

Dr. Babasaheb Ambedkar Marathwada University,
Aurangabad.



Syllabus

Of

B.Sc. (Zoology) Semester System

Second Year

(Third Semester and Fourth Semester)

Effective from June 2010-2011

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.

B.Sc. Zoology Pattern in Semester System

B. Sc. II Year Zoology

III	ZOL-301	Paper – IX	Vertebrate Zoology	50
	ZOL-302	Paper – X	Genetics- II	50
	ZOL-303	Paper – XI	Practical based upon Paper IX	50
	ZOL-304	Paper – XII	Practical based upon Paper X	50
IV	ZOL-401	Paper – XIII	Animal Physiology (Special Emphasis On animals)	50
	ZOL-402	Paper – XIV	Biochemistry & Endocrinology	50
	ZOL-403	Paper – XV	Practical based upon Paper XIII	50
	ZOL-404	Paper – XVI	Practical based upon Paper XIV	50

B.Sc. III Semester**Course Code - ZOL- 301****PAPER IX****VERTEBRATE ZOOLOGY**

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- | | |
|--|-----------|
| 1) Agnatha: - Out line classification and general characters of cyclostomata. | 02 |
| 2) Pisces: - Out line classification and general characters. | 08 |
| ➤ Scoliodon: - External characters, Digestive system, Respiratory system, Blood Vascular System and Nervous System. | |
| 3) Amphibia: - Out line classification and general characters. | 06 |
| ➤ Development of frog: - Fertilization Cleavage Blastula Gastulation and formation of germinal layers. | |
| ➤ Neotony | |
| ➤ Parental care in amphibia. | |
| 4) Reptilia: - Out line classification and general characters. | 06 |
| ➤ Calotes:-External features, Respiratory system and Blood vascular system. | |
| ➤ Poisonous and non- poisonous snakes. | |
| 5) Aves: - Out line classification and general characters. | 10 |
| ➤ <i>Columba livia</i> : - External features, Respiratory system, | |
| ➤ Embryology of chick.-Cleavage Blastula Gastulation and formation of germinal layers and extra embryonic membranes. | |
| ➤ Flight adaptation in birds. | |
| ➤ Migration in Birds. | |
| 6) Mammalia: - Out line classification and general characters. | 13 |
| ➤ <i>Ratus ratus</i> : - External features, Blood Vascular System, Urino-genital System and Adaptive radiation in mammals. | |
| ➤ Placentation in Mammals. | |
| Total Periods | 45 |

B.Sc. III Semester**Course Code - ZOL- 302****PAPER X****GENETICS – II**

1) Genes and its expression :-	08
1.1 Definition, concept and function of gene.	
1.2 Transcription of gene: - Initiation, elongation and termination.	
1.3 Genetic code:- Concept of codon, properties of genetic code	
1.4 Translation of gene: - Initiation, elongation and termination.	
2) Population Genetics :-	05
2.1- Gene Pool., Gene Frequency.	
2.2- Herdy-weinberg's Law.	
2.3- Application of Herdy-weinberg's Law.	
3) Human Genetics: -	12
3.1 Human chromosomes.	
3.2 Sex linked inheritance- X and Y Linked.	
3.3 Dizygotic and monozygotic twins.	
3.4 Inborn errors in metabolism: - PKU, Albinism.	
3.5 Genetic disorders: - Down's syndrome, Turners' syndrome Klinefelter's syndrome.	
3.6 Use of human genetics in medical science: - Disease diagnosis Gene therapy and DNA finger printing.	
4) Microbial Genetics: -	05
4.1 Transformation.	
4.2 Conjugation.	
4.3 Transduction.	
5) Genetic Engineering: -	10
5.1 Introduction: - Definition, Concept and significance.	
5.2 Restriction enzymes: - Concept and types.	
5.3 Cloning vectors: - Plasmid, cosmid, phage.	
5.4 Construction of r-DNA.	
5.5 Application of r-DNA technology.	
Total Periods	45

