



**Dharmabad Shikshan Sanstha's**  
**Lal Bahadur Shastri Mahavidyalaya, Dharmabad. 431809**

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*Pro-forma for program and course outcomes (2.6.1)*  
**2018 - 19**  
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**Name of Teacher: Dr. S. R. Bhupalwar**

**Department: Zoology**

**Program: B. Sc. First Year**

**Subject: Zoology**

**Course Code: CCZ-I (SECTION A)**

**Paper Title: Life and Diversity of Animals – I (Non- Chordata)**

Unit	Unit Name/Topics	Unit wise Outcome
I	<ol style="list-style-type: none"><li><b>1. Introduction of Non-chordates</b></li><li><b>2. Protozoa:</b> General Characters and classification up to class level <b>Plasmodium vivax-</b> Structure, Life Cycle, Pathogenecity and Control Measures</li><li><b>3. Porifera:</b> General Characters and classification up to class level. <b>Sycon:</b> General Morphology, different types of cells. Economic importance of Porifera</li></ol>	Zoology deals with study of the animals. It embodies study of the structure, embryonic development, classification, habits, distribution and evolution of all animals, both living and extinct.
II	<ol style="list-style-type: none"><li><b>1. Coelenterata:</b> General Characters and classification up to class level Polymorphism in Coelenterata. Coral, and Coral reefs, its Economic Importance.</li><li><b>2. Platyhelminthes:</b> General Characters and classification up to class level <b>Taenia solium:</b> Structure and life cycle</li><li><b>3. Nematohelminthes</b> <b>Ascaris:</b> Structure and life cycle</li></ol>	There are several specializations available to students pursuing this field. There are several groups of animals studied in Zoology like Invertebrates, Vertebrates and others.
III	<ol style="list-style-type: none"><li><b>1. Annelida:</b> General Characters and classification up to class level Role of Earthworm in Agriculture.</li></ol>	In the study of this unit student knows



	<p><b>2. Arthropoda:</b> General Characters and classification up to class level <b>Cockroach:</b> External Morphology, Digestive system, Respiratory system, Nervous system Economic Importance of Insects</p>	about details of characters and classification of animals.
<b>IV</b>	<p><b>1. Mollusca:</b> General Characters and classification up to class level Economic Importance of Mollusca.</p> <p><b>2. Echinodermata:</b> General Characters and classification up to class level <b>Star Fish</b> External Morphology and Water vascular system</p> <p><b>3. Hemichordata:</b> General Characters and Affinities</p>	Student understand the characters, classification and economic importance of different animals

**Specify Course Outcome:** Zoology deals with study of the animals. It embodies study of the structure, embryonic development, classification, habits, distribution and evolution of all animals, both living and extinct. There are several specializations available to students pursuing this field. There are several groups of animals studied in Zoology like Invertebrates, Vertebrates and others. In the study of zoology, there are many options to choose from depending on individual capabilities and interests.

**Specify Program Outcome:** Student learns Specific characters morphology lifecycle & its affinities.

**Signature of Teacher: Dr. S. R. Bhupalwar**



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*Pro-forma for program and course outcomes (2.6.1) 2018-19*

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**Name of Teacher: Dr. S. R. Bhupalwar**

**Department: Zoology**

**Program: B.Sc. First Year**

**Subject: Zoology**

**Course Code: CCZ-I (Section B)**

**Paper Title: Cell Biology Paper II**

Unit	Unit Name/Topics	Unit wise Outcome
I	<ol style="list-style-type: none"><li>1. <b>Introduction of Cell Biology</b></li><li>2. <b>Microscopy</b> (An elementary idea)<ol style="list-style-type: none"><li>a. Light microscopy</li><li>b. Electron microscopy</li></ol></li><li>3. <b>Types of cells:</b><ol style="list-style-type: none"><li>a. Prokaryotic cell structure</li><li>b. Eukaryotic cell structure</li></ol></li><li>4. <b>Plasma membrane</b><ol style="list-style-type: none"><li>a. Structure<ol style="list-style-type: none"><li>i. Bimolecular model</li><li>ii. Trilaminar model</li><li>iii. Lattice model</li><li>iv. Fluid mosaic model</li><li>v. Micellar model</li></ol></li><li>b. Composition</li><li>c. Functions</li></ol></li></ol>	Discussion about microscope, cell structure and functions
II	<ol style="list-style-type: none"><li>1. <b>Endoplasmic reticulum</b><ol style="list-style-type: none"><li>a. Structure</li><li>b. Functions</li></ol></li><li>2. <b>Golgi complex:</b><ol style="list-style-type: none"><li>a. Structure</li><li>b. Functions</li></ol></li><li>3. <b>Mitochondria</b><ol style="list-style-type: none"><li>a. Structure</li><li>b. Functions</li></ol></li><li>4. <b>Ribosomes</b><ol style="list-style-type: none"><li>a. Structure</li><li>b. Functions</li></ol></li></ol>	Discussion about cell structure and functions
III	<ol style="list-style-type: none"><li>1. <b>Lysosomes</b><ol style="list-style-type: none"><li>a. Structure</li><li>b. Functions</li></ol></li><li>2. <b>Nucleus</b><ol style="list-style-type: none"><li>a. Structure</li><li>b. Functions</li></ol></li><li>3. <b>Nucleolus</b><ol style="list-style-type: none"><li>a. Structure</li><li>b. Functions</li></ol></li></ol>	Discussion about cell structure and functions



	<p><b>4. Chromosome</b></p> <ul style="list-style-type: none"><li>a. Shape –(metacentric, submetacentric, Acrocentric, and Telocentric)</li><li>b. Structure</li><li>c. Functions</li><li>d. Polytene and Lampbrush chromosomes</li></ul>	
<b>IV</b>	<p><b>1. Cell cycle</b></p> <ul style="list-style-type: none"><li>a. Phases</li><li>b. Mitosis and its significance</li><li>c. Meiosis and its significance</li></ul> <p><b>2. Cytology of cancer</b></p> <p>Malignant and Non-malignant</p>	Discussion about cell structure and functions

**Specify Course Outcome:** Student learn more about Microscope, cell structure and functions.

**Specify Program Outcome:** Students understand the details about the cell biology.

**Signature of Teacher. Dr. S. R. Bhupalwar**



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Pro-forma for program and course outcomes (2.6.1)

2018-19

Name of Teacher: Dr. S. R. Bhupalwar Department: Zoology

Program: B.Sc. First Year

Subject: Zoology

Course Code: CCZ – II (Section A)

Paper Title: Life and Diversity of Animals – III

(Chordata)

Unit	Unit Name/Topics	Unit wise Outcome
I	<ol style="list-style-type: none"><li><b>Introduction of Chordates</b></li><li><b>Protochordata:</b> <b>Urochordata:</b> General characters, concept of retrogressive metamorphosis. <b>Cephalochordata:</b> General Characters</li><li><b>Agnatha</b> <b>Cyclostomata :</b> General characters of cyclostomes</li></ol>	Students learn characters of protochordata of the animals.
II	<ol style="list-style-type: none"><li><b>Pisces:</b> General characters and classification of Pisces up to class level <b>Scoliodon(Dogfish):</b> External characters, Digestive system, Respiratory system, Circulatory System, Nervous system Economic Importance of Fishes</li></ol>	Learns vertebrates its characters classification type study of animals.
III	<ol style="list-style-type: none"><li><b>Amphibia</b> General characters and classification upto order level Parental care in amphibians Summer and winter sleep in Frog.</li><li><b>Reptilia</b> General characters Poisonous and Nonpoisonous snakes,Importance of snake Venom</li><li><b>Aves</b> General characters, Flight Adaptations in birds,Migration of birds.</li></ol>	Animals its parental care & its winter sleeping animals. Understands poisonous and non-poisonous snakes, birds migration.
IV	<ol style="list-style-type: none"><li><b>Mammals</b> General characters and classification up to order level</li><li><b>Rat</b></li></ol>	To understand general characters and type study of mammals.



