

डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद

परिपत्रक क्रमांक/एस.यू./विज्ञान/अभ्यासक्रम/७४/२०१४

या परिपत्रकाद्वारे सर्व संबंधितांना सुचित करण्यात येते की, विज्ञान विद्याशाखेने शिफारस केल्यानुसार बी. एस्सी. / एम. एस्सी. प्रथम व द्वितीय वर्षाच्या सुधारित अभ्यासक्रमास आणि बी. एस्सी. प्रथम वर्षाच्या अभ्यासक्रमात किरकोळ बदल करण्यास विद्यापरिषदेच्या वतीने मा. कुलगुरु यांनी, त्यांना प्राप्त असलेल्या विशेष अधिकार महाराष्ट्र विद्यापीठ अधिनियम-१९९४ कलम १४(७) अन्वये मान्यता दिलेली आहे. त्या अनुषंगाने सुधारीत तयार केलेल्या अभ्यासक्रमाची प्रत या परिपत्रकासोबत आपल्या पुढील कार्यवाहीसाठी पाठविण्यात येत आहे.

[1]	B.Sc. Physics	Semester-III & IV,
[2]	B.Sc. Chemistry	Semester-III & IV,
[3]	B.Sc. Botany	Semester-III & IV,
[4]	B.Sc. Zoology with minor changes	Semester-I & II,
[5]	B.Sc. Zoology	Semester-III & IV,
[6]	B.Sc. Fisheries	Semester-III & IV,
[7]	B.Sc. Electronics (Opt.)	Semester-III & IV,
[8]	B.A./B.Sc. Mathematics	Semester-III & IV,
[9]	B.Sc. Computer Science	Semester-I & II,
[10]	B.Sc. Information Technology	Semester-I & II,
[11]	B.C.A.	Semester-I & II,
[12]	B.Sc. Computer Science(Opt.)	Semester-I & II,
[13]	B.Sc. Information Technology(Opt.)	Semester-I & II,
[14]	B.Sc. Computer Application(Opt.)	Semester-I & II,
[15]	B.Sc. Computer Maintenance(Opt.)	Semester-I & II,
[16]	B.Sc. Biotechnology (Progressively)	Semester-I to VI,
[17]	B.Sc. Biotechnology (Opt.) (Progressively)	Semester-I to IV,
[18]	B.Sc. Sericulture Technology	Semester-I & II,
[19]	B.Sc. Networking Multimedia	Semester-III & IV,
[20]	B.Sc. Bioinformatics	Semester-I & II,
[21]	B.Sc. Hardware & Networking	Semester-I & II,
[22]	B.Sc. Animation	Semester-I & II,
[23]	B.Sc. Dairy Science & Technology	Semester-III & IV,
[24]	B.Sc. Biochemistry	Semester-III & IV,
[25]	B.Sc. Analytical Chemistry	Semester-III & IV,
[26]	B.Sc. Textile & Int. Decoration with minor changes	Semester-I & II,
[27]	B.Sc. Textile & Int. Decoration	Semester-III & IV,
[28]	B.Sc. Home Science with minor changes	Semester-I & II,
[29]	B.Sc. Home Science	Semester-III & IV,
[30]	B.Sc. Agro.Chem. & Fertilizers	Semester-III & IV,

S-29 Nov., 2013 AC after Circulars from Circular No.55 & onwards - 42 -  
 :: [2] ::

[31]	B.Sc. Geology	Semester-III & IV,
[32]	B.A. Statistics with minor changes	Semester-I & II,
[33]	B.A. Statistics	Semester-III & IV,
[34]	B.Sc. Statistics with minor changes	Semester-I & II,
[35]	B.Sc. Statistics	Semester-III & IV,
[36]	B.Sc. Industrial Chemistry	Semester-III & IV,
[37]	B.Sc. Horticultural	Semester-I & II,
[38]	B.Sc. Dry land Agriculture	Semester-I & II,
[39]	B.Sc. Microbiology	Semester-III & IV,
[40]	M.Sc. Computer Science	Semester-I to IV,
[41]	M.Sc. Information Technology	Semester-I to IV.

