



# Government Arts and Science College Ratlam (M.P.) 457001



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The syllabus applied in UG and PG for the session 2019-20 have been adopted from Central Board of Studies Bhopal and Vikram University Ujjain respectively.

*Principal*

Principal

**Principal**

Govt. Arts and Science College  
Ratlam (M.P.)  
Ratlam (M.P.)

1,

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

उच्च शिक्षा विभाग, म.प्र. शासन  
स्नातक कक्षाओं के लिए त्रिवर्षीय पाठ्यक्रम  
केन्द्रीय अध्ययन मण्डल प्राणीशास्त्र द्वारा अनुशंसित

<b>Class / कक्षा</b>	:	<b>B.Sc I year (Session-2019-20)</b>
<b>Paper</b>	:	<b>I</b>
<b>Subject/ विषय</b>	:	<b>प्राणीशास्त्र</b>
<b>Title of Paper</b>	:	<b>अकशेरुकी</b>
<b>Max. Mark/ अधिकतम अंक</b>	:	<b>40</b>

**इकाई I**

1. प्राणिकीय नामकरण एवं अंतर्राष्ट्रीय कोड का सामान्य अध्ययन
2. निम्नतर अकशेरुकी प्रणियों का वर्गीकरण (पारकर एवं हेजवैल का 7वाँ संस्करण अनुसार )  
(i) प्रोटोजोआ (ii) पोरीफेरा (iii) सीलेंट्रेटा (iv) प्लेटिहेल्मिन्थीस (v) निमेटोहेल्मिन्थीस
3. उच्चतर अकशेरुकी प्रणियों का वर्गीकरण (पारकर एवं हेजवैल का 7वाँ संस्करण अनुसार )  
(i) ऐनेलिडा (ii) आर्थ्रोपोडा (iii) मोलस्का (iv) इकाइनोडर्मेटा (v) हेमीकार्डेटा

**इकाई II**

1. प्रोटोजोआ- प्लाजमोडियम का प्रारूप अध्ययन
2. प्रोटोजोआ एवं रोग
3. पोरीफेरा- साइकॉन का प्रारूप अध्ययन
4. सीलेंट्रेटा- ओबेलिया का प्रारूप अध्ययन
5. प्रवाल एवं प्रवाल-भित्ती का निर्माण

**इकाई III**

1. हेल्मिन्थस- फेसिओला का प्रारूप अध्ययन
2. नेमेटोडा के रोग एवं रोगजनक लक्षण
3. ऐनेलिडा- केंचुए (फेरीटिमा) का प्रारूप अध्ययन
4. ऐनेलिडा में देह गुहा एवं मेटामेरिज्म
5. ट्रोकोफोर लार्वा की संरचना एवं महत्व

**इकाई IV**

1. आर्थ्रोपोडा - झींगे (पेलीमॉन) का प्रारूप अध्ययन
2. क्रस्टेशिया के लार्वा
3. कीटों में विभिन्न प्रकार के मुखांग
4. मानव रोगों के वाहक कीट
5. मोलस्का - पाइला का प्रारूप अध्ययन (ऐपल घोंघा)

**इकाई V**

1. इकाइनोडर्मेटा - तारा मछली की बाह्य संरचना एवं जल संवहन तंत्र
2. तारा मछली का जीवन चक्र
3. इकाइनोडर्मेटा के लार्वा
4. हेमीकार्डेटा - बैलेनोग्लासॅस का प्रारूप अध्ययन
5. बैलेनोग्लासॅस की बंधुता

Dr. Sushila Shrivastava

(Sagooli, Satna)

Dr. Shivani Shrivastava

Dr. Shivani Pratap Singh  
Prof. & Head, Dept. of Zoology  
Govt. Autonomous P.G. College, Satna (M.P.)

