

**Department of Higher Education, Govt of M.P.**

**Under Graduate Syllabus for B.Sc (Bio)**

**As recommended by Central Board of Studies in Zoology**

<b>Class</b>	:	<b>B.Sc. II year (Session 2019-20)</b>
<b>Paper</b>	:	<b>I</b>
<b>Subject</b>	:	<b>Zoology</b>
<b>Title of Paper</b>	:	<b>Vertebrates and Evolution</b>
<b>Max Mark</b>	:	<b>40</b>

**Unit I**

1. Origin of Chordates, Classification of Phylum Chordate upto orders according to Parker and Haswell (Latest Edition)
2. Urochordata – Type study of Herdmania
3. Cephalochordata - Type study of Amphioxus, Affinities of Amphioxus
4. Comparison between Petromyzon and Myxine

**Unit II**

1. Comparative account of integuments
2. Comparative account of limb bones and girdles of vertebrates (Amphibia, Reptiles, Birds and Mammals)
3. Comparative account of Digestive system (Amphibia, Reptiles, Birds and Mammals)
4. Comparative account of respiratory system (Amphibia, Reptiles, Birds and Mammals)

**Unit III**

- 1 Comparative account of aortic arches and heart.
- 2 Comparative account of Brain
- 3 Comparative account of Urinogenital System
- 4 Placentation in Mammals

**Unit IV**

- 1 Origin of Life – modern concept only
- 2 Lamarckism, Darwinism, Modern Synthetic theories; Variations, Mutation, Isolation & Speciation
- 3 Adaptation and Mimicry
- 4 Micro, Macro evolution and Mega Evolution

**Unit V**

- 1 Fossils, methods of fossilization, determination of age of fossils.
- 2 Study of extinct forms, Dinosaurs and Archaeopteryx
- 3 Zoogeographical distribution
- 4 Evolution of man
- 5 Geological time scale and Insular fauna.

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<b>Paper</b>	<b>:</b>	<b>II</b>
<b>Subject</b>	<b>:</b>	<b>Zoology</b>
<b>Title of Paper</b>	<b>:</b>	<b>Vertebrates and Evolution</b>
<b>Max Mark</b>	<b>:</b>	<b>40</b>

**Unit I: Nutrition and Metabolism**

1. Physiology of digestion in mammals,
2. Protein Metabolism: Deamination, Decarboxylation. Transamination of amino acids and Ornithine cycle
3. Carbohydrate Metabolism – Glycogenesis, Glycogenolysis, Glycolysis, The Citric Acid Cycle, Gluconeogenesis
4. Lipid Metabolism – Beta Oxidation of fatty acids.

**Unit II: Respiration Excretion and Immune System**

1. Mechanism and physiology of respiration in mammals (transport of gases, chloride shift)
2. Physiology of excretion – Urea and urine formation in mammals
3. Innate and acquired immunity, immune cells and lymphoid system, immune response, cellular and humoral immunity

**Unit III: Regulatory Mechanisms of Enzymes and role of Vitamins**

- 1 Thermoregulation.
- 2 Definition and nomenclature of enzymes, classification of enzymes.
- 3 Mechanism of enzyme action.
- 4 Co-enzymes
- 5 Vitamins

**Unit IV: Neuromuscular Co-ordination**

- 1 Types of neurons and glial cells
- 2 Physiology of nerve impulse conduction
- 3 Types and structure of Muscles
- 4 Theory of muscle contraction and its biochemistry

**Unit V Endocrine System**

- 1 Structure and functions of Pituitary gland.
- 2 Structure and functions of Thyroid gland.
- 3 Structure and functions of Adrenal gland.
- 4 Structure and functions of Parathyroid, Thymus and Islets of Langerhan's.
- 5 Physiology of Male and Female Sex hormones

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<b>Class</b>	<b>:</b>	<b>B.Sc. II Year (Session 2019-20)</b>
<b>Subject</b>	<b>:</b>	<b>Zoology Practical</b>
<b>Max Mark</b>	<b>:</b>	<b>50</b>

- 1 Dissections of commercially available species of locally available fishes (Efforts may be done to use computer simulation technique)
- 2 Study of museum specimens (Vertebrates)
- 3 Study of specimens of evolutionary importance viz; living fossils, connecting links, extinct animals, fossils : Limulus, Latimeria, Dinosaurs, Asiatic chital, Archaeopteryx, Peripatus, etc
- 4 Osteology: Limb bones and Girdle bones of Frog, Varanus, Pigeon and Rabbit
- 5 Detection of Protein, Carbohydrate and Lipid / Study of Human salivary enzyme activity in relation to pH
- 6 Hematological Experiment – RBC and WBC counting / Blood grouping in blood samples / Estimation of Hemoglobin and sugar in blood samples.
- 7 Histological study of various endocrine glands – T.S. of Thyroid, T.S. of Pituitary gland, T.S. Adrenal gland, T.S. of Testis, T.S. of Ovary
- 8 Histological study of Digestive and Visceral organs - T.S. of Stomach, T.S. of Intestine, T.S. of Pancreas, T.S. of Liver, T.S. of Lungs and L.S. of Kidney