	External characters Digestive system(Anatomy) Respiratory system Circulatory system Nervous system – Brain and spinal cord Eye and Ear	
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**Specify Course Outcome:** Students learn more about the life diversity of chordates.

**Specify Program Outcome:** Students learn more about the life diversity of chordates.

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*Pro-forma for program and course outcomes (2.6.1) 2018-19*

**Name of Teacher: Dr. S. R. Bhupalwar**

**Department: Zoology**

**Program: B.Sc. First Year**

**Subject: Zoology**

**Course Code: CCZ – II (Section B)**

**Paper Title: Developmental Biology-IV**

Unit	Unit Name/Topics	Unit wise Outcome
<b>I</b>	<ol style="list-style-type: none"> <li><b>1. Introduction of Developmental Biology</b></li> <li><b>2. Gametogenesis</b> <ol style="list-style-type: none"> <li>a. Spermatogenesis</li> <li>b. Oogenesis</li> </ol> </li> <li><b>3. Types of eggs</b> <ol style="list-style-type: none"> <li>a. On the basis of amount of yolk</li> <li>b. On the basis of distribution of yolk</li> </ol> </li> </ol>	Students learn about animals' embryology types of gametes.
<b>II</b>	<ol style="list-style-type: none"> <li><b>1. Gametes of frog:</b> <ol style="list-style-type: none"> <li>a. Structure of Sperm</li> <li>b. Structure of Ovum</li> </ol> </li> <li><b>2. From Embryology</b> <ol style="list-style-type: none"> <li>a. Fertilization</li> <li>b. Cleavage</li> <li>c. Blastulation</li> <li>d. Gastrulation</li> <li>e. Formation of three germinal layers</li> </ol> </li> <li><b>3. Regeneration in Non- chordates and chordates</b></li> </ol>	Students learn about the complete life study of embryology of frog.
<b>III</b>	<ol style="list-style-type: none"> <li><b>1. Chick Embryology:</b> (Extra-embryonic membranes)-           <ol style="list-style-type: none"> <li>a. Yolk sac, structure and its functions</li> <li>b. Amnion, structure and its functions</li> <li>c. Chorion, structure and its functions</li> <li>d. Allantois, structure and its functions</li> </ol> </li> <li><b>2. Placentation in mammals</b> Classification on the basis of           <ol style="list-style-type: none"> <li>a. Mode of origin</li> <li>b. Mode of distribution of villi</li> <li>c. Functions of Placenta</li> </ol> </li> </ol>	To understand chick membranes of embryology and placentation in mammals.
<b>IV</b>	<ol style="list-style-type: none"> <li><b>1. Stem Cell:</b> <ol style="list-style-type: none"> <li>a. Sources</li> <li>b. Types – Embryonic,</li> </ol> </li> </ol>	Study of sources of stem cells and types. Embriotransfer techniques and natural artificial parthenogenesis.



	<p>Haemopoitic, Adult, Nervous</p> <p>c. Role of stem cells in human welfare</p> <p><b>2. Embryo Transfer Techniques:</b></p> <p>a. Gamete Intra-Fallopian Transfer(GIFT)</p> <p>b. Test tube baby</p> <p>c. Infertility in male</p> <p>d. Infertility in female</p> <p><b>3. Parthenogenesis:</b></p> <p>a. Natural</p> <p>b. Artificial</p>	
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**Specify Course Outcome:** Students learn about animals' embryology types of gametes, the complete life study of embryology of frog, chick membranes of embryology and placentation in mammals, study of sources of stem cells and types and Embriotransfer techniques and natural artificial parthenogenesis.

**Specify Program Outcome:** Students learn more about the developmental biology.

**Signature of Teacher:** Dr. S. R. Bhupalwar





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**Name of Teacher: Dr. S. R. Bhupalwar**

**Department: Zoology**

**Program: B.Sc. First Year**

**Subject: Zoology**

**Course Code: Laboratory work**

**Paper Title: Practical-V**

Unit	Unit Name/Topics	Unit wise Outcome
I	Study of at least two museum specimens from Invertebrate Phyla. (Protozoa to Echinodermata and Hemichordate)	Student learns external morphology of invertebrate animals.
II	Study of at least two museum specimens from Protochordata to Mammalia.	Student learns external morphology of vertebrates.
III	Demonstration based on Models, Charts and Computer Aided Techniques: i) Cockroach: Digestive system, Nervous system. ii) Scoliodon: Digestive system, Heart and ventral Aorta, Afferent arteries, Brain.	Student observed and understand the digestive system and Nervous system of Cockroach and Scoliodon.
IV	Mountings - i) Mouth parts of Cockroach ii) Trachea of Cockroach iii) Salivary glands of Cockroach iv) Nereis Parapodia v) Mountings of Scales (by Local Available Fishes): Ctenoid and Cycloid	Students learn more about preparation of mouth parts of cockroach and scales of fish.
V	Skeleton of Rat/Rabbit: Atlas Vertebra, Thoracic Vertebra, Pectoral Girdle, Pelvic Girdle, Humerus, Femur, Tibia-Fibula, Radius-ulna (Models / Charts). 6) Study of permanent slides of mitosis.	Study of bones of vertebrate animals.
VI	Squash preparation of Onion root tips. 8) Study of permanent slides of meiosis.	Student develop practical skill for the preparation of onion root tips and permanent slides.
VII	9) Squash preparation of Onion buds. 10) Study of permanent slides of Frog Embryology (Any Five). 11) Study of permanent slides of Chick Embryo: 18 hrs., 24 hrs., 36 hrs., 48 hrs., 72 hrs. stages. 12) Short excursion/ study Tour is compulsory.	Develop the skill for squash preparation of onion buds and slides.

**Specify Course Outcome:** Students develop skills for the preparation of permanent slides. Student learns the bones of vertebrates.