हा सुधारीत व नवीन तयार केलेल्या अभ्यासक्रमाचा आराखडा शैक्षणिक वर्ष २०१४-१५ करिता मर्यादित असेल व विद्यापरिषदेच्या अंतिम मान्यतेनंतर हे परिपत्रक नियमित ठेवण्याबाबत या कार्यालयाद्वारे नवीन परिपत्रक पारीत करण्यात येईल. तसेच सुधारीत व नवीन तयार केलेल्या अभ्यासक्रमाची प्रत विद्यापीठाच्या संकेतस्थळावर उपलब्ध आहे.

करिता, या परिपत्रकाची सर्व संबंधितांनी नोंद घ्यावी.

विद्यापीठ प्रांगण,  
 औरंगाबाद-४३१ ००४.  
 संदर्भ क्र.एस.यु./सा.शा./सबवि /२०१३-१४/  
 ६५९९-७०२  
 दिनांक :- २७-०५-२०१४.

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 संचालक,  
 महाविद्यालये व विद्यापीठ  
 विकास मंडळ.

या परिपत्रकाची एक प्रत :-

- १) मा. परिक्षा नियंत्रक, परिक्षा विभाग,
- २) मा. प्राचार्य, सर्व संलग्नीत महाविद्यालये,
- ३) संचालक, युनिक यांना विनंती करण्यात येते की, सदरील अभ्यासक्रम विद्यापीठाच्या संकेतस्थळावर उपलब्ध करुण देण्यात यावेत.
- ४) संचालक, ई-सुविधा केंद्र, विद्यापीठ परिसर,
- ५) जनसंपर्क अधिकारी, मुख्य प्रशासकीय इमारत,
- ६) कक्ष अधिकारी, पात्रता विभाग, मुख्य प्रशासकीय इमारत,
- ७) कक्ष अधिकारी, बी.ए. / बी.एससी./ बी.सी.एस./एम.एससी. विभाग, परीक्षा भवन,
- ८) अभिलेख विभाग, मुख्य प्रशासकीय इमारती मागे,  
 डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

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# **Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.**



**Revised Syllabus of  
B.Sc. Second Year  
Zoology [Optional]  
Third and Fourth Semester**

**Effective from 2014-2015**

**Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.**  
**B.Sc. Zoology Pattern in Semester System**

**B. Sc. II Year Zoology**

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

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

1. Agnatha:- Out line classification, general characters and affinities of Cyclostomata	<b>02</b>
2. Pisces : - Out line classification and general characters. <i>Scoliodon</i> : - External characters, Digestive system, Respiratory system, Blood Vascular System and Nervous System.	<b>08</b>
3. Amphibia: - Out line classification and general characters. Development of frog: - Fertilization Cleavage Blastula Gastulation and formation of germinal layers. Neotony in Amphibia Parental care in amphibia.	<b>06</b>
4. Reptilia: - Out line classification and general characters. <i>Calotes</i> :-External features, Respiratory system and Blood vascular system. Poisonous and non- poisonous snakes.	<b>06</b>
5. Aves: - Out line classification and general characters. <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.	<b>10</b>
6. Mammalia: - Out line classification and general characters. <i>Ratus ratus</i> : - External features, Blood Vascular System, Urino-genital System and Adaptive radiation in mammals. Placentation in Mammals.	<b>13</b>
<b>Total Periods: -</b>	<b>45</b>

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

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1. Genes and its expression :-	<b>08</b>
Definition, concept and function of gene.	
Transcription of gene: - Initiation, elongation and termination.	
Genetic code:- Concept of codon, properties of genetic code	
Translation of gene: - Initiation, elongation and termination.	
2. Population Genetics :-	<b>05</b>
Gene Pool., Gene Frequency.	
Herdy-weinberg's Law.	
Application of Herdy-weinberg's Law.	
3. Human Genetics: -	<b>12</b>
Human chromosomes.	
Sex linked inheritance- X and Y Linked.	
Dizygotic and monozygotic twins.	
Inborn errors in metabolism: - PKU, Albinism.	
Genetic disorders:- Down's syndrome, Turners' syndrome, Klinefelter's syndrome.	
Use of human genetics in medical science: - Disease diagnosis Gene therapy and DNA finger printing.	
4. Microbial Genetics: -	<b>05</b>
Transformation.	
Conjugation.	
Transduction.	
5. Genetic Engineering: -	<b>10</b>
Introduction: - Definition, Concept and significance.	
Restriction enzymes: - Concept and types.	
Cloning vectors: - Plasmid, cosmid, phase.	
Construction of r-DNA.	
Application of r-DNA technology.	
<b>Total Periods: -</b>	<b>45</b>

**RECOMMENDED BOOKS**  
**VERTEBRATE ZOOLOGY**

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- 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.
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**GENETICS-II**

- Genetics. By Verma, PS and Agarwal, VK., S. Chand and Co., New Delhi
- Principles of Genetics. By Sinnott Dunn & 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.