RECOMMENDED BOOKS

GENETICS-II

- Genetics. By Verma, PS and Agarwal, VK., S. Chand and Co., New Delhi
- Principles of Genetics. By. Sinnott, Dunn and Dobzhansky, Tata McGraw Hill, New Delhi India.
- Genetics. By Gupta, PK., Rastogi Publications, Meerut
- Genetics. By Sarin, C., Tata McGraw Hill, New Delhi.
- Principles of Genetics. By Gardner, EJ, Simmons, MJ and Snustad, DP. John Wiley and sons
- Genetics-Strikberger, Macmillan Pub.
- Principles of Genetics- Tamarin, 7th Ed. Tata McGraw Hill.
- Genetics-- Winchester. Oxford IBH Pub
- Introductions genetic analysis – Griffith et.al.

PAPER X: VERTEBRATE ZOOLOGY

- A life of Vertebrate – K.Z.Young, ELBS Oxford University Press.
- Modern Text Book of Zoology Vertebrate – R.L.Kotpal, Rastogi Publication Meerut.
- A Text Book of Chordate Zoology – R.C.Dalela –Jaiprakashnath Publication Meerut.
- Chordate Zoology – E.L.Jordan and P.S.Verma, S.Chand and Company New De
- Zoology- S. A. Miller and J. B. Harley, Tata McGraw Hill.
- Biological Science, 3rd Ed. D. J. Taylor, N. P. O. Green and G. W. Stout, Cambridge Univ. Press. Low priced Ed.
- Verma &Agarwal- chordate Embryology – S.Chand publication.

B.Sc. III Semester**Course Code - ZOL- 303
PAPER XI****VERTEBRATE ZOOLOGY (Practical)**

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|--|-----------|
| 1. Museum study of vertebrates. (At least 20).
(Identification, classification, sketches, General characters and biological importance) | 05 |
| 2. Dissection of Scoliodon / Labeo
➤ Afferent and efferent,
➤ Cranial Nerves.
➤ Brain | 03 |
| 3. Dissection of Rat/ Frog ;
➤ Urinogenital system,
➤ Arterial system,
➤ Venous System,
➤ Brain of Rat.
➤ | 05 |
| 4. Mounting of Placoid, Cycloid and Ctenoid scales of fish | 01 |
| 5. Study of Embryological development of chick according to hours of incubation. | 01 |
| 6. Visit to Zoological museum/Zoo Park is compulsory and Submission of report | |
| 7. Write a report on common birds/mammals in your locality, scientific names and economic importance. | |

Total Practical periods: - 15

B.Sc. III Semester**Course Code - ZOL- 304****PAPER XII****G E N E T I C S – II (Practical)**

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|--|-----------|
| 1. Preparation of paper model of DNA and study of DNA structure | 01 |
| 2. Study of protein synthesis with the help of charts/models. | 02 |
| 3. Estimation of DNA from animal tissue with the help of Diphenyl amine method. | 02 |
| 4. Study of preparation of Normal Karyotype of human. | 01 |
| 5. Karyotypic study of Down's syndrome, Turner's syndrome, Klinefelter's syndrome with the help of photograph. | 02 |
| 6. Detection of Barr body from epithelial cell. | 01 |
| 7. Problems on sex linked inheritance | 02 |
| 8. Problems based on Hardy – Weinberg's law | 02 |
| 9. Study of gene frequency and mutants of man ; | 02 |
| ➤ Attached and free ear lobe. | |
| ➤ Colour of eye. | |
| ➤ Rolling of tongue. | |
| ➤ Blood group frequency. | |

Total Practical periods: - 15

**Pattern of Question Paper
B.Sc. III Semester**

**Course Code - ZOL- 301
PAPER IX**

VERTEBRATE ZOOLOGY

Time: 01:30 hours

Max. Marks: 30

- N.B. 1) Attempt all questions.
2) All question carry equal marks.
3) Illustrate your answer with suitable labeled diagram.
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- | | | |
|-----|--|--|
| Q1. | Long answer question.
OR
Long answer question. | Based on chapter1, 2 & 3
OR
Based on chapter1, 2 & 3 |
| Q2 | Long answer question.
OR
Long answer question. | Based on chapter 4 & 5
OR
Based on chapter 4 & 5 |
| Q3 | Long answer question.
OR
Long answer question. | Based on chapter 6
OR
Based on chapter 6 |