Dr. H.S. Rathore

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 केन्द्रीय अध्ययन मण्डल प्राणीशास्त्र द्वारा अनुशंसित

<b>Class / कक्षा</b>	:	<b>B.Sc I year (Session-2019-20)</b>
<b>Paper</b>	:	<b>II</b>
<b>Subject/ विषय</b>	:	<b>प्राणीशास्त्र</b>
<b>Title of Paper</b>	:	<b>कोशिका विज्ञान एवं भ्रौणिकी विकास</b>
<b>Max. Mark/ अधिकतम अंक</b>	:	<b>40</b>

**इकाई I**

1. कोशिका विज्ञान का इतिहास, कोशिका सिद्धांत
2. प्रोकैरियोटिक एवं यूकेरियोटिक कोशिका
3. प्लाज्मा झिल्ली की संरचना एवं कार्य
4. गोलजी बॉडी, एन्डोप्लाज्मिक रेटिकुलम, लाइसोसोम की संरचना एवं कार्य
5. माइटोकॉन्ड्रियाँ, राइबोसोम, सेंट्रिओल की संरचना एवं कार्य

**इकाई II**

1. केन्द्रक एवं केंद्रिका की संरचना एवं कार्य
2. प्रारूपिक गुणसूत्र की संरचना एवं कार्य
3. क्रोमेटिन एवं हेटरोक्रोमेटिन की आधारभूत अवधारणा
4. विशेष प्रकार के गुणसूत्र – लेम्पेंब्रुश एवं पॉलीटीन
5. कोशिका चक्र, समसूत्री एवं अर्ध सूत्री कोशिका विभाजन

**इकाई III**

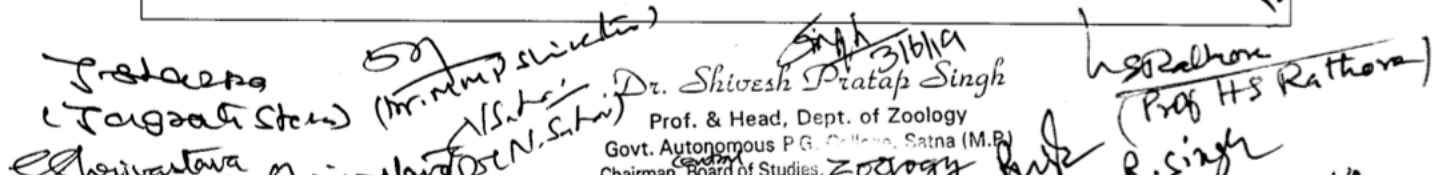
1. युग्मक जनन
2. निषेचन
3. अनिषेकजनन
4. पुनरुदभवन
5. स्टैम कोशिका – स्रोत, प्रकार एवं उपयोगिता

**इकाई IV : मेढक का विकास**

1. विदलन
2. ब्लास्टुलेशन
3. फेटमेष का निर्माण
4. गेस्टुलेशन एवं तीन जनन स्तरो का निर्माण
5. टैंडपोल लार्वा की संरचना

**इकाई V : चूजे का विकास**

1. विदलन
2. ब्लास्टुलेशन
3. फेटमेष का निर्माण
4. गेस्टुलेशन
5. प्रिमिटिव स्ट्रीक बनने तक चूजे के भ्रूण का विकास
6. चूजे में बाह्य भ्रूण झिल्लियाँ

  
 Dr. Shivesh Pratap Singh  
 Prof. & Head, Dept. of Zoology  
 Govt. Autonomous P.G. College, Satna (M.P.)  
 Chairman, Board of Studies, Zoology

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 केन्द्रीय अध्ययन मण्डल प्राणीशास्त्र द्वारा अनुशंसित

<b>Class / कक्षा</b>	:	<b>B.Sc. 1<sup>st</sup> year (Session-2019-20)</b>
<b>Paper</b>	:	<b>II<sup>ND</sup></b>
<b>Subject/ विषय</b>	:	<b>Zoology</b>
<b>Title of Paper</b>	:	<b>Cell Biology and Developmental Biology</b>
<b>Max. Mark/ अधिकतम अंक</b>	:	<b>40</b>