**Specify Program Outcome:** Development of practical skills in zoology.

**Signature of Teacher: Dr. S.R. Bhupalwar**



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*Pro-forma for program and course outcomes (2.6.1)*

**Name of Teacher:** Dr. S. R. Bhupalwar

**Department:** Zoology

**Program:** B.Sc. Second Year

**Subject:** Zoology

**Course Code:** CCZ III(Section A)

**Paper Title:** Genetics (P-VI)

Unit	Unit Name/Topics	Unit wise Outcome
<b>I</b>	<b>Introuction to Genetics</b> <b>Mendelism</b> Mendel's Laws of inheritance Monohybrid, dihybrid cross and ratio Incomplete dominance Back cross and test cross <b>Interaction of Genes</b> Complementary factor (9:7) Supplementary factor (9:3:4) Inhibitory factor (13:3) Duplicate genes (15:1) Lethal genes (1:2:1)	Students learn about interoduction of genetics and Mendels laws, gene factors
<b>II</b>	<b>Multiple Alleles and Genes</b> Inheritance of ABO Bloog groups in Man Rh factor and Erythroblastosis foetalis in man Multiple genes – skin pigmentation in man <b>Linkage an Crossing over</b> Linkage – definition, types and significance Crossing over – Mechanism of crossing over Factor affecting crossing over Significance of crossing over	Students learn about different types of blood groups, linkage and crossing over its mechanism and factors effecting.
<b>III</b>	<b>Sex determination</b> Chromosomal methods of sex determination Bridge's ratio theory of genic balance <b>Sex linked inheritance</b> Sex linked inheritance in Drosophila Sex linked inheritance in man – colourblindness, haemophile, Hypertrichosis <b>Cytoplasmic Inheritance</b> – Ex. Kappa particles (Paramecium) <b>Mutation</b> Chromosomal mutations – Structural alterations & Numeric alteration (Polyploidy)Genemutations – Sickle Cell Anaemia.	Students studied chromosomal methods of sex determination and sex link inheritance in Drosophila and man.
<b>IV</b>	<b>Human Genetics</b> Syndromes – Turner, Klinefelter, Down, Cat – Cry, patus Inborn errors of metabolism – Phenylketonuria(PKU), Alkaptonura,	Students learns woman syndromes, nature and functions of genetic material



	Albinism. <b>Nature and functions of genetic materials</b> DNA – structure, functions and replications RNA – Structure, types and functions Genetic code.	
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**Specify Course Outcome:** Student understand more about the genetics.

**Specify Program Outcome:** Student understand more about the genetics.

**Signature of Teacher: Dr. S. R. Bhupalwar**



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*Pro-forma for program and course outcomes (2.6.1) 2018-19*

**Name of Teacher: Dr. S. R. Bhupalwar**

**Department: Zoology**

**Program: B.Sc. Second Year**

**Subject: Zoology**

**Course Code: CCZ III (Section B)**

**Paper Title: Comparative Anatomy and Physiology Paper-VII**

<b>Unit</b>	<b>Unit Name/Topics</b>	<b>Unit wise Outcome</b>
<b>I</b>	<b>1. Comparative Anatomy of Vertebrates</b> i. Integument ii. Heart iii. Kidney	Students learn to compare the anatomy of different parts of the vertebrate animals.
<b>II</b>	<b>1. Enzymes</b> i. Nature and Classification of enzymes ii. Mechanism of enzyme action iii. Factors effecting on enzyme activity <b>2. Nutrition</b> i. Digestion of carbohydrates, proteins and lipids ii. Vitamins – Fat soluble and Water soluble vitamins (Sources, deficiency, diseases and effects )	Students studied nature of enzymes classification and mechanism. Digestion of nutrition.
<b>III</b>	<b>1. Respiration</b> i. Definition of Aquatic and Aerial respiration ii. Respiratory organs in man iii. Mechanism of respiration iv. Transport of O <sub>2</sub> and CO <sub>2</sub> <b>2. Circulation</b> i. Blood – composition and functions ii. Structure and working of heart iii. E.C.G and Blood	Students learn the types of respiration organs mechanism and transport of O <sub>2</sub> & CO <sub>2</sub> . Also learn the blood composition and functions.



	Pressure iv. Blood clotting	
<b>IV</b>	<b>1. Excretion</b> i. Modes of excretion in animals (Ammonotelism, Ureotelism and Uricotelism) ii. Structure of kidney(V.S) iii. Structure of uriniferous tubules iv. Physiology of urine formation v. Composition of urine <b>2. Nerve Physiology</b> i. Structure and types of neurons ii. Structure of synapse iii. Conduction of nerve impulse <b>3. Muscle Physiology</b> i. Types of muscles – smooth muscles, skeletal muscles and cardiac muscles ii. Ultra-structure of skeletal muscles	Student learns the modes of excretion in animals, structure of kidney and functions. Also, more about the types of neurons and muscles.

**Specify Course Outcome:** Students learn in detail about the comparative anatomy and physiology of vertebrate animals.

**Specify Program Outcome:** Students learn in detail about the comparative anatomy and physiology of vertebrate animals.

**Signature of Teacher: Dr. S. R. Bhupalwar**



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*Pro-forma for program and course outcomes (2.6.1)*

**Name of Teacher: Dr. S. R. Bhupalwar**                      **Department: Zoology**

**Program: B.Sc. Second Year**                      **Subject: Zoology**

**Course Code: CCZ IV**                      **Year: 2018 - 19**

**Paper Title: Genetic Engineering and Evolution-VIII**

Unit	Unit Name/Topics	Unit wise Outcome
<b>I</b>	<b>1. Introduction to Genetic Engineering</b> <b>2. Recombinant DNA Technology : Tools</b> <b>i. Enzymes</b> Lysing a. Ligases b. Nucleases (Exonucleases, Endonucleases, Restriction Endonucleases) c. Synthetases (DNA polymerase, reverse transcriptase) <b>ii. Vectors: Cloning vectors</b> (Plasmid – psBR322, Bacteriophage – Lambda phage, Virus- SV40, Cosmid vectors) <b>3. Techniques</b> i. Gel-Electrophoresis ii. PCR(Polymerase chain Reaction) iii. Southern, Northern and Western Blotting	Student learns DNA technology and techniques of gel electrophoresis
<b>II</b>	1. Construction of r-DNA 2. C-DNA libraries and Genomic libraries 3. Transgenesis and Transgenic animals (Transgenic cattle, sheep, pig and fish) 4. Clonning and cloned animals (Dolly sheep) 5. DNA fingerprinting	Learn about r-DNA and c-DNA, Cloning DNA fingure printing
<b>III</b>	<b>1. Concepts of Evolution</b> <b>2. Theories of organic evolution</b> i. Lamarck's theory ii. Darwin's theory iii. Modern synthetic theory – Neo – Darwinism iv. Hugo De Vries theory	Student learns concept of evolution and theories of organic evolutions
<b>IV</b>	<b>1. Evidences of organic evolution</b> a. Anatomical b. Embryological c. Paleontological	Student learn evidences of organic evolutions and adaptations.



	d. Biochemical 2. <b>Adaptations:</b> Aquatic, Terrestrial, Fossorial, Volant and Desert 3. <b>Hardy – Weinberg's law</b>	
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**Specify Course Outcome:** Students learn about the DNA, RNA and adaptations.

