डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद

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

या परिपत्रकाद्वारे सर्व संबंधीतांना सुचित करण्यात येते की, विज्ञान विद्याशाखेने शिफारस केल्यानुसार बी. एस्सी. / एम. एस्सी. प्रथम व द्वित्तीय 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,

..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.

संचालक,
महाविद्यालये व विद्यापीठ
विकास मंडळ.

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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 संकेतस्थंळावर 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.एस्सी./ बी.सी.एस./एम.एस्सी. 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

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1. Agnatha:- Out line classification, general characters and affinities 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 in Amphibia
   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**
   Columba livia: - 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**
   Ratus ratus: - 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: VIII

GENETICS – II

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1. Genes and its expression :- **08**
   - 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 :- **05**
   - Gene Pool., Gene Frequency.
   - Herdy-weinberg's Law.
   - Application of Herdy-weinberg's Law.

3. Human Genetics: - **12**
   - 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: - **05**
   - Transformation.
   - Conjugation.
   - Transduction.

5. Genetic Engineering: - **10**
   - Introduction: - Definition, Concept and significance.
   - Restriction enzymes: - Concept and types.
   - Cloning vectors: - Plasmid, cosmid, phase.
   - Construction of r-DNA.
   - Application of r-DNA technology.

Total Periods: - 45

RECOMMENDED BOOKS
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.

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)

1.	Museum study of vertebrates. (At least 20).	**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: X

GENETICS – II (Practical)

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 ; Attached and free ear lobe. Colour of eye. Rolling of tongue. Blood group frequency.	**02**
	Total Practical periods:-	**15**

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.

Q.1.	Long answer question.	Based on chapter 1&2
	OR	OR
	Long answer question.	Based on chapter 1&2
Q.2.	Long answer question.	Based on chapter 3&4
	OR	OR
	Long answer question.	Based on chapter 3&4
Q.3.	Long answer question.	Based on chapter 5&6
	OR	OR
	Long answer question.	Based on chapter 5&6
Q.4.	Short Notes on:	Based on all chapters
	a)	
	b)	
	OR	OR
	Short Notes on:	Based on all chapters
	a)	
	b)	
Q.5.	Multiple choice questions:	Based on all chapters
	1)	
	2)	
	3)	
	4)	
	5)	
	6)	
	7)	
	8)	
	9)	
	10)	

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.

Q.1.	Long answer question.	Based on chapter 1&2
	OR	OR
	Long answer question.	Based on chapter 1&2
Q.2.	Long answer question.	Based on chapter 3
	OR	OR
	Long answer question.	Based on chapter 3
Q.3.	Long answer question.	Based on chapter 4&5
	OR	OR
	Long answer question.	Based on chapter 4&5
Q.4.	Short Notes on: a) b)	Based on all chapters
	OR	OR
	Short Notes on: a) b)	Based on all chapters
Q.5.	Multiple choice questions: 1) 2) 3) 4) 5) 6) 7) 8) 9) 10)	Based on all chapters

B.Sc. IV Semester

Course Code - ZOL- 401

PAPER: XI

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: XII

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 phosphoration.

3. Proteins :- **06**
   Definition , classification -simple , conjugated and derived proteins,
   Structure of proteins: - Primary, secondary, tertiary and quartery.
   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

1. Endocrine system of vertebrates: - **04**
   Introduction: - Definition of endocrine, Paracrine and Autocrine system.
   Significance of endocrine and neuro - endocrine system.

2. Pituitary gland: - Morphology & histological structure, Hormones and their function. **05**

3. Thyroid gland: - Morphology & histological structure, Hormones and their function. **03**

4. Adrenal gland: - Morphology & histological structure, Hormones and their function. **05**

5. Pancreas: - Islets of langarhance- Histological structure **02**
   Hormones and their function.

Total Periods: - 45

RECOMMENDED BOOKS
ANIMAL PHYSILOGY

- 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

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)

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. T.S. of Kidney T.S. of Testis T.S. of Ovaries T.S. of Pancreas T.S. of Intestine	**01**
	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. **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: 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.

Q.1.	Long answer question.	Based on chapter 1 & 2
	OR	OR
	Long answer question.	Based on chapter 1 & 2
Q.2.	Long answer question.	Based on chapter 3, 4 & 5
	OR	OR
	Long answer question.	Based on chapter 3, 4 & 5
Q.3.	Long answer question.	Based on chapter 6 & 7
	OR	OR
	Long answer question.	Based on chapter 6 & 7
Q.4.	Short Notes on: a) b)	Based on all chapters
	OR	OR
	Short Notes on: a) b)	Based on all chapters
Q.5.	Multiple choice questions: 1. 2. 3. 4. 5. 6. 7. 8. 9. 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.

Q.1.	Long answer question. OR Long answer question.	Based on chapter Sec. A 1 & 2 OR Based on chapter Sec. A 1 & 2
Q.2.	Long answer question. OR Long answer question.	Based on chapter Sec. A 3, 4 & 5 OR Based on chapter Sec. A 3, 4 & 5
Q.3.	Long answer question. OR Long answer question.	Based on chapter Sec. B 1 to 5 OR Based on chapter Sec. B 1 to 5
Q.4.	Short Notes on: a) b) OR Short Notes on: a) b)	Based on all chapters OR Based on all chapters
Q.5.	Multiple choice questions: 1 2 3 4 5 6 7 8 9 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 **20**
OR
Dissect Frog / Rat …….so as to expose it's …….system

Q.2. Estimation of O_2 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 of ……..scale 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
(Museum study -05. Chick embryo - 02 & histology -03) **30**

Q.5. Record books **10**

Q.6. Submission of slide (At least five) **05**

Q.7. Vivo-voce. **05**

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**

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