<p><b>Unit-I</b></p> <ol style="list-style-type: none"> <li>1. History of Cell Biology, Cell theory.</li> <li>2. Prokaryotic and Eukaryotic Cells.</li> <li>3. Structure and functions of Plasma membrane.</li> <li>4. Structure and functions of Golgi body, Endoplasmic reticulum, Lysosomes.</li> <li>5. Structure and functions of Mitochondria, Ribosome, Centriole.</li> </ol>
<p><b>Unit-II</b></p> <ol style="list-style-type: none"> <li>1. Structure and functions of Nucleus and Nucleolus.</li> <li>2. Structure and functions of typical Chromosome.</li> <li>3. Basic concept of Chromatin and Heterochromatin</li> <li>4. Structure and functions of Lampbrush and Polytene Chromosome.</li> <li>5. Cell cycle, Mitotic and Meiotic cell division.</li> </ol>
<p><b>Unit-III</b></p> <ol style="list-style-type: none"> <li>1. Gametogenesis</li> <li>2. Fertilization</li> <li>3. Parthenogenesis</li> <li>4. Regeneration.</li> <li>5. Stem cells sources, types and their uses.</li> </ol>
<p><b>Unit-IV</b></p> <p><b>Development of Frog:</b></p> <ol style="list-style-type: none"> <li>1. Cleavage.</li> <li>2. Blastulation.</li> <li>3. Fate map construction.</li> <li>4. Gastrulation and formation of three germinal layers.</li> <li>5. Structure of Tadpole Larva</li> </ol>
<p><b>Unit-V</b></p> <p><b>Development of Chick:</b></p> <ol style="list-style-type: none"> <li>1. Cleavage.</li> <li>2. Blastulation.</li> <li>3. Fate map construction</li> <li>4. Gastrulation</li> <li>5. Development of chick embryo upto formation of primitive streaks.</li> <li>6. Extra embryonic membranes in chicks</li> </ol>

*(Dr. Neelam Sahai)*

*(Prof. H. R. Rastogi)*

*36/19*  
 Dr. Shivesh Pratap Singh  
 Prof. & Head, Dept. of Zoology  
 Govt. Autonomous P.G. College, Satna (M.P.)  
 Chairman, Board of Studies, Zoology

*(Dr. R. Singh)*

*S. Shrivastava*  
 Dr. Sushila Shrivastava  
 03.06.2019  
*(Dr. R. Singh)*

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Recommended books for B.Sc. – I Year -Zoology

Books of MP Hindi Granth Academy

- Parker & Haswall : Text book of Invertebrate Zoology
- Kotpal, RL : Invertebrate
- Rastogi, VB : Developmental Biology
- Arora, MP : Embryology
- Verma, PS and Agrawal, VK : Chordate Embryology
- Karp : Cell and molecular Biology
- Sheelar & Bianchi : Cell and Molecular Biology
- Rastogi V.B. : Introduction to cytology
- De Robertis : Cell and Molecular Biology
- Powar, CB : Cell Biology
- Verma, PS and Agrawal, VK : Cell Biology, Genetics, Molecular Biology, Evolution

*NSaha*  
(Dr. Neera Saha)

*AM 3/6/14*  
Dr. Shivesh Pratap Singh  
Prof. & Head, Dept. of Zoology  
Govt. Autonomous P.G. College, Satna (M.P.)  
Chairman, Board of Studies, *Zoology*

*SShivastava*  
Dr. Sushila Shivastava  
03-6-19

*LRB*  
(Prof. H.S. Ratione)

*Rijh*  
(Dr. R. Singh)

*Dr. S. Steane*  
(to M.P.S. Institute)

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केन्द्रीय अध्ययन मण्डल प्राणीशास्त्र द्वारा अनुशंसित  
Class / कक्षा : B.Sc. I year (Session-2019-20)  
Subject/ विषय : Zoology Practical  
Max. Mark/ अधिकतम अंक : 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 Museum Specimens and slides relevant to Invertebrates Studied in theory.
2. Mounting
  - (a) Prawn statocyst
  - (b) Pila: Ctenidium /redula /osphradium
  - (c) Earthworm: Septal nephridia
  - (d) Mouth parts of insects.
3. Dissection/ demonstration
  - (a) Earthworm: Digestive System, Nervous System, Reproductive System
  - (b) Prawn: Nervous System, Appendages
  - (c) Pila: Nervous System
4. Exercise related to frog and Chick embryology.
5. Exercise/ spotting related to cell biology.
  - (a) Squash preparation of onion root tip
  - (b) Stages of mitotic and meiotic cell division
  - (c) Special types of Chromosomes

**Distribution of Marks**

1. Dissection	08
2. Spotting	16
3. Mounting	04
4. Exercise related to Embryology	04
5. Exercise related to Cell Biology	04
6. Viva -voce	05
7. Practical Record	05
8. Collection	
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Total	50
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(V.S. Sahi)  
(Dr. Neera Sahni)

(Prof. K.S. Rathore)

Dr. Shivesh Pratap Singh  
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Chairman, Board of Studies, Zoology