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

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1. Museum study of vertebrates. (At least 20).	<b>05</b>
2. Dissection of Scoliodon / Labeo Afferent and efferent, Cranial Nerves. Brain	<b>03</b>
3. Dissection of Rat/ Frog ; Urinogenital system, Arterial system, Venous System, Brain of Rat.	<b>05</b>
4. Mounting of Placoid, Cycloid and Ctenoid scales of fish	<b>01</b>
5. Study of Embryological development of chick according to hours of incubation.	<b>01</b>
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.	
<b>Total Practical periods: -</b>	<b>15</b>



**B.Sc. III Semester**  
**Course Code - ZOL- 304**  
**PAPER: X**  
**GENETICS – II (Practical)**

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1. Preparation of paper model of DNA and study of DNA structure	<b>01</b>
2. Study of protein synthesis with the help of charts/models.	<b>02</b>
3. Estimation of DNA from animal tissue with the help of Diphenyl amine method.	<b>02</b>
4. Study of preparation of Normal Karyotype of human.	<b>01</b>
5. Karyotypic study of Down's syndrome, Turner's syndrome, Klinefelter's syndrome with the help of photograph.	<b>02</b>
6. Detection of Barr body from epithelial cell.	<b>01</b>
7. Problems on sex linked inheritance.	<b>02</b>
8. Problems based on Hardy – Weinberg's law	<b>02</b>
9. Study of gene frequency and mutants of man ; Attached and free ear lobe. Colour of eye. Rolling of tongue. Blood group frequency.	<b>02</b>
<b>Total Practical periods:-</b>	<b>15</b>

**Pattern of Question Paper****B.Sc. III Semester****Course Code - ZOL- 301****PAPER: VII****VERTEBRATE ZOOLOGY****Time: 03:00 hours****Max. Marks: 50**

- N.B. 1) Attempt all questions.  
2) All question carry equal marks.  
3) Illustrate your answer with suitable labeled diagram.
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| Q.1. Long answer question.<br>OR<br>Long answer question.                                    | Based on chapter 1&2<br>OR<br>Based on chapter 1&2           |
| Q.2. Long answer question.<br>OR<br>Long answer question.                                    | Based on chapter 3&4<br>OR<br>Based on chapter 3&4           |
| Q.3. Long answer question.<br>OR<br>Long answer question.                                    | Based on chapter 5&6<br>OR<br>Based on chapter 5&6           |
| Q.4. Short Notes on:<br>a)<br>b)<br>OR<br>Short Notes on:<br>a)<br>b)                        | Based on all chapters<br><br><br>OR<br>Based on all chapters |
| Q.5. Multiple choice questions:<br>1)<br>2)<br>3)<br>4)<br>5)<br>6)<br>7)<br>8)<br>9)<br>10) | Based on all chapters  |

**Pattern of Question Paper****B.Sc. III Semester****Course Code - ZOL- 302****PAPER: VIII****GENETICS – II****Time: 03:00 hours****Max. Marks: 50**

- N.B. 1) Attempt all questions.  
2) All question carry equal marks.  
3) Illustrate your answer with suitable labeled diagram.
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| Q.1. Long answer question.<br>OR<br>Long answer question.                                    | Based on chapter 1&2<br>OR<br>Based on chapter 1&2           |
| Q.2. Long answer question.<br>OR<br>Long answer question.                                    | Based on chapter 3<br>OR<br>Based on chapter 3               |
| Q.3. Long answer question.<br>OR<br>Long answer question.                                    | Based on chapter 4&5<br>OR<br>Based on chapter 4&5           |
| Q.4. Short Notes on:<br>a)<br>b)<br>OR<br>Short Notes on:<br>a)<br>b)                        | Based on all chapters<br><br><br>OR<br>Based on all chapters |
| Q.5. Multiple choice questions:<br>1)<br>2)<br>3)<br>4)<br>5)<br>6)<br>7)<br>8)<br>9)<br>10) | Based on all chapters  |