Note: - wherever necessary sub-questions may be asked in a question

**Pattern of Question Paper
B.Sc. III Semester**

**Course Code - ZOL- 302
PAPER X**

G E N E T I C S - II

Time: 01:30 hours

Max. Marks: 30

- N.B. 1) Attempt all questions.
2) All question carry equal marks.
3) Illustrate your answer with suitable labeled diagram.
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- | | | |
|-----|--|--|
| Q1. | Long answer question.
OR
Long answer question. | Based on chapter1&2
OR
Based onchapter1&2 |
| Q2 | Long answer question.
OR
Long answer question. | Based on chapter 3
OR
Based on chapter3 |
| Q3 | Long answer question.
OR
Long answer question. | Based on chapter 4&5
OR
Based on chapter 4&5 |

Note: - wherever necessary sub-questions may be asked in a question

B.Sc. IV Semester**Course Code - ZOL- 401
PAPER XIII****ANIMAL PHYSIOLOGY (Special Emphasis on Mammals)**

1) Digestion :-	07
➤ Brief Introduction to digestive system.	
➤ Buccal digestion - salivary secretion and digestion.	
➤ Gastric digestion - gastric secretion and digestion.	
➤ Intestinal digestion - Pancreatic secretion, bile juices and digestion in Small intestine, Digestion and absorption in large intestine.	
2) Respiration :-	09
➤ Respiratory organs.	
➤ Breathing mechanism.	
➤ Respiratory pigments: - Properties and function of respiratory pigments.	
➤ External respiration.	
➤ Internal respiration.	
➤ Transport of gases.	
3) Circulation :-	05
➤ Working of mammalian heart.	
➤ Blood and its composition.	
➤ Mechanism of blood clotting.	
4) Excretion :-	05
➤ Structure of kidney.	
➤ Structure of uriniferous tubules.	
➤ Urine formation: - Ultra filtration selective, re-absorption and tubular secretion.	
➤ Counter current multiplier system.	
5) Nerve Physiology :-	06
➤ Structure of nerve cells and neuron.	
➤ Neurotransmitters.	
➤ Synapses: - Ultra structure and function.	
6) Muscles Physiology :-	05
➤ Ultra structure of smooth muscle, striated muscles, and cardiac muscles.	
➤ Muscle contraction.	
➤ Simple twitch and fatigue	
7) Reproduction :-	08
➤ Structure of gonads, Gametogenesis.	
➤ Role of sex hormones in Reproduction.	
➤ Reproductive cycles – oestrous and menstrual cycle	
Total Periods	45

B.Sc. IV Semester**Course Code - ZOL- 402
PAPER XIV****BIOCHEMISTRY AND ENDOCRINOLOGY****A-BIOCHEMISTRY**

- | | |
|--|-----------|
| 1. Enzymes :- | 05 |
| ➤ Definition, concept and nomenclature, | |
| ➤ Properties, classification, | |
| ➤ Mechanism of enzyme action, | |
| ➤ Factors affecting enzyme action (Temperature, pH, Substrates & Co-enzyme.) | |
| 2. Carbohydrates :- | 06 |
| ➤ Definition Classification monosaccharide, disaccharides, oligosaccharides and polysaccharides. | |
| ➤ Metabolism: - Glucogenesis, Gluconeogenesis, Glycolysis, TCA. & oxidative phosphorylation. | |
| 3. Proteins :- | 06 |
| ➤ Definition , classification -simple , conjugated and derived proteins, | |
| ➤ Structure of proteins: - Primary, secondary, tertiary and quaternary. | |
| ➤ Metabolism: - Deamination and transamination. | |
| 4. Lipids: - | 05 |
| ➤ Definition, classification, simple, compound and derived lipids. | |
| ➤ Metabolism: - β oxidation and cholesterol biosynthesis . | |
| 5. Vitamins: - Sources and deficiency | 02 |