(Dr. R. Singh)  
(Dr. M.M.P. Shrivastava)

Dr. Shrivastava  
Dr. Sushila Shri  
03.6.19

(5)

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<b>Class / कक्षा</b>	:	<b>B.Sc. II year (Session- 2019-20)</b>
<b>Paper</b>	:	<b>I</b>
<b>Subject/ विषय</b>	:	<b>Zoology</b>
<b>Title of Paper</b>	:	<b>Vertebrates and Evolution</b>
<b>Max. Mark/ अधिकतम अंक</b>	:	<b>42<sup>1/2</sup></b>

<p><b>UNIT I</b></p> <ol style="list-style-type: none"> <li>1. Origin of Chordates, Classification of phylum Chordate upto orders according to Parker and Haswell (Latest edition).</li> <li>2. Urochordata- Type study of Herdmania</li> <li>3. Cephalochordata- Type study of Amphioxus, Affinities of Amphioxus</li> <li>4. Comparison between Petromyzon and Myxine.</li> </ol>
<p><b>UNIT II</b></p> <ol style="list-style-type: none"> <li>1. Comparative account of integuments</li> <li>2. Comparative account of limb bones and girdles of vertebrates (Amphibia, Reptiles, Birds and Mammals).</li> <li>3. Comparative account of digestive system (Amphibia, Reptiles, Birds and Mammals).</li> <li>4. Comparative account of respiratory system (Amphibia, Reptiles, Birds and Mammals).</li> </ol>
<p><b>UNIT III</b></p> <ol style="list-style-type: none"> <li>1. Comparative account of aortic arches and heart.</li> <li>2. Comparative account of brain.</li> <li>3. Comparative account of Urinogenital system.</li> <li>4. Placentation in mammals.</li> </ol>
<p><b>UNIT IV</b></p> <ol style="list-style-type: none"> <li>1. Origin of life- modern concepts only.</li> <li>2. Lamarckism, Darwinism.</li> <li>3. Modern synthetic theories: Variations, Mutation, Isolation &amp; Speciation</li> <li>4. Adaptation and Mimicry</li> <li>5. Micro, macro evolution and mega evolution.</li> </ol>
<p><b>UNIT V</b></p> <ol style="list-style-type: none"> <li>1. Fossils, methods of fossilization, determination of age of fossils.</li> <li>2. Study of extinct forms: Dinosaurs and Archaeopteryx.</li> <li>3. Zoogeographical distribution.</li> <li>4. Evolution of man.</li> <li>5. Geological time scale and Insular fauna.</li> </ol>

C.V. Saha  
 Dr. N. Jha  
 Dr. Shivesh Pratap Sino  
 Prof. & Head, Dept. of Zoology  
 Govt. Autonomous P.G. College, Satna  
 Chairman, Board of Studies, A.P.S. Univ  
 Dr. M.S. Chauhan  
 Dr. S. Hobha Shrivastava  
 Dr. Allex Yaghes  
 Dr. S. Hobha Shrivastava  
 28/11/17  
 28/11/17  
 28/11/17

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केन्द्रीय अध्ययन मण्डल प्राणीशास्त्र द्वारा अनुशंसित

Class / कक्षा	:	<b>B.Sc. II year (Session- 2019-20)</b>
Paper	:	<b>II</b>
Subject/ विषय	:	<b>Zoology</b>
Title of Paper	:	<b>Animal Physiology and Bio-Chemistry</b>
Max. Mark/ अधिकतम अंक	:	<b>42<sup>1/2</sup></b>