**Specify Program Outcome:** Student gets knowledge about DNA technology and theories and different adaptations.

**Signature of Teacher: Dr. S. R. Bhupalwar**



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**Pro-forma for program and course outcomes (2.6.1) 2018-19**  
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**Name of Teacher: Dr. S. R. Bhupalwar**

**Department: Zoology**

**Program: B.Sc. Second Year Semester IV**

**Subject: Zoology**

**Course Code: CCZ IV (Section B) Title: Endocrinology, Histology and Biochemistry-IX**

Unit	Unit Name/Topics	Unit wise Outcome
I	<b>1. Endocrinology</b> i. Pituitary gland ii. Thyroid gland iii. Adrenal gland iv. Islet's of Langerhans (Pancreas) v. Menstrual Cycle	Students studied different endocrine glands structures and functions.
II	<b>1. Histology of mammalian organs and tissues</b> i. Stomach ii. Intestine iii. Pancreas iv. Liver v. Kidney vi. Testes vii. Ovary	Histological study of mammalian organs and tissues.
III	<b>1. Carbohydrate metabolism</b> i. Glycogenesis, Glycogenolysis and Gluconeogenesis ii. Glycolysis iii. Kreb's cycle	Students learn about complete study of carbohydrate metabolism.
IV	<b>1. Protein metabolism</b> i. Deamination and Transamination ii. Ornithine cycle <b>2. Lipid metabolism</b> i. B-Oxidation ii. Ketosis, Ketogenesis and Ketolysis	Student learn about protein and lipid metabolism

**Specify Course Outcome:** Students learn different endocrine glands structures and functions.

Histological study of mammalian organs and tissues, carbohydrate metabolism and protein and lipid metabolism.

**Specify Program Outcome:** Student learn more about Endocrinology, Histology and Biochemistry.

**Signature of Teacher: Dr. S. R. Bhupalwar**





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Pro-forma for program and course outcomes (2.6.1) 2019-2020

Name of Teacher: Dr. S. R. Bhupalwar

Department: Zoology

Program: BSc SY Subject: Zoology

Course Code: CCZP II

Paper Title: Practical Paper: Genetics, Genetic Engineering and Evolution-X

Unit Number	Topics	Unit-wise Outcome
I	<ol style="list-style-type: none"> <li>1. Problems based on Monohybrid and Dihybrid cross.</li> <li>2. Problems based on interaction of genes (Complementary, Supplementary, Inhibitory Duplicate factors)</li> <li>3. Problems based on blood group inheritance in man.</li> <li>4. Problems based on sex linked inheritance.</li> <li>5. Culture of Drosophila and its observation of genetic characters likes eyes and wings.</li> <li>6. Preparation of temporary slides of salivary gland chromosomes from chironomous larva .</li> <li>7. Study of permanent slide of sickle cell anaemia.</li> <li>b) Study of chromosomal abnormalities in man with the help of photographs/charts and Karyotypes a) Down's syndrome Klinfelter's syndrome</li> <li>c) Turner's syndrome</li> <li>9. Human pedigree analysis- various symbols used.</li> <li>10. Estimation of DNA by Diphenyl amine (DPA method) 11. Study of human genetic traits (Rolling tongue, Length of index and ring finger, ear lobes) by using Hardy Weinberg's principle.</li> <li>12. Calculation of frequencies of recessive and dominant gene in a population by using Hardy Weinberg Principle.</li> <li>13. Calculation of heterozygote and homozygote in population by using Hardy Weinberg's principle.</li> <li>14. Study of evidences by using photograph/charts and models a) Analogous and Homologous organs b) Connecting link (Peripatus and Archaeopteryx) c) Embryological evidences</li> </ol>	Solve the problems based on Genetics and explain the various types of genetic diseases and Evolutionary study.
	15. Study of adaptations (Museum Specimens).	

Specify Course Outcome: Solve the problems based on Genetics and explain the various types of genetic diseases and compare the various evolutionary links.

Specify Program Outcome: Explain and clarify animals anatomy, physiology, endocrinology, biochemistry, histology, genetic, genetic engineering technique and evolution also practice histotechniques and hematology.



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**ZOOLOGY**

**PRACTICAL PAPER NO. – XI**

**Based on P-VII & P-IX**

**Comparative Anatomy and Physiology**

**Endocrinology, Histology and Biochemistry**

**Practical Paper: CCZP III [Based on CCZ III & CCZ IV (Section B)]**

Credits: 02

Marks: 50

Unit	Unit Name/Topics	Unit wise Outcome
<b>I</b>	<ol style="list-style-type: none"> <li>1. Qualitative detection of digestive enzymes (Protease, Amylase and Lipase) in cockroach</li> <li>2. Detection of human salivary amylase</li> <li>3. Estimation of oxygen consumption in fish or any other suitable aquatic animal</li> <li>4. R.B.C. counting</li> <li>5. W.B.C counting</li> <li>6. Estimation of Haemoglobin</li> <li>7. Detection of blood groups</li> <li>8. Measurement of B.P by using B.P. apparatus (Demonstration only)</li> <li>9. Qualitative detection of nitrogenous waste products (Ammonia, Urea, Uric acid) in bird' s excreta and urine in Mammals.</li> <li>10. Preparation of Haematin crystals.</li> <li>11. Temporary preparation of squamous epithelium, ciliated epithelium, skeletal muscle fiber and blood smear.</li> </ol>	<ol style="list-style-type: none"> <li>1. Students able to improve the skills in microscopy, slide preparations, observations, drawings and laboratory techniques</li> <li>2. To acquaint the students with operations of different laboratory equipments</li> <li>3. Ability to understand the detection of blood groups of humans</li> <li>4. Ability to understand the estimation of blood cells count, haemoglobin contents in humans</li> <li>5. To acquaint the students the preparations of blocks etc.</li> </ol>



	<p>12. Study of histological structure of following organs – stomach, intestine, pancreas, liver, kidney, testis, ovary, thyroid and pituitary.</p> <p>13. Structure of synapse, structure of neurons (slide/chart)</p> <p>14. Types of nerve cells – Unipolar, Bipolar, Multipolar (Slides)</p> <p>15. Location of endocrine glands through charts and models.</p> <p>16. Preparation of block</p>	
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**Name of Teacher: Dr. S. R. Bhupalwar**

**Department: Zoology**

**Program: B.Sc. Second Year Semester-IV**

**Subject: Zoology**

**Course Code: SECZ-I(B)**

**Paper Title: Uranology**

<b>Unit</b>	<b>Unit Name/Topics</b>	<b>Unit wise Outcome</b>
<b>I</b>	Definition, Structure and Functions of Urinary System, Physiology of Mechanism of Urine formation	Students develop the skill for the qualitative analysis and composition of urine.
<b>II</b>	<b>Constituents and composition of Urine</b> i. Normal constituents and abnormal constituents of Urine ii. Qualitative tests for sugar, albumin, ketone bodies, bile salts and bile pigments <b>Practical</b> – Study of normal and abnormal constituents of Urine	
<b>III</b>	<b>Renal function tests</b> i. Definition, importance of tests like urea, creatinine, uric acid, proteins ii. Importance of Dialysis <b>Practical</b> – Biochemical Qualitative and Quantitative tests for Urine	
<b>IV</b>	<b>Collection and preservation of Urine Sample</b> i. Physical and Chemical Examinations of abnormal constituents ii. Microscopic Examination of Urine iii. Preparation of Urine Report iv. Urinometer <b>Practical</b> - Study of Microscopic Examination of urine	

