

**Department of Higher Education, Govt. of M.P.**  
**Under Graduate Syllabus for B.Sc. (Bio) 3 years**  
**As recommended by Central board of Studies in Zoology**

**B.Sc. III Year**  
**Subject : Zoology**  
**Session 2021-22**

**Scheme of Examination**

<b>Paper</b>	<b>Topic of Paper</b>	<b>Theory</b>		<b>Internal Assessment</b>		<b>Total marks</b>
		<b>Max.Marks.</b>	<b>Min.Marks.</b>	<b>Quarterly Exam</b>	<b>Half yearly Exam</b>	
<b>I</b>	Genetics	40	13	10	10	<b>100</b>
<b>II</b>	Ecology and Applied Zoology	40	13			
	Practical	50	17			<b>50</b>

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<b>Class</b>	- B.Sc. III year
<b>Paper</b>	- I
<b>Subject</b>	- Zoology
<b>Title of Paper</b>	- Genetics
<b>Max. Marks:</b>	- 40

**Unit I: Heredity and Genetic Material**

1. Mendel's laws of heredity wsr Law of Segregation, Law of Independent assortment and Law of Dominance.
2. Variations wsr Sources, Types of Variations and Phenocopy.
3. Structure, molecular organization and functions of DNA and RNA.
4. Types of RNA
5. DNA Replication in Prokaryotes
6. 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 genes, Overlapping genes and Pseudo genes

**Unit III: Linkage and Chromosomal Aberrations**

1. Linkage: Types and Significance.
2. Crossing over: Types and Significance.
3. Sex determination : Chromosomal Theory and Genic Balance Theory
4. Sex linked inheritance ( Haemophilia, Colour blindness )
5. Types of Mutation and classification of Mutagens
6. Structural and numerical changes in chromosomes

**Unit IV: Human Genetics**

1. Human Karyotype
2. Elementary idea of Human Genome Project.
3. Multiple alleles and inheritance of blood groups
4. Autosomal Syndromes in Man: Down Syndrome, Edward Syndrome and Patau Syndrome.
5. Sex chromosome Syndromes in Man: Turner Syndrome, Klinefelter Syndrome and Criminal Syndrome.
6. Common Genetic Diseases in Man -Sickle cell anemia, Albinism & Thalassemia

**Unit V: Genetic Engineering**

1. Recombinant DNA technology. Construction of Chimeric DNA, Elementary idea of Plasmids & Vectors.
2. Gene cloning
3. Polymerase Chain Reaction (PCR)
4. Gel Electrophoresis
5. Blotting : Southern and Northern Blotting.
6. DNA finger printing.
7. Gene therapy

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<b>Class</b>	- B.Sc. III year
<b>Paper</b>	- II
<b>Subject</b>	- Zoology
<b>Title of Paper</b>	- Ecology and Applied Zoology
<b>Max. Marks:</b>	- 40

**Unit-I Concept of Ecology:**

1. Components of Ecosystem: Abiotic and biotic factors
2. Energy flow in ecosystem: Food chain, Food web and Ecological pyramids Energy Flow models.
3. Biogeochemical cycle: Carbon, Oxygen, Nitrogen and Phosphorus
4. Population Concept – Characteristics of population, Factors affecting population growth.
5. Community: Characteristics of community

**Unit-II Habitat Ecology**

1. Fresh water habitat
2. Marine habitat
3. Terrestrial habitat
4. Ecological division of India.
5. 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. Rare, Endangered & Threatened (RET) species of India.
4. Types of pollution: Air, Water, Soil, Thermal, Noise and Radioactive pollution.
5. 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 honey bees, methods of bee keeping, products of honey bees and 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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**Class** - B.Sc. III year  
**Subject** - Zoology Practical  
**Max. Marks:** - 50

1. Study of Fresh Water, Marine and Terrestrial Fauna.
2. Study of Indian Major carps – *Labeo rohita*, *Catla catla* and *Cirrhina mrigala*
3. Study of Common Stored Grain Pests- *Sitophilus oryzae* and *Tribolium castanaeum*
4. Study of Common Vegetable Pests - *Pieris brassicae* and *Dacus cucurbitae*
5. Water analysis- Dissolved Oxygen, pH, Hardness, turbidity.
6. Study of Ecosystems wsr Pond ecosystem
7. Maintenance of Aquarium wsr Study of Artificial ecosystem
8. Study of Principle and Working of instruments related to Applied Genetics – Centrifuge, PCR, Gel electrophoresis, DNA fingerprinting.
9. Study of Principle and Working of PCR Comparative analysis of short DNA sequences using PCR thermocycler
10. Study of Human Karyotype under Phase Contrast Microscope
11. Problems based on genetics –Law of segregation, Law of independent assortment, Multiple gene interaction, interaction of Complementary factor and interaction of Supplementary factor
12. Wild life: Study of Endangered species wsr Rhinoceros, Tiger, Leopard and Ghariyal, Endangered and Endemic Species wsr Barasingha (*Cervus duvaucelii*)
13. Study of life cycles of Silkworm, Honey bee and Lac insects.  
Insect.

**Scheme of Practical Examination**

**Distribution of Marks**

1. Spotting	12
2. Water analysis	04
3. Exercise based on wild life	05
4. Study of ecosystem	04
5. Study of instruments	05
6. Problems based on genetics	05
7. Life cycle	05
6. Viva-Voce	05
7. Practical record and collection	05

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Total 50 Marks

## Recommended Books for B.Sc. III year – Zoology

### Books of M.P.Hindi Granth Academy

1. Lewin : Genetics (Latest Edition)
2. Strickberger: Genetics.
3. Gardener,M.J. : Principles of Genetics
4. Singh B.D. : Genetics
5. Singh B.D. : Biotechnology
6. Gupta P.K. : Genetics
7. Gupta P.K. : Molecular Biology and Genetic Engineering
8. Verma P.S. and Agarwal, V.K. : Genetics
9. Purohit : Biotechnology
10. Kohli and Ansari : Economic Zoology
11. Kohli : Ecology
12. Odum E.P. : Fundamentals of Ecology
13. Sharma P. D.: Environmental Biology and Toxicology
14. Natarajan ,S.S. : A Manual of Freshwater Aquaculture
15. Upadhyaya : Economic Zoology
16. Pal Ajay : Cellular and Molecular Biology
17. Gerald Karp : Cell and Molecular Biology.
18. Verma & Agrawal, Cell Biology, Genetics, Molecular Biology & Evolution
19. Snustad : Principles of Genetics
20. Russell Peter.J.: Genetics