<p><b>Unit I: Nutrition and Metabolism</b></p> <ol style="list-style-type: none"> <li>1. Physiology of digestion in mammals</li> <li>2. Protein Metabolism: Deamination, Decarboxylation. Transamination of amino acids and Ornithine cycle.</li> <li>3. Carbohydrate metabolism- Glycogenesis, Glycogenolysis, Glycolysis, The Citric acid cycle, Gluconeogenesis.</li> <li>4. Lipid Metabolism-Beta oxidation of fatty acids.</li> </ol>
<p><b>Unit II: Respiration, Excretion and Immune System</b></p> <ol style="list-style-type: none"> <li>1. Mechanism and Physiology of respiration in mammals(transport of gases, chloride shift).</li> <li>2. Physiology of Excretion- urea and urine formation in mammals</li> <li>3. Innate and acquired immunity, immune cells and lymphoid system, immune response: cellular and humoral immunity</li> </ol>
<p><b>Unit III: Regulatory Mechanisms of Enzymes and role of Vitamins</b></p> <ol style="list-style-type: none"> <li>1. Thermoregulation.</li> <li>2. Definition and nomenclature of enzymes, classification of enzymes.</li> <li>3. Mechanism of enzyme action.</li> <li>4. Co-enzymes</li> <li>5. Vitamins</li> </ol>
<p><b>Unit IV: Neuromuscular Co- ordination</b></p> <ol style="list-style-type: none"> <li>1. Types of neurons and glial cells</li> <li>2. Physiology of nerve impulse conduction.</li> <li>3. Types and structure of Muscles</li> <li>4. Theory of muscle contraction and its biochemistry.</li> </ol>
<p><b>Unit V: Endocrine system</b></p> <ol style="list-style-type: none"> <li>1. Structure and functions of Pituitary gland.</li> <li>2. Structure and functions of Thyroid gland.</li> <li>3. Structure and functions of Adrenal gland.</li> <li>4. Structure and functions of Parathyroid, Thymus and Islets of Langerhan's.</li> <li>5. Physiology of Male and female Sex hormones.</li> </ol>

Dr. Shivesh Singh  
 Prof. & Head, Dept. of Zoology  
 Govt. Autonomous P.G. College, Satna (M.P.)  
 Chairman, Board of Studies, A.P.S. University, Rewa

Dr. Vinodini Nigam  
 Dr. Ramesh Singh  
 Dr. Shobha Shukla  
 Dr. Shobha Shukla

28/3/17



B.Sc. – II Year – Zoology

Books of MP Hindi Granth Academy

- Parker & Haswall : Text book of Vertebrate Zoology
- Kotpal, RL : Vertebrate
- Jordan, EL and Verma, PS : Chordate Zoology
- Rastogi, VB : Organic Evolution
- Singh and Chaturvedi : Organic Evolution
- Ernst W. Mayr : Evolution and the Diversity of life
- Colbert : Evolution
- Verma, PS and Agrawal, VK : Cell Biology, Genetics, Molecular Biology, Evolution
- Verma PS : Animal Physiology
- Nigam, HL : Animal Physiology
- Wood, DW : Principle of Animal Physiology
- Berry, AK : Animal Physiology and Biochemistry
- Prosser, CL : Comparative Animal Physiology
- Goyal and Shastri : Animal Physiology
- Shrivastava, HS : Biochemistry
- Lehninger : Biochemistry

Rathore  
28.6.17  
(Prof. S. Rathore)

Buys  
28.4.17  
(Dr. Ramshree Singh)

Vinodhini Nigam  
28.4.17  
(Dr. Vinodhini Nigam)

N. Sahni  
(Dr. N. Sahni)

Shrivastava  
28/4/17  
(Dr. C. S. Shrivastava)

Rajni Shrivastava  
28/4/17  
(Dr. Rajni Shrivastava)

Shobha Shrivastava  
28.4.17  
(Dr. Shobha Shrivastava)

C. Banerjee  
(Dr. C. Banerjee)

Dr. Shivesh Pratap Singh  
Prof. & Head, Dept. of Zoology  
Govt. Autonomous P.G. College, Satna (M.P.)  
Chairman, Board of Studies, A.P.S. University, Rewa

Utkarsh  
28/4/17  
(Dr. Utkarsh)

Anita Salunkhi  
28/04/17  
(Dr. Anita Salunkhi)

(8)

**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**

उच्च शिक्षा विभाग, म.प्र. शासन  
 स्नातक कक्षाओं के लिए त्रिवर्षीय पाठ्यक्रम  
 केन्द्रीय अध्ययन मण्डल प्राणीशास्त्र द्वारा अनुशंसित

**Class / कक्षा** : **B.Sc. II year (Session- 2019-20)**  
**Subject/ विषय** : **Zoology Practical**  
**Max. Mark/ अधिकतम अंक** : **50**

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, Dianosaurs, Asiatic chital, Archeopteryx, 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. of 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
4. Viva -voce	05
7. Record	05

Total	50
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 Chairman, Board of Studies, A.P.S. University, Rewa