**Specify Course Outcome:** Students develop the skill for the qualitative analysis and composition of urine.

**Specify Program Outcome:** Students develop the skill for the qualitative analysis and composition of urine.

**Signature of Teacher: Dr. S. R. Bhupalwar**



**Dharmabad Shikshan Sanstha's**  
**Lal Bahadur Shastri Mahavidyalaya, Dharmabad. 431809**

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*Pro-forma for program and course outcomes (2.6.1) 2018-19*  
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**Name of Teacher: Dr. S. R. Bhupalwar**

**Department: Zoology**

**Program: B.Sc. Second Year Semester-IV**

**Subject: Zoology**

**Course Code: SECZ - II**

**Paper Title: Apiculture**

<b>Unit</b>	<b>Unit Name/Topics</b>	<b>Unit wise Outcome</b>
<b>I</b>	<b>Biology of Bees</b> i. History, Classification and Biology of Honeybees ii. Social Organization of Honey bees	Student understand about Classification and social organization of honey bees.
<b>II</b>	<b>Rearing of Honey Bees</b> Artificial Bee Rearing (Apiary), Believes – Newton and Langstroth, Bee Pasturage, Selection of Bee Species for apiculture, Bee keeping equipment, Methods of extraction of honey (Indegenous and Modern) <b>Practical</b> – Visit to the Apiculture centers, Collect practical information of artificial Bee Hives and its mechanism	Rearing, diseases and enemies. The economics of honey bees and entrepreneurship.
<b>III</b>	<b>Diseases and Enemies</b> Bee diseases and enemies, Control and preventive measures	Students learn bee diseases, enemies, control and preventive measures.
<b>IV</b>	<b>Economy of Bees and Entrepreneurship</b> a. Products of Apiculture industry and its uses (Honey, Bees wax, Propolis, Pollen etc.) b. Bee keeping industry – recent efforts, Moern methods in employing artificial believes for Cross pollination in horiculture gardens <b>Practical</b> – Collection of natural bee hives, wax, honey etc.	Products of apiculture industries and its uses, modern methods, cross pollination in horticulture gardens.

**Specify Course Outcome:** Students learn complete study of culture of Bees.

**Specify Program Outcome:** Students learn complete study of culture of Bees.

**Signature of Teacher: Dr. S. R. Bhupalwar**



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**Lal Bahadur Shastri Mahavidyalaya, Dharmabad. 431809**

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*Pro-forma for program and course outcomes (2.6.1) 2018-19*  
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**Name of Teacher: Dr. S. R. Bhupalwar**

**Department: Zoology**

**Program: B.Sc. Third Year Semester-V**

**Subject: Zoology**

**Course Code: DSEZ – I (Section A)**

**Year: 2018 - 19**

**Paper Title: Ecology & Zoography-XII**

**Creits: 02 (Marks 50)**

Unit	Unit Name/Topics	Unit wise Outcome
<b>I</b>	<ol style="list-style-type: none"> <li>1. <b>Ecology</b> - Introduction and Scope of Ecology</li> <li>2. <b>Introduction to Ecosystem</b> <ol style="list-style-type: none"> <li>i. Components of an ecosystem               <ol style="list-style-type: none"> <li>a. Abiotic components – Light, Temperature &amp; Water</li> <li>b. Biotic components – Producers, Consumers &amp; Decomposers</li> </ol> </li> <li>ii. Types of Ecosystem               <p><b>Aquatic</b> – Pond ecosystem</p> <p><b>Terrestrial</b> – Desert Ecosystem</p> </li> <li>iii. Food Chain, Food Web, Ecological Pyramids</li> <li>iv. Energy Flow in an Ecosystem</li> </ol> </li> <li>3. <b>Bio-geochemical Cycles</b> <ol style="list-style-type: none"> <li>i. <b>Gaseous Cycle</b> – Oxygen Cycle</li> <li>ii. <b>Sedimentary Cycle</b> – Sulphur Cycle</li> </ol> </li> <li>4. <b>Spheres of Earth</b> <ol style="list-style-type: none"> <li>i. Atmosphere</li> <li>ii. Lithosphere</li> <li>iii. Hydrosphere</li> <li>iv. Biosphere</li> <li>v. Ecological Succession- Trends, Basic Types, Hydrarch and Xerarch</li> </ol> </li> </ol>	Students learn about scope of ecology its component ecosystem types etc.
<b>II</b>	<ol style="list-style-type: none"> <li>1. <b>Population Ecology</b>- Characteristics of Population           <ol style="list-style-type: none"> <li>i. Natality</li> <li>ii. Mortality</li> <li>iii. Population Dispersal</li> <li>iv. Population Density</li> <li>v. Age distribution</li> <li>vi. Population Growth Form</li> <li>vii. Population Equilibrium and Fluctuation</li> </ol> </li> <li>2. <b>Biotic interactions</b> <ol style="list-style-type: none"> <li>i. Positive interactions – Commensalism, Mutualism</li> <li>ii. Negative interactions – Competition,</li> </ol> </li> </ol>	Student learns characteristics of population ecology.



	Predation, parasitism	
<b>III</b>	<p><b>1. Pollution – Sources, Effects and Control</b></p> <ul style="list-style-type: none"> <li>i. Air Pollution</li> <li>ii. Water Pollution</li> <li>iii. Noise Pollution</li> </ul> <p><b>2. Energy Resources</b></p> <ul style="list-style-type: none"> <li>i. Conventional energy resources and their limitations <ul style="list-style-type: none"> <li>a. Fossil fuels</li> <li>b. Nuclear power</li> <li>c. Hydel Power</li> </ul> </li> <li>ii. Non-conventional energy resources – Advantages, Limitations and Latest developments <ul style="list-style-type: none"> <li>a. Solar Energy</li> <li>b. Wind Energy</li> <li>c. Tidal Energy</li> </ul> </li> </ul>	Student learn types of pollution sources, effects control and energy resources.
<b>IV</b>	<p><b>1. Adaptations</b></p> <ul style="list-style-type: none"> <li>i. Aquatic Adaptations</li> <li>ii. Desert Adaptations</li> <li>iii. Volant Adaptations</li> </ul> <p><b>2. Wildlife Conservation and Endangered Species</b></p> <ul style="list-style-type: none"> <li>i. Aims &amp; necessity of wildlife conservation</li> <li>ii. Wild life and Endangered species of India</li> <li>iii. Measures to protect endangered species in India</li> <li>iv. Sanctuaries and National parks in India</li> </ul> <p><b>3. Zoogeographical Realms- Physical features and fauna of following Realms in Brief</b></p> <ul style="list-style-type: none"> <li>i. Oriental Realm</li> <li>ii. Australian Realm</li> </ul>	Student learns types of adaptations, wild life conservation and Zoo geographical realms.