B- ENDOCRINOLOGY

- | | |
|--|-----------|
| 6. Endocrine system of vertebrates: - | 04 |
| ➤ Introduction: - Definition of endocrine, Paracrine and Autocrine system. | |
| ➤ Significance of endocrine and neuro - endocrine system. | |
| 7. Pituitary gland: - Morphology & histological structure,
Hormones and their function. | 05 |
| 8. Thyroid gland: - Morphology & histological structure,
Hormones and their function. | 03 |
| 9. Adrenal gland: - Morphology & histological structure,
Hormones and their function. | 05 |
| 10. Pancreas: - Islets of Langerhans- Histological structure
Hormones and their function. | 02 |

Total Periods	45
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RECOMMENDED BOOKS

ANIMAL PHYSIOLOGY

- William S. Hoar- General and Comparative Physiology, prentice hall of India Ltd.
- Wood E.W. Principle of Animal physiology
- Nagbhusnum R., Sarojini R., Kodarkar M.S. –Animal Physiology
- Verma, Agarwal & Tyagi-animal physiology
- Moeve K.-Animal Physiology, Cambridge low prize edition.
- Dantzler, W.H. Comparative Physiology (Handbook of Physiology): Vol. 1, 2, (ed.) Oxford University Press, New York, USA
- R. Eckert. Animal Physiology: Mechanisms and Adaptation. W.H.
- Mohan Arora – animal physiology, Himalaya publication
- A.K. Berry. –animal physiology

BIOCHEMISTRY AND ENDOCRINOLOGY

- J.L. Jain –biochemistry S.Chand Publication, Meerut
- Lehninger- Biochemistry, Kalyani Publications
- Stryer-Biochemistry, W.H Freeman and Co., New York
- Granner and Rodwell - Harper's Illustrated Biochemistry, Murray, (27th Ed.), McGraw Hill, New York, USA
- Nelson and Cox - Principles of Biochemistry. Lehninger. 2nd Ed. CBS publishers.
- J H Wet - General Biochemistry Wiley Eastern Ltd.
- Rangnatha Rao K-Text Book of Biochemistry, Prentice-Hall of India
- C.B.Powar- Biochemistry – (Himalaya Pub.)
- Das.-Biochemistry
- E.J.W. Barrington, General and Comparative Endocrinology, Oxford, Clarendon Press.
- R.H. Williams, Textbook of Endocrinology, W.B. Saunders

B.Sc. IV Semester**Course Code - ZOL- 403****PAPER XV****ANIMAL PHYSIOLOGY (PRACTICAL)**

- | | |
|---|-----------|
| 1. To study the digestive enzymes from cockroach/Human Saliva. | 02 |
| 2. Total count of RBC /WBC from given blood sample. | 04 |
| 3. Preparation of Heamatin crystals from blood sample. | 01 |
| 4. Hb% from given blood sample. | 01 |
| 5. Effect of isotonic, hypotonic, and hypertonic solutions on blood cell (RBCs) | 01 |
| 6. Detection of nitrogenous west product from the extract of different animals | 01 |
| 7. Detection of nitrogenous west product in fish/frog water tank. | 01 |
| 8. Estimation of O ₂ consumed by fish in relation to temperature by
Wrinkle's method. | 02 |
| 9. Typographic reading of skeletal muscle properties , heart beating in
Toad / Rat. (Demo only) 01 | |
| 10. Histological study of following. | 01 |
| ➤ T.S. of Kidney | |
| ➤ T.S. of Testis | |
| ➤ T.S. of Ovaries | |
| ➤ T.S. of Pancreas | |
| ➤ T.S. of Intestine | |

Total practical periods 15

B.Sc. IV Semester**Course Code - ZOL- 404
PAPER XVI****BIOCHEMISTRY AND ENDOCRINOLOGY (PRACTICAL)**