*Dr. Shobha Shouche*  
 (Dr. Utkal Yadav)  
 (Dr. Vinodhini Nigam)

*Dr. N. S. Rai*  
 Dr. H. S. RATHORE

*Dr. S. Shrivastava*  
 (Dr. M. S. Chauhan)  
 Dr. Ramshy Singh

(9)

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Class / कक्षा	:	<b>B.Sc. III year (Session-2019-20)</b>
Paper	:	<b>I</b>
Subject/ विषय	:	<b>Zoology</b>
Title of Paper	:	<b>Genetics</b>
Max. Mark/ अधिकतम अंक	:	<b>42<sup>1/2</sup></b>

**UNIT I : 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
3. Autosomal and Sex Chromosome Syndromes in human
4. 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

*(Dr. N. T. Sahni)*  
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*Dr. Ramesh Singh*  
*Dr. Ramesh Singh*  
28.4.17  
*Dr. C. S. Shrivastava*  
*Dr. C. S. Shrivastava*

*Dr. Vinodini Nigam*  
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*Dr. Ullas Yadav*  
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Class / कक्षा	:	<b>B.sc III year (Session-2019-20)</b>
Paper	:	<b>II</b>
Subject/ विषय	:	<b>Zoology</b>
Title of Paper	:	<b>Ecology and Applied Zoology</b>
Max. Mark/ अधिकतम अंक	:	<b>42<sup>1/2</sup></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, Phosphorus
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: Lifecycle of lac insect and host plant of lac insects.
4. Common pests: Stored grains: *Sitophilus oryzae* and *Tribolium castaneum*, Vegetable pest: *Piers brassicae* and *Dacus cucurbitae*.
5. Biological control of insect pests.

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 (Dr. S. S. Singh)  
 (Dr. S. S. Singh)

Dr. Lites Yadav  
 28/4/17  
 (Dr. Ramshy Singh)  
 Abhauke

B.Sc. – III Year – Zoology

Books of MP Hindi Granth Academy

- Lewin : Genetics (Latest Edition Strickberger : Genetics)
- Gardner, MJ : Principles of Genetics
- Singh, BD : Genetics
- Singh, BD : Biotechnology
- Gupta, PK : Genetics
- Gupta, PK : Molecular Biology and Genetic Engineering
- Verma, PS and Agrawal, VK : Genetics
- Purohit : Biotechnology
- Kohli and Ansar : Economic Zoology
- Kohli : Ecology
- Odum, EP : Fundamental of Ecology
- Sharma PD : Environmental Biology and Toxicology
- Natrajan, SS : A Manual of Fresh Water Aquaculture
- Upadhaya : Economic Zoology

Pal Ajay : Cellular & Molecular Biology

Pragya Khanna → Cell & Molecular Biology

*H.S. Rathore*  
28.4.17  
(Prof. H.S. Rathore)

*Dr. Ramesh Singh*  
28.4.17  
(Dr. Ramesh Singh)

*N. Saha*  
(Dr. N. Saha)

*Dr. S. Shrivastava*  
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(Dr. S. Shrivastava)

*Dr. Rajiv Shrivastava*  
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(Dr. Anita Solanki)

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*Dr. Celka Yadav*  
28/4/17  
(Dr. Celka Yadav)

*Dr. Shobha Shourey*  
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*Dr. C. Behera*  
(Dr. C. Behera)

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Subject/ विषय : Zoology Practical  
Max. Mark/ अधिकतम अंक : 50

The practical's work will be as per 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 – Dissolve Oxygen, pH, Hardness, Turbidity.
3. Study of Ecosystems 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 cycle of silkworm, Honey Bee, Lac insect

**Distribution of Marks**

1. Spotting	12
2. Analysis of water	04
3. Exercise based on wildlife	05
4. Ecosystem	04
5. Study of Instruments	05
6. Problem on Genetics	05
7. Life Cycle	05
8. Viva -voce	05
9. Practical Record and collection	05

Total 50

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*Dr. Ulice Yadav*  
*Dr. Anshu Singh*  
28/4/17

*Prof. H.S. Rathore*  
(Prof. H.S. Rathore)

*Dr. C.S. Shivastava*

*Dr. M.S. Chouhan*  
*Dr. Vinodini Nigam*  
*Dr. Rajni Shevatar*  
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*Dr. Anshu Singh*  
28/4/17