**Specify Course Outcome:** Students learns more about the ecology and zoogeographical reams.

**Specify Program Outcome:** Students learns more about the ecology and zoogeographical reams.

**Signature of Teacher: Dr. S. R. Bhupalwar**



**Dharmabad Shikshan Sanstha's**  
**Lal Bahadur Shastri Mahavidyalaya, Dharmabad. 431809**

*Pro-forma for program and course outcomes (2.6.1)*

**Name of Teacher: Dr. S. R. Bhupalwar**                      **Department: Zoology**

**Program: B.Sc. Third Year Semester-V**                      **Subject: Zoology**

**Course Code: DSEZ – I (Section B)**                      **Year:2018-19**

**Paper Title: Applied Parasitology – I (Parasitic Protozoa and Platyhelminthes)-XIII(B)**

Unit	Unit Name/Topics	Unit wise Outcome
<b>I</b>	<b>1. Introduction to Parasitology:</b> i. Brief introduction of Parasitology, Parasitism, Parasite, Host Vector, Host parasite relationship ii. Scope and Branches of Parasitology <b>2. Parasitic Protozoa:</b> Classification and general organization of parasitic Protozoa <b>3. Study of Systematic Position, Geographical distribution, Morphology, Life Cycle, Pathogenicity, Diagnosis, Prophylaxis and Treatment of</b> 1. Entamoeba histolytica 2. Giardia intestinalis 3. Trichomonas vaginalis	Student learns about parasites vector relationship scope and branches.
<b>II</b>	Study of Systematic Position, Geographical distribution, Morphology, Life Cycle, Pathogenicity, Diagnosis, Prophylaxis and Treatment of 1. Trypanosoma gambiense 2. Balantidium coli 3. Sarcocystis cruzi 4. Plasmodium vivax 5. Eimeriatenella	Student learns about classification, general organization, type studies of different parasites.
<b>III</b>	<b>Parasitic Platyhelminthes : Trematodes</b> 1. Introduction, classification, General organization of Trematodes 2. Study of Systematic Position, Geographical distribution, Morphology, Life Cycle, Pathogenicity, Diagnosis, Prophylaxis and Treatment of i. Schistosoma haematobium ii. Paragonimus westermani	Students learn helminth parasites, classification, general organization, trematodes type study.





	<ul style="list-style-type: none"><li>iii. Gastrodiscoides hominis</li><li>3. Parasitic adaptations in Trematodes</li><li>4. Larval forms in Trematodes</li></ul>	
<b>IV</b>	<b>Parasitic Platyhelminthes: Cestodes</b> <ul style="list-style-type: none"><li>1. Introduction, classification, General organization of Cestodes</li><li>2. Study of Systematic Position, Geographical distribution, Morphology, Life Cycle, Pathogenicity, Diagnosis, Prophylaxis and Treatment of<ul style="list-style-type: none"><li>i. Taenia saginata</li><li>ii. Taenia solium</li><li>iii. Echinococcus granulosus</li></ul></li><li>3. Parasitic adaptations in Cestodes</li><li>4. Larval forms in Cestodes</li></ul>	Cestode helminths classification general organization and type studies of cestode parasites.

**Specify Course Outcome:** Students learn about protozoa, helminths parasites of complete type studies.

**Specify Program Outcome:** Students learn about protozoa, helminths parasites of complete type studies.

**Signature of Teacher: Dr. S. R. Bhupalwar**



Dharmabad Shikshan Sanstha's

Lal Bahadur Shastri Mahavidyalaya, Dharmabad-431809

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*Pro-forma for program and course outcomes (2.6.1) 2018-19*  
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Name of Teacher: Dr. S. R. Bhupalwar                      Department: Zoology

Program: B.Sc. Third Year                                              Subject: Zoology

Course Code: DSEZ – II (Section A)                              Year: 2018-19

Paper Title: Ethology, Biometry and Bioinformatics-XIV

Unit	Unit Name/Topics	Unit wise Outcome
I	<b>Ethology: Classification of Animal Behaviour</b> <ol style="list-style-type: none"> <li>i. Inborn or stereotyped animal behaviour – Taxis and Instincts with examples</li> <li>ii. Acquired animal behaviour – Imprinting, Conditioning, Habituation, reasoning</li> <li>iii. Social behaviour in Insects – Honeybee</li> </ol>	Students learn about classification of animal behavior and social behavior of insects.
II	<b>Ethology</b> <ol style="list-style-type: none"> <li>1. <b>Communication in animals</b> <ol style="list-style-type: none"> <li>i. Auditory Communication</li> <li>ii. Chemical Communication</li> <li>iii. Visual Communication</li> <li>iv. Tactile Communication</li> </ol> </li> <li>2. <b>Mimicry and Colouration</b> <ol style="list-style-type: none"> <li>i. Types of Mimicry- Protective and Aggressive</li> <li>ii. Types of Colouration- Protective, Aggressive and Warning</li> </ol> </li> </ol>	Students learn about types of communication of animals and types of mimicry and coloration.
III	<b>Biometry</b> <ol style="list-style-type: none"> <li>1. <b>Collection and classification of data</b> <ol style="list-style-type: none"> <li>i. Methods of collection of data</li> <li>ii. Types of classification of data – Geographical, Chronological, Quantitative, Qualitative, Continuous, Discontinuous</li> </ol> </li> <li>2. <b>Measures of central Tendency</b> Arithmetic Mean, Median and Mode</li> <li>3. <b>Graphic Representation of Data</b> <ol style="list-style-type: none"> <li>i. Histogram</li> <li>ii. Pie Diagram</li> <li>iii. Polygon Frequency Curve</li> </ol> </li> </ol>	Student learns collection and communication of data and measures of central tendency.
IV	<b>Bioinformatics</b> <ol style="list-style-type: none"> <li>i. Computer and its Applications in</li> </ol>	Computer and its applications of biology internet uses, world wide web and broad



	<ul style="list-style-type: none"><li>Biology</li><li>ii. Internet and its uses</li><li>iii. World Wide Web</li><li>iv. Search Engines</li><li>v. Broad Applications of Bioinformatics</li><li>vi. Introduction to biological Database<ul style="list-style-type: none"><li>a. NCBI</li><li>b. Pub Med</li></ul></li></ul>	applications of bioinformatics.
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**Specify Course Outcome:** Students learn about social behavior and its animal communications and collection and classification of data, graphic representation of data in biometry. Computer complete information.

**Specify Program Outcome:** Students learn about social behavior and its animal communications and collection and classification of data, graphic representation of data in biometry. Computer complete information.

