorphism, Mate choice, Intra-sexual selection( Male rivalry),Inter- sexual selection (Female choice), Sexual conflict in Parental care.</li> </ul>	25%
4	<b>Biological Rhythm</b> <ul style="list-style-type: none"> <li>• Types and characteristics of Biological rhythms:</li> <li>• Short and long term rhythm, Circadian rhythm, Epicycles, Tidal rhythms, lunar rhythms, Circannual Rhythms, Photoperiod and regulation seasonal reproduction of Vertebrates, Role of Melatonin.</li> </ul> <b>Biological clock:</b> <ul style="list-style-type: none"> <li>• Introduction, The concept of Average, amplitude, phase and period of Biological clock, Significance of Biological clock, Chronopharmacology.</li> </ul>	25%

**Basic Text & Reference Books:**

- Ecology & Environment: P.D.Sharma
- Ecology: Mohan P. Arora
- Environmental biology: P.S.Verma & V.K.Agrawal
- Zoology for IAS: Satguru Prasad
- Animal behavior: Reena mathur

**Learning Outcome:**

- Animal habitate with aspect of Ecology
- Concept of Biodiversity, Animal Behavior
- Concept of Rhythem and Clock

# SARDAR PATEL UNIVERSITY

## Programme: B.Sc. (ZOOLOGY)

### Semester: V

#### Syllabus with effect from: June 2020

Paper Code: US05CZOO25		Total Credit: 6
Title Of Paper: Practical Based on papers US05CZOO21-22-23-24		
Part -1	<ul style="list-style-type: none"><li>• Protozoa: Entamoeba, Diffugia, Foramenifera, Actinospherium, Rediolaria, Monocystis, Stentor, Balantidium</li><li>• Porifera: leucosolenia, Euspongea, Chalina,</li><li>• Coelenterata: Plumularia, Porpita, lucernaria, Alcyonium, Corelium, Vergularia, Medrepora.</li><li>• Platyhelminthes: Schistosoma, Echinococcus,</li><li>• Nematoda: Trichinella spiralis, Trichuris.</li><li>• Annelida: Sabella, Heteronereis, Serpula, Bonelia</li><li>• Arthropoda: Branchipus, Cypris, Argulus, Mysis, Gammarus, Squeilla, Centipede, Locust, Belostoma.</li><li>• Mollusca: Patella, Cypraea, Doris, Snail, Slug, Mytilus, Pecten, Terido, Loligo.</li><li>• Echinodermata: Starfish Pedicellaria, Bipinaria, Branchiolaria, Ophiopluteus, Echinopluteus, Auricularia,</li><li>• Hemichordata: Ptychodera.</li><li>• Mouth parts of insects [ housefly, mosquito, moth]</li><li>• To study community by quadrat method.</li><li>• Soil and water analysis</li><li>• To study abiotic components. [ PH , turbidity, Temperature and light intensity]</li><li>• Protozoan culture</li></ul>	2 credits
Part-2	<ul style="list-style-type: none"><li>• Study of mitosis by Squash preparation of onion root tip.</li><li>• Study of meiosis from grass hopper testis.</li><li>• Mounting of giant chromosomes from Chironomous larva.</li><li>• Study of different characteristics of drosophila.</li><li>• Genetics problems.</li><li>• Isolation of DNA from tissue.</li><li>• Bioinformatics. [phylogeny]</li><li>• Study of animal relationship through chart /specimen/live observation.</li><li>• Study of different animals with reference to their behavior.</li><li>• Visit to SICART</li></ul>	2 credits
Part-3	<ul style="list-style-type: none"><li>• Total count of RBC</li><li>• Total count of WBC</li><li>• Estimation of Blood glucose.</li><li>• Estimation of Serum protein.</li><li>• Estimation of Blood cholesterol.</li><li>• Estimation of Serum Creatinine.</li><li>• Mammalian histology by permanent slides. [Types of Muscle fibers and Nerve Fibers, Spinal Cord]</li><li>• Preparation skeletal and smooth muscle.</li><li>• Preparation nerve tissue.</li><li>• ESR</li></ul>	2 credits

#### Basic Text & Reference Books:

Practical zoology invertebrate: P S Verma.

Practical zoology invertebrate: S S Lal.