**Distribution of Marks**

1	Dissection	08
2	Spot related to evolution	05
3	Spotting ( 4 spot, 2 Bones, 2 Slides)	16
4	Biochemical test / Enzyme activity	05
5	Hematological Experiment	06
6	Viva – voce	05
7	Record	<u>05</u>

Total 50

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<b>Class</b>	<b>:</b>	<b>B.Sc. III Year (Session 2019-20)</b>
<b>Paper</b>	<b>:</b>	<b>I (First)</b>
<b>Subject</b>	<b>:</b>	<b>Zoology</b>
<b>Title of Paper</b>	<b>:</b>	<b>Genetics</b>
<b>Max. Mark</b>	<b>:</b>	<b>40</b>

### **Unit 1: Heredity and Genetic material**

1. Mendel's Laws of heredity.
2. Variations - Sources and types.
3. Structure, molecular organization and function of DNA and RNA and types of RNA.
4. DNA replication in Prokaryotes.
5. Nucleosome (Solenoid model).

### **Unit II : Gene Expression**

1. Genetic Code.
2. Transcription in Prokaryotes.
3. Translation in Prokaryotes.
4. Gene expression, Regulation of Protein synthesis and Lac operon model.
5. Split gene, Overlapping gene, Pseudo gene.

### **Unit III : Linkage and Chromosomal aberration**

1. Linkage and Crossing Over : Types and Significance.
2. Sex Determination - Chromosomal and genetic balance theory.
3. Sex linked inheritance (Haemophilia, colour blindness).
4. Structural and Numerical changes in chromosomes.
5. Mutation - Types and Mutagens.

### **Unit IV: Human Genetics**

1. Human Karyotype.

2. Human Genome Project.
3. Multiple allele and inheritance of blood group.
4. Autosomal and Sex Chromosome Syndromes in human.
5. Genetic diseases in human - Sickle cell anaemia, Albinism and Thalassemia

**Unit V: Genetic Engineering**

1. Recombinant DNA technology and Gene Cloning.
2. Polymerase Chain Reaction.
3. Blotting-Southern and Northern
4. DNA finger printing.
5. Gene Therapy.

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<b>Class</b>	<b>:</b>	<b>B.Sc. III Year (Session 2019-20)</b>
<b>Paper</b>	<b>:</b>	<b>II (Second)</b>
<b>Subject</b>	<b>:</b>	<b>Zoology</b>
<b>Title of Paper</b>	<b>:</b>	<b>Ecology and Applied Zoology</b>
<b>Max. Mark</b>	<b>:</b>	<b>40</b>

### **Unit I: Concept of Ecology**

1. Abiotic and Biotic factors, Component of ecosystem.
2. Energy flow in ecosystem : Food chain, Food web and Pyramids.
3. Biogeochemical cycle : Carbon, Oxygen, Nitrogen, Phosphorous.
4. Population Concept - Characteristics of population, Factors affecting population growth.

### **Unit II : Habitat Ecology**

1. Fresh water, marine and terrestrial habitat.
2. Ecological division of India.
3. Biodiversity : Natural Resources and their conservation with special reference to forests.

### **Unit III : Wild life and Environment**

1. Wild life Protection Act, National Parks and Sanctuaries of Madhya Pradesh.
2. Endangered species of India.
3. Types of Pollution : Air, Water, Soil, Thermal and Noise pollution.
4. Urbanisation and effect of human population on environment.

#### **Unit IV: Aquaculture**

1. Prawn culture : Culture of fresh water prawn, methods of prawn fishing, preservation and processing of prawns.
2. Pearl culture and pearl industry.
3. Frog culture.
4. Major carp culture : Management of ponds, preservation and processing of fishes.
5. Maintenance of Aquarium.

#### **Unit V: Economic Entomology**

1. Sericulture: Species of silkworm, life history of *Bombyx mori*, Sericulture Industry in India.
2. Apiculture - Life cycle of the honey bee, methods of bee keeping, products of bees, enemies of bees.
3. Lac culture : Life cycle of lac insect and host plant of lac insects.
4. Common pests : Stored grains : *Sitophilus oryzae* and *Tribolium castanaeum*,  
Vegetable pest: *Pieris brassicae* and *Dacus cucurbitae*.
5. Biological control of insect pests.

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**Subject : Zoology Practical**  
**Max. Mark : 50**

The practical's work will be based on theory syllabus and the candidates will be required to show the knowledge of the following:

1. Study of fresh water, marine and terrestrial fauna, Major Carps, Common Stored grain pest and Vegetable pest.
2. Water analysis. Dissolved Oxygen, pH, hardness, turbidity.
3. Study of Ecosystem and Maintenance of Aquarium.
4. Study of instrument related to Genetics - Centrifuge, PCR, Gel Electrophoresis, DNA Finger Printing.
5. Wild life: Endangered species.
6. Life cycles of silkworm, honey bee, lac insect.

**Distribution of Marks**

1. Spotting	12 (8+4)
2. Analysis of water bodies	04
3. Exercise based on Wild Life (any two)	05
4. Ecosystem / Maintenance of Aquarium	04
5. Study of Instruments	05
6. Problems on Genetics	05
7. Life cycle	05
8. Viva	05
9. Practical Record and Collection	05

**Total 50**