**Signature of Teacher: Dr. S. R. Bhupalwar**



**Dharmabad Shikshan Sanstha's**  
**Lal Bahadur Shastri Mahavidyalaya, Dharmabad. 431809**

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*Pro-forma for program and course outcomes (2.6.1)*  
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**Name of Teacher: Dr. S. R. Bhupalwar**

**Department: Zoology**

**Program: B.Sc. Third Year**

**Subject: Zoology**

**Course Code: DSEZ – II (Section B)**

**Year: 2018 - 19**

**Paper Title: Applied Parasitology – II (Parasitic Nematodes and Arthropods)-XV**

<b>Unit</b>	<b>Unit Name/Topics</b>	<b>Unit wise Outcome</b>
<b>I</b>	<b>Parasitic Nematodes: Animal Nematodes</b> 1. Introduction, classification, General organization of Animal Nematodes 2. Study of Systematic Position, Geographical distribution, Morphology, Life Cycle, Pathogenecity, Diagnosis, Prophylaxis and Treatment of i. Enterobius vermicularis ii. Ancylostoma duodenale iii. Wuchereria bancrofti 3. Larval forms in Animal Nematodes	Study of parasitic nematodes classification, general organization and systematic position of different parasite animals.
<b>II</b>	<b>Parasitic Nematodes: Plant Nematodes</b> 1. Introduction, classification, General organization of Plant Nematodes 2. Study of Systematic Position, Geographical distribution, Morphology, Life Cycle, Pathogenecity, Diagnosis, Prophylaxis and Treatment of i. Meloidugyne (Root knot nematode) ii. Heterodera (Cyst nematode) iii. Tylenchulus (Citrus nematode)	Students learn parasitic plant nematodes general organization, systematic study of different types plant nematode parasites.
<b>III</b>	<b>Parasitic Arthropodes</b>	Study of parasitic orthropodes, systematic position



	<ol style="list-style-type: none"> <li>1. Systematic Position, Geographical distribution, Morphology, Life Cycle, diseases and control Measures of             <ol style="list-style-type: none"> <li>i. Acarina – Ticks &amp; Mites</li> <li>ii. Parasitic Hemiptera – Bed Bug (<i>Cimex lacturalis</i>)</li> </ol> </li> <li>2. Parasitic flies – Outline classification, Morphology, role as vectors of Human diseases and Control Measures of House Fly (<i>Musca domestica</i>), Bot Fly (<i>Dermatobia hominis</i>)</li> </ol>	<p>distribution morphology, life cycle, disease control treatment.</p>
<b>IV</b>	<ol style="list-style-type: none"> <li>1. Morphology, pathogenicity and Control Measures of-             <ol style="list-style-type: none"> <li>i. Siphonaptera</li> <li>ii. Anopleura</li> <li>iii. Mallophaga</li> <li>iv. Hymenoptera</li> </ol> </li> <li>2. Mosquitoes as a vector in the transmission of Malaria, Dengue fever, Elephentiasis, Yellow fever, Chikungunia and their control measures</li> <li>3. Chemical and Biological Control of Insects</li> </ol>	<p>Orthopedic parasites transmits various diseases and chemical, biological control of diseases.</p>

**Specify Course Outcome:** Orthopod parasites are causes diseases, vector transmitter and study the chemical and biological control of insects.

**Specify Program Outcome:** Orthopod parasites are causes diseases, vector transmitter and study the chemical and biological control of insects.

**Signature of Teacher: Dr. S. R. Bhupalwar**



**Dharmabad Shikshan Sanstha's  
Lal Bahadur Shastri Mahavidyalaya, Dharmabad. 431809**

Pro-forma for program and course outcomes (2.6.1) 2019-2020

Name of Teacher: Dr. S. R. Bhupalwar

Department: Zoology.

Program: B. Sc. T. Y.

Subject: Zoology

Course Code: DSEZP-I

Paper Title: Ecology, Zoogeography Ethology, Biometry and Bioinformatics: Practical Paper- XVI.

Unit Number	Unit Name	Topics	Unit-wise Outcome
1	Ecology	<ol style="list-style-type: none"> <li>1. Estimation of Dissolved O<sub>2</sub> from Water Sample.</li> <li>2. Estimation of Dissolved CO<sub>2</sub> from Water Sample.</li> <li>3. Estimation of Population Density from Water Sample/ Terrestrial area.</li> <li>4. Determination and study of Atmospheric Humidity.</li> <li>5. Study of positive and negative interactions (biotic interaction) in animals.</li> <li>6. Estimation of Chlorides, Salinity, Hardness from given water sample for Water quality status</li> <li>7. Ecological Adaptations (Any two examples from each to be studied) a) Volant Adaptations. b) Aquatic Animals (from fresh water and marine environment). c) Desert Animals.</li> <li>8. Report on a Field Visit to Zoo Park/National Park/Biodiversity Park/Wild Life Sanctuary to study management, behavior and enumeration of wild animals.</li> </ol>	Analyse abiotic factors and adaptations in ecosystem.
2	Zoogeography	<ol style="list-style-type: none"> <li>1. Museum study of Vertebrate Endangered Species or Threatened Wild Animals on the Basis of charts/ models/ photographs (Any Five).</li> <li>2. Identification of Zoogeographical Realms from the Map and Identify Specific Fauna of Respective Regions.</li> </ol>	Categorise endangered species and zoogeographical realms.



3	Ethology	1. To study the Positive and Negative Phototropism with suitable examples. 2. To study the Positive and Negative Chemotactic Response with suitable examples. 3. Study of Colouration of animals with suitable examples.	Demonstrate animal behavior.
4	Biometry	1. Problems Based on Mean, Mode, Median. 2. Classification of Data- i) Histogram, ii) Pie-Diagram, iii) Polygon Frequency Curve.	Interpret and construct biological data.
5	Bioinformatics	1. To perform online search on Biological information/Literature 2. How to access the biological data from NCBI and Pub Med 3. BLAST- Sequence Search & alignment.	Analyse biological data online.

Specify Course Outcome: Analyse and demonstrate ethology, ecosystem and interpretation of biological data via statistical techniques and internet.

Specify Program Outcome: Explain and illustrate ecological, ethological and parasitological aspects also practice techniques of biostatistics, Bio-informatics, vermicomposting and aquarium keeping.

Signature of Teacher: Dr. S.R. Bhupalwar



**Dharmabad Shikshan Sanstha's  
Lal Bahadur Shastri Mahavidyalaya, Dharmabad. 431809**

Pro-forma for program and course outcomes (2.6.1) 2019-2020

Name of Teacher: Dr. S. R. Bhupalwar

Department: Zoology.

Program: B.Sc. TY Semester-VI

Subject: Zoology.

Course Code: DSEZP-II.