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

1. Digestion :-	<b>07</b>
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 :-	<b>09</b>
Respiratory organs.	
Breathing mechanism.	
Respiratory pigments: - Properties and function of respiratory pigments.	
External respiration.	
Internal respiration.	
Transport of gases.	
3. Circulation :-	<b>05</b>
Working of mammalian heart.	
Blood and its composition.	
Mechanism of blood clotting.	
4. Excretion :-	<b>05</b>
Structure of kidney.	
Structure of uriniferous tubules.	
Urine formation: - Ultra filtration selective, re-absorption and tubular secretion.	
Counter current multiplier system.	
5. Nerve Physiology :-	<b>06</b>
Structure of nerve cells and neuron.	
Neurotransmitters.	
Synapses: - Ultra structure and function.	
6. Muscles Physiology :-	<b>05</b>
Ultra structure of smooth muscle, striated muscles, and cardiac muscles.	
Muscle contraction.	
Simple twitch and fatigue	
7. Reproduction :-	<b>08</b>
Structure of gonads, Gametogenesis.	
Role of sex hormones in Reproduction.	
Reproductive cycles – oestrous and menstrual cycle	
<b>Total Periods: -</b>	<b>45</b>

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

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

**B- ENDOCRINOLOGY**

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|--|-----------|
| 1. Endocrine system of vertebrates: -<br>Introduction: - Definition of endocrine, Paracrine and Autocrine system.<br>Significance of endocrine and neuro - endocrine system. | <b>04</b> |
| 2. Pituitary gland: - Morphology & histological structure, Hormones and their function.  | <b>05</b> |
| 3. Thyroid gland: - Morphology & histological structure, Hormones and their function.  | <b>03</b> |
| 4. Adrenal gland: - Morphology & histological structure, Hormones and their function.  | <b>05</b> |
| 5. Pancreas: - Islets of Langerhans- Histological structure<br>Hormones and their function.  | <b>02</b> |

**Total Periods: - 45**

**RECOMMENDED BOOKS**  
**ANIMAL PHYSIOLOGY**

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- William S.Hoar- General and Comparative Physiology, prentice hall of India ltd.
  - Wood E.W. Principle of Animal physiology
  - Nagbhushnum R., Sarojini R., Kodarkar M.S. –Animal Physiology
  - Verma ,Agarwal & Tyagi-animal physiology
  - Moeye 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
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**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: XIII**  
**ANIMAL PHYSIOLOGY (PRACTICAL)**

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1. To study the digestive enzymes from cockroach/Human Saliva.	<b>02</b>
2. Total count of RBC /WBC from given blood sample.	<b>04</b>
3. Preparation of Heamatin crystals from blood sample.	<b>01</b>
4. Hb% from given blood sample.	<b>01</b>
5. Effect of isotonic, hypotonic, and hypertonic solutions on blood cell (RBCs)	<b>01</b>
6. Detection of nitrogenous waste product from the extract of different animals	<b>01</b>
7. Detection of nitrogenous waste product in fish/frog water tank.	<b>01</b>
8. Estimation of O <sub>2</sub> consumed by fish in relation to temperature by Wrinkle's method.	<b>02</b>
9. Typographic reading of skeletal muscle properties , heart beating in Toad / Rat. (Demo only)	<b>01</b>
10. Histological study of following.	<b>01</b>
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: XIV**  
**BIOCHEMISTRY AND ENDOCRINOLOGY (PRACTICAL)**

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1. Preparation of solutions of given percentage, normality and molarity.	<b>02</b>
2. Study of analytical instrument principle and applications. pH meter, Colorimeter, Centrifuge Electrophoresis	<b>04</b>
3. Factors affecting enzymes activity temperature and pH.	<b>02</b>
4. Detection of amino acid by paper chromatography.	<b>01</b>
5. Qualitative test for organic compound. Carbohydrate. Protein. Fats.	<b>03</b>
6. Quantitative estimation of protein from animal tissue using Lawry's method.	<b>02</b>
7. Study of permanent histological slides of endocrine glands. 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	<b>02</b>
<b>Total practical periods: -</b>	<b>15</b>



**Pattern of Question Paper****B.Sc. IV Semester****Course Code - ZOL- 401****PAPER: XI****ANIMAL PHYSIOLOGY (Special Emphasis on Mammals)****Time: 03:00 hours****Max. Marks: 50**