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|--|-----------|
| 1. Preparation of solutions of given percentage, normality and molarity. | 02 |
| 2. Study of analytical instrument principle and applications. | 04 |
| ➤ pH meter, | |
| ➤ Colorimeter, | |
| ➤ Centrifuge | |
| ➤ Electrophoresis | |
| 3. Factors affecting enzymes activity temperature and pH. | 02 |
| 4. Detection of amino acid by paper chromatography. | 01 |
| 5. Qualitative test for organic compound. | 03 |
| ➤ Carbohydrate. | |
| ➤ Protein. | |
| ➤ Fats. | |
| 6. Quantitative estimation of protein from animal tissue using Lawry's method. | 02 |
| 7. Study of permanent histological slides of endocrine glands. | 02 |
| ➤ T.S. of Pituitary gland, | |
| ➤ T.S. of Thyroid gland, | |
| ➤ T.S. of Adrenal Gland, | |
| ➤ T.S. of Islets of langarhance. | |
| ➤ T.S. of Testis | |
| ➤ T.S. of Ovaries | |

Total practical periods: - 15

**Pattern of Question Paper
B.Sc. IV Semester**

**Course Code - ZOL- 401
PAPER XIII**

**ANIMAL PHYSIOLOGY
(Special Emphasis on Mammals)**

Time: 01:30 hours

Max. Marks: 30

- N.B. 1) Attempt all questions.
2) All question carry equal marks.
3) Illustrate your answer with suitable labeled diagram.
-

- | | | |
|-----|--|---|
| Q1. | Long answer question.
OR
Long answer question. | Based on chapter 1&2
OR
Based on chapter 1&2 |
| Q2 | Long answer question.
OR
Long answer question. | Based on chapter 3, 4 & 5
OR
Based on chapter3, 4 & 5 |
| Q3. | Long answer question.
OR
Long answer question. | Based on chapter 6 &7
OR
Based on chapter 6 &7 |

Note: - wherever necessary sub-questions may be asked in a question

**Pattern of Question Paper
B.Sc. IV Semester**

**Course Code - ZOL- 402
PAPER XIV**

BIOCHEMISTRY AND ENDOCRINOLOGY

Time: 01:30 hours

Max. Marks: 30

- N.B. 1) Attempt all questions.
2) All question carry equal marks.
3) Illustrate your answer with suitable labeled diagram.
-

- | | | |
|-----|--|--|
| Q1. | Long answer question.
OR
Long answer question. | Based on chapter 1 & 2
OR
Based on chapter 1 & 2 |
| Q2 | Long answer question.
OR
Long answer question. | Based on chapter 3, 4 & 5
OR
Based on chapter 3, 4 & 5 |
| Q3 | Long answer question.
OR
Long answer question. | Based on chapter 6to10
OR
Based on chapter 6 to10 |

Note: - wherever necessary sub-questions may be asked in a question

**SKELETON OF QUESTION PAPER
B. Sc. III&IV semester**

**Course Code - ZOL-303+403
PAPER XI +XV**

VERTIBRATE ZOOLOGY+ANIMAL PHYSIOLOGY (PRACTICAL)

Time: - 4:00 hrs

Total marks:-100

- Q.1. Dissect fish.....so as to expose it'ssystem **20**
OR
Dissect Frog / Ratso as to expose it'ssystem
- Q.2 Estimation of O₂ consumption in relation to temperature. **20**
OR
Detection of any two nitrogenous waste products from the given sample
OR
Total count of RBC/WBC from given blood sample
- Q.3 Mounting ofscale of fish. **10**
OR
Effect of hypotonic/ isotonic/ hypertonic solution on RBC
OR
Preparation of haematin crystals from given blood sample
- Q.4 Identification of given spot **30**
(Museum study -05. Chick embryo - 02 & histology -03)
- Q.5 Record books **10**
- Q.6 submission of slide (At least five) **05**
- Q.7 Vivo-voce. **05**