Practical physiology anatomy and biochemistry: Patel and goel

Practical biochemistry: Plumer

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**Semester: V**  
**Syllabus with effect from: November 2020**

<b>Paper Code:</b> US05DZOO26	<b>Total Credit: 2</b>
<b>Title Of Paper:</b> Wild Life	

Unit	Description in detail	Weighting (%)
1	Wild life of India, Sanctuary of India. National parks under special Projects : Tiger, Lion, Elephant, Crocodile breeding Projects Endangered species	25%
2	Biosphere reserves: Desert, Grassland, Fresh water and Marine water Wetlands of Gujarat and their importance. Values of wild life Wild life organizations.	25%
3	Habitat analysis, Evaluation and Management of Wild life Physical parameters: Topography, Geology, Soil and Water, Biological Parameters : Food, cover, forage, browse and cover estimation Standard evaluation procedure: Remote sensing and GIS	25%
4	Eco tourism/ Wild life tourism in Forest and Ecological disturbance Management of excess population and translocation Care of injured and diseased animal Estimation of carrying capacity	25%

**Basic Text & Reference Books:**

- Ecology & Environment: P.D.Sharma
- Environmental biology: P.S.Verma & V.K.Agrawal
- Zoology for IAS: Satguru Prasad
- Wild life: M.M.Ranga
- Animals of India: BNHS Publication
- Endangered Animals of India & their conservation: Nair S.N.

**Learning Outcome:**

- Details of National Parks and Sanctuary
- Ecosystem of Habitats
- Significance of Eco tourism animal Care



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**Syllabus with effect from: November 2020**

<b>Paper Code:</b> US05DZOO27	<b>Total Credit: 2</b>
<b>Title Of Paper:</b> Animal Rescue and Rehabilitation	

Unit	Description in detail	Weighting (%)
1	<ul style="list-style-type: none"> <li>• Animal behaviour of stray Animals</li> <li>• Biosecurity</li> <li>• First aid</li> <li>• Liability issues</li> </ul>	25%
2	<ul style="list-style-type: none"> <li>• Wild animals Rescue within domestic area</li> <li>• Wild animals rehabilitation</li> <li>• distress in wild animals identify symptoms and causes of distress</li> <li>• treat common injuries such as broken limbs and wings</li> <li>• restrain, transport, and release wildlife</li> </ul>	25%
3	<ul style="list-style-type: none"> <li>• Basics of Animal Science</li> <li>• Animal Pharmacy</li> <li>• Animal Care and Domestication</li> </ul>	25%
4	<ul style="list-style-type: none"> <li>• Animal Food</li> <li>• Animal Nutrition</li> <li>• Animal Handling</li> <li>• Animal Cleaning</li> </ul>	25%

**Basic Text & Reference Books:**

Environmental biology: P.S.Verma&V.K.Agrawal  
 Zoology for IAS: Satguru Prasad  
 Wild life: M.M.Ranga  
 Animals of India: BNHS Publication

**Learning Outcome:**

- Basics of Animal care and domestication
- Rescue of injured stray and wild animals

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**Semester: VI**  
**Syllabus with effect from: November 2020**

<b>Paper Code:</b> US06CZOO21	<b>Total Credit: 4</b>
<b>Title Of Paper:</b> Vertebrata	

Unit	Description in detail	Weighting (%)
<b>1</b>	Introduction and significance of protochordates. Comparison of prochordate sub phyla. Type: Amphioxus Type: Lamprey	25%
<b>2</b>	Origin of class: Pisces Swim bladder and accessory respiratory organs of Fishes Types of fins in Fishes Type: Labeo rohita Adaptive radiation and origin of class Amphibia Adaptive radiation, origin and Evolution of class Reptile Merozoic Reptiles	25%
<b>3</b>	Birds as glorified reptiles Origin of Birds Archeopteryx and its significance Affinities of Birds Flight less birds Type: Pigeon	25%
<b>4</b>	Aquatic Mammals and their adaptations Flying Mammals and their adaptations Economic importance of Mammals Type: Rabbit	25%

**Basic Text & Reference Books:**

Vertebrate zoology by R L Kotpal  
 Chordate zoology by Dhama and Dhama Chordate Zoology  
 E. L .Jhorden and verma

**Learning Outcome:**

- Classical Zoology, History of Classification and Taxonomy of Vertebrate
- Detail study of Animal types
- Detail study of topics related to Different phyla