- N.B. 1) Attempt all questions.  
2) All question carry equal marks.  
3) Illustrate your answer with suitable labeled diagram.
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|--|--|
| Q.1. Long answer question.<br>OR<br>Long answer question.                                    | Based on chapter 1 & 2<br>OR<br>Based on chapter 1 & 2       |
| Q.2. Long answer question.<br>OR<br>Long answer question.                                    | Based on chapter 3, 4 & 5<br>OR<br>Based on chapter 3, 4 & 5 |
| Q.3. Long answer question.<br>OR<br>Long answer question.                                    | Based on chapter 6 & 7<br>OR<br>Based on chapter 6 & 7       |
| Q.4. Short Notes on:<br>a)<br>b)<br>OR<br>Short Notes on:<br>a)<br>b)                        | Based on all chapters<br><br><br>OR<br>Based on all chapters |
| Q.5. Multiple choice questions:<br>1.<br>2.<br>3.<br>4.<br>5.<br>6.<br>7.<br>8.<br>9.<br>10. | Based on all chapters  |

**Pattern of Question Paper****B.Sc. IV Semester****Course Code - ZOL- 402****PAPER: XII****BIOCHEMISTRY AND ENDOCRINOLOGY****Time: 03:00 hours****Max. Marks: 50**

- N.B. 1) Attempt all questions.  
2) All question carry equal marks.  
3) Illustrate your answer with suitable labeled diagram.
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| Q.1. Long answer question.<br>OR<br>Long answer question.                          | Based on chapter Sec. A 1 & 2<br>OR<br>Based on chapter Sec. A 1 & 2       |
| Q.2. Long answer question.<br>OR<br>Long answer question.                          | Based on chapter Sec. A 3, 4 & 5<br>OR<br>Based on chapter Sec. A 3, 4 & 5 |
| Q.3. Long answer question.<br>OR<br>Long answer question.                          | Based on chapter Sec. B 1 to 5<br>OR<br>Based on chapter Sec. B 1 to 5     |
| Q.4. Short Notes on:<br>a)<br>b)<br>OR<br>Short Notes on:<br>a)<br>b)              | Based on all chapters<br><br><br>OR<br>Based on all chapters               |
| Q.5. Multiple choice questions:<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10 | Based on all chapters  |

**SKELETON OF QUESTION PAPER****B. Sc. III & IV Semester****Course Code - ZOL-303+403****PAPER: IX+XIII****VERTIBRATE ZOOLOGY+ANIMAL PHYSIOLOGY (PRACTICAL)****Time: - 4:00 hrs****Total marks:-100**

Q.1.	Dissect fish.....so as to expose it's .....system	<b>20</b>
	OR	
	Dissect Frog / Rat .....so as to expose it's .....system	
Q.2.	Estimation of O <sub>2</sub> consumption in relation to temperature.	<b>20</b>
	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 of .....scale of fish.	<b>10</b>
	OR	
	Effect of hypotonic/ isotonic/ hypertonic solution on RBC	
	OR	
	Preparation of haematin crystals from given blood sample	
Q.4.	Identification of given spot (Museum study -05. Chick embryo - 02 & histology -03)	<b>30</b>
Q.5.	Record books	<b>10</b>
Q.6.	Submission of slide (At least five)	<b>05</b>
Q.7.	Vivo-voce.	<b>05</b>

**SKELETON OF QUESTION PAPER****B.Sc. III & IV Semester****Course Code - ZOL-304+404****PAPER: X + XIV****GENETICS – II + BIOCHEMISTRY AND ENDOCRINOLOGY (PRACTICAL)****Time: - 4:00 hrs****Total marks:-100**

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|---|-----------|
| Q.1. Estimation of total DNA from..... Tissue<br>OR<br>Problems on sex linked inheritance/ Hardy –Weinberg's law.   | <b>20</b> |
| Q.2. Quantitative estimation of Protein from..... Tissue<br>OR<br>Detection of organic compound from given samples A&B .Report the test, observation and results.<br>OR<br>Preparation of DNA model.                                      | <b>20</b> |
| Q.3. Calculates the RF values of given amino acids.<br>(Using paper chromatography)<br>OR<br>Prepare the solutions of given percentage/normality/ molarity<br>(At least two types)<br>OR<br>Detection of Barr body from epithelial cells. | <b>15</b> |
| Q.4. Identify the given spots and comment.<br>(Syndroms-02. Endocrine glands-03)  | <b>30</b> |
| Q.5. Record book  | <b>10</b> |
| Q.6. Viva-voce  | <b>05</b> |