Paper Title: Applied Parasitology {XVII (B)}

Unit Number	Unit Name	Topics	Unit-wise Outcome
1	I	<p>Identification, classification and description of Protozoan Parasites through permanent slides/photomicrographs i. Entamoeba histolytica, ii. Giardia intestinalis, iii. Trichomonas vaginalis iv. Trypanosoma gambiense v. Balantidium coli vi. Sarcocystis cruzi, vii. Plasmodium sp. viii. Eimeria tenella</p> <p>1 Collection, staining, identification and description of Parasitic protozoa from Blood sample or rectal contents of suitable animals – i. Ciliates, ii. Flagellates, iii. Malarial parasites, iv. Coccidian Parasites</p> <p>2 Identification, classification and description of Parasitic platyhelminths through permanent slides/photomicrographs or specimens -</p> <p>i. Schistosoma haematobium ii. Fasciola hepatica iii. Paragonimus westermani. iv. Gastrodiscoides hominis</p>	<p>Able to identify, classify parasites and practice mounting of parasites.</p>





	<p>v. Taenia saginata, vi. Taenia solium vii. Echinococcus granulosus viii. Diphyllbothrium lattu</p> <p>2. Collection, Preservation, Staining, Mounting, identification and description of Trematodes and Cestodes from locally available different hosts (Gills &amp; intestines).</p> <p>3. Identification, classification and description of Parasitic Nematodes (Animals &amp; Plants) through permanent slides/photomicrographs or specimens – i. Enterobius vermicularis ii. Ancylostoma duodenale. iii. Ascaris lumbricoides iv. Wuchereria bancrofti.</p> <p>v. Meloidogyne (Root knot nematode), vi. Heterodera (Cyst nematode) vii. Tylenchulus (Citrus nematode) viii. Anguina (Seed Gall- nematode)</p> <p>6. Collection, Preservation, Mounting, identification and description of Animal Nematodes from locally available different hosts (intestines).</p> <p>7. Collection, Preservation, Mounting, identification and description of Plant Nematodes from soil samples.</p> <p>8. Study of following arthropods through permanent slides/ photographs: Aedes, Culex, Anopheles, Pediculus humanus, Xenopsylla cheopis, Cimex lectularius Phlebotomus argentipes, Musca domestica.</p> <p>9 Collection, preservation, Preparation of permanent slides and description of mouth-parts of - House fly ii. Mosquito iii. Bed bug iv. Head louse</p> <p>10. Submission of a brief report on parasites of vertebrates.</p>	
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Specify Course Outcome: Identify, classify parasites and practice mounting of parasites.

Specify Program Outcome: Explain and illustrate ecological, ethological and parasitological aspects also practice techniques of biostatistics, Bio-informatics, vermicomposting and aquarium keeping.

Signature of Teacher: Dr. S. R. Bhupalwar



**Dharmabad Shikshan Sanstha's**  
**Lal Bahadur Shastri Mahavidyalaya, Dharmabad. 431809**

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*Pro-forma for program and course outcomes (2.6.1)*

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**Name of Teacher: Dr. S. R. Bhupalwar**                      **Department: Zoology**

**Program: B.Sc. Third Year**                                              **Subject: Zoology**

**Course Code: SECZ-III(E)**                                              **Year: 2018 – 19**

**Paper Title: Parasites of Public Health Importance**

**Credits: 02 (Marks: 50)**

Unit	Unit Name/Topics	Unit wise Outcome
<b>I</b>	<p>Brief introduction of Parasitology, Parasitism, Parasite, Host, Vector.</p> <p><b>MALARIAL PARASITES.</b></p> <p>History, Geographic distribution, Taxonomic position of different Species of malarial parasites.</p> <p>Distinguishing characters of different species of human malarial parasites, Life cycle, Pathogenicity, Prevention and control measures of Malarial parasites.</p>	To acquaint the students learn about history, distribution, different types of malarial diseases
<b>II</b>	<p><b>PARASITIC PLATYHELMINTHES</b></p> <p>History, Geographic distribution, Morphology, Life Cycle, Pathogenicity, Prevention and control measures of Schistosoma haematobium and Taenia solium</p>	Ability to understand the students about platyhelminthes history, distribution, structure, life cycle, diseases control treatment of different helminth parasites
<b>III</b>	<p><b>LYMPHATIC FILARIAL PARASITES- Wuchereria bancrofti.</b></p> <p>History, Geographic distribution of lymphatic filariasis, Taxonomic position of Filarial worm (Wuchereria bancrofti), Distinguishing characters, Life cycle, Pathogenicity, Prevention and control measures.</p>	Ability to understand the students lymphatical filarial parasites characters, life cycle, pathogenicity, prevention and control measures



<b>IV</b>	<b>INSECTS OF MEDICAL IMPORTANCE</b>  Morphology, Medical importance and Control of Pediculus humanus, Xenopsylla cheopis Anopheles, Culex, Aedes	Students learn about insect vectors of human diseases, transmitters, preparation of mouth parts of arthropod insects
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**Dharmabad Shikshan Sanstha's**  
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*Pro-forma for program and course outcomes (2.6.1)*

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**Name of Teacher: Dr. S. R. Bhupalwar**                      **Department: Zoology**

**Program: B.Sc. Third Year**                                              **Subject: Zoology**

**Course Code: SECZ-IV(H)**                                              **Year: 2018 – 19**

**Paper Title: Sericulture**

**Credits: 02 (Marks: 50)**

Unit	Unit Name/Topics	Unit wise Outcome
<b>I</b>	<b>Introduction of Sericulture</b> 1.1 History and Scope of Sericulture, Present status of sericulture in India. 1.2 Types of silkworm- Mulberry, Tasar, Eri and Muga silkworm 1.3 Systematic position, Morphology, Life Cycle of Silkworm 1.3 Cultivation of Mulberry- Planting, grafting and Harvesting. 1.4 Mulberry diseases and pest managements. a) Foliar Disease b) Root rot Disease c) Root knot Disease d) Common pest of Mulberry	Students learn about history, scope, status, types of silk worm and cultivation, harvesting and diseases of Silk worms
<b>II</b>	<b>Silk worm Rearing</b> 1.1 Prerequisite for silkworm rearing. 1.2 Silkworm Rearing Equipments 1.3 Rearing Practices- Procurement of quality seeds, Brushing, Preparation of feed bed and feeding, Bed Cleaning, Spacing, Mounting, Harvesting of Cocoons, Post Cocoon Processing Stifling, Reeling. 1.4 Role of Environmental factors in rearing	Students understand about rearing, practice, equipments, feeding, role of environment factors of rearing in silkworms
<b>III</b>	<b>Pests and Diseases</b> 1.1 Introduction and classification of different types of silkworm diseases	Students ability to understand about silk worms, pests, diseases, fungal infections, control prevention of silk worms.



	<p>1.2 Influence of environment and Nutrition on the incidence of diseases.</p> <p>1.3 Pests of silkworm: Uzi fly, dermestid beetles and vertebrates</p> <p>1.4 Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial</p> <p>1.5 Control and prevention of pests and diseases</p>	
<b>IV</b>	<p><b>Sericulture Economics and Marketing</b></p> <p>1.1 Mulberry cultivation (per hectare) –Cost and returns under irrigation and rainfed condition.</p> <p>1.2 Economics of egg production: Expenditure and income.</p> <p>1.3 Economics of silkworm rearing: Investment and returns</p> <p>1.4 Economics of silk reeling (per kg of raw silk): Cost and returns for different types of reeling establishments.</p> <p>1.5 Sericulture marketing organization for seed cocoon, raw silk and silk fabric</p> <p>1.6 Traditional and regulated markets, their merits and limitations</p>	<p>Students learn about mulberry cultivation, investment, sericulture marketing and organization and traditional and regulated markets, merits and limitations of sericulture.</p>