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<b>Paper Code:</b> US06CZOO22	<b>Total Credit: 4</b>
<b>Title Of Paper:</b> Developmental Biology and Evolution	

Unit	Description in detail	Weighting (%)
1	Development of frog Ovulation and spawning cleavage and blastula the fate-map gastrulation neurulation metamorphosis	25%
2	Development of chick Gametes and fertilization Cleavage and blastulation Gastrulation Differentiation of mesoderm and coelom Neurulation Development of chick according to incubation Extra embryonic membranes of Chick	25%
3	Concept of organic evolution Origin of earth Origin of life Evidences of organic evolution Theories of organic evolution [Darwinism, Lamarkism, de vries]	25%
4	Isolation, Colouration Speciation Tempo of evolution. Artificial selection Sexual selection	25%

**Basic Text & Reference Books:**

Introduction to embryology: A K Berry  
 Chordate embryology: Verma and Agrawal  
 Developmental biology: Sastry and Shukul  
 Organic evolution: M P Arora

**Learning Outcome:**

- Detail Study of Developmental Biology of Frog and Chick
- Concept of Evolution and Organic Evolution

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**Semester: VI**  
**Syllabus with effect from: November 2020**

Paper Code: US06CZOO23	Total Credit: 4
Title Of Paper: Metabolism and Nutrition	

Unit	Description in detail	Weighting (%)
1	Metabolic Reactions, Energy Transfer, The Fate of carbohydrate Classification of Carbohydrate Carbohydrate Metabolism: Glycolysis Acetyle Co-A formation Kreb's cycle Electron Transport Chain Reactions	25%
2	Classification of Lipids Lipid Metabolism: Transport of Lipids by Lipoproteins Sources and Significance of Blood Cholesterol The Fate of Lipids, Triglyceride Storage Lipid Catabolism: Lipolysis, Lipid Anabolism: Lipogenesis	25%
3	Classification of Protein Protein Metabolism: The Fate of Proteins, Protein Catabolism, Protein Anabolism Classification of Nucleic acids <u>Nucleic acids metabolism:</u> <u>Biosynthesis of Purine nucleotide, Biosynthesis of Pyrimidine nucleotides</u> <u>Catabolism of Purine Nucleotide, Catabolism of Pyrimidine Nucleotide</u>	25%
4	Metabolic Adaptations Nutrition heat and energy balance Hypothermia Guidelines for Healthy Eating, Minerals, Vitamins Disorders: Fever and Obesity	25%

**Basic Text & Reference Books:**

Principal of Anatomy and Physiology by Gerard J Tortora and Braya Derrickson

Biochemistry-U.Satyanarayan

Lehninger Principles of Biochemistry Book by Albert L. Lehninger, David L. Nelson, and Michael M. Cox

**Learning Outcome:**

- Metabolism of Major Molecules
- Nutritional Importance and Disorders

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**Syllabus with effect from: November 2020**

<b>Paper Code:</b> US06CZOO24	<b>Total Credit: 4</b>
<b>Title of Paper:</b> Comparative Anatomy of Chordates	

Unit	Description in detail	Weighting (%)
<b>1</b>	<b>Integumentary System</b> Integument proper Integumentary glands Scales, Feathers Hair, Beaks Claws, Nail and hoofs, Horns and antlers	25%
<b>2</b>	<b>Digestive system</b> Mouth and associated structure, Lips, Vestibule, Oral cavity and oral glands Teeth Tongue Esophagus Stomach Intestine Liver Pancreas	25%
<b>3</b>	<b>Reproductive System</b> Ovaries Oviducts Testes Maleduct Copulatory organs	25%
<b>4</b>	<b>Circulatory System</b> Blood & blood vessels Evolution of Heart Arterial system Venous system Lymph & lymphatic system	25%

**Basic Text & Reference Books:**

Elements of Chordate anatomy- Charles Weichert  
 Vertebrate body – Romar  
 Modern text book of Vertebrate Zoology- R .L .Kotpal  
 Biology of Chordate – H.C. Nigam

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<b>Paper Code:</b> US06CZOO25		<b>Total Credit: 6</b>
<b>Title Of Paper:</b> Practical Based on papers US05CZOO21-22-23-24		
Part -1	Protochordata :Oikopluera, Botryllus, Amphioxus, T.S. of amphioxus through, Oral hood, Pharynx, Intestine, Testes, Ovary. Cyclostomata: Ammocete larva, Myxine Pisces: Hammer headed shark, Eagle ray, Pristis, Chimaera, Catla, Belone, Hemiramphus, Pterois, Syngnathus, Diodon, Amphibian: Ambystoma, Amphiuma, Triton, Proteus, Necturus, Siren, Pipa, Hyla, Toad[Bufo], Rhacophorus. Reptilia: Gecko, Mabuia, Eryx, Rattle snake, Aves: Flamingo, Vulture, Peacock, Saras crane, Owl, Mammalia:, Duckbill Platypus, Kangaroo, Flying fox, Ant eater, Squirrel, Mongoose, Pigion- Digestive, Urinogenital, Brain Mountings- Section of Feather, LS of Syrinx, LS of Crop of Pigion, Pectin Rabbit-Digestive ,Urino genital System, Brain, Mountings- Muscle, Nerve,	2 credits
Part-2	Colour and Precipitation Reactions on Food Stuffs Carbohydrates Proteins Lipids Test of Trypsin Enzymes on Protein Evolutionary Study of Skull Chromatography	2 credits
Part-3	Development of frog By Permanent Slides Development of chick By Permanent Slides Temporary preparation of chick embryo. Bull's Sperm Counting Bull's Sperm Motility and Mortality Observation of migratory birds [Field Study] To Study The knee jerk Reflex in Human Visit to national park and sanctuary	2 credits

**Basic Text & Reference Books:**

Practical zoology invertebrate: P S Verma.

Practical zoology invertebrate: S SLal.

Practical physiology anatomy and biochemistry: Patel and goel

Practical biochemistry: Plumer

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<b>Paper Code:</b> US06DZOO26	<b>Total Credit: 2</b>
<b>Title Of Paper:</b> Applied Zoology	

Unit	Description in detail	Weighting (%)
1	Bio Statistics: Data Collection: Random –Non random sampling Data Tabulation: Graph, Histogram, Scattered Diagram Mean, Mode, Median, Standard Deviation and Error Statistical Significance	25%
2	Insect Pest Management: Natural Control Applied control Integrated Pest Management	25%
3	Fresh water Fishes of India Fresh water fishery and by products Marine water fishery and by products	25%
4	Poultry Dairy industry Pharmaceuticals from animals.	25%

**Basic Text & Reference Books:**

Economic Zoology : Shukla and Upadhyay  
Economic and applied – entomology: Ashok kumar  
Fishery science and Indian fisheries : Srivastava  
Poultry science: Dr N T Mehta and Dr Dhasura

**Learning Outcome:**

- Detail Learning of Biostatistics and applied zoology like, Fisheries, Poultry, Dairy.

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<b>Paper Code:</b> US06DZOO27	<b>Total Credit: 2</b>
<b>Title Of Paper:</b> ECONOMIC ENTOMOLOGY	

Unit	Description in detail	Weighting (%)
1	Morphology of medically important insects and other arthropods Head: antenna - mouth parts, Thorax: wings - wing venation - legs - general structure, Abdomen: Appendages - cerci - external genitalia.	25%
2	Harmful insects of dipterans – Mosquitos, Sand flies and other flies,	25%
3	Arboviral pathogens Classification of Arboviruses - Dengue, Chikungunya, Japanese encephalitis, Kyasanur Forest Disease (KFD), West Nile, and Yellow fever viruses - Geographic distribution - Viral structure and replication - Transmission and maintenance cycle.	25%
4	Management of Public Health Pesticides Elements of management of public health pesticides: Product registration - Procurement - Label - Storage and transport - Distribution - Application - Disposal - surveillance of pesticide poisoning - Quality control; Safe use of pesticides: general principles of safety measures - medical surveillance; Operative procedures: Preparation of spray materials - House treatment with residual spraying - Larvicidal - Rodenticidal - Herbicidal treatments - Diagnosis and treatment of poisoning.	25%

**Basic Text & Reference Books:**

A handbook of Economic Entomology: Dr. Abhishek Shukla  
Economic Zoology : Shukla and Upadhyay  
Economic and applied – entomology: Ashok kumar  
WHO literature

**Learning Outcome:**

- Detail Learning of harmful insect and their management