

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY



CIRCULAR NO.SU./B.Sc.CBC & GS/11/2022

It is hereby inform to all concerned that, on the recommendation of Faculty of Science & Technology Meeting dated 24.08.2022, **the Academic Council at its meeting held on 29 August 2022 has accepted the following Syllabi of B.Sc. Degree under the Choice Based Credit & Grading System along with Rules and Regulation** as appended herewith:-

1.	B.Sc.Computer Science (Optional)	Ist and IInd semester
2.	B.Sc.Computer Application (Optional)	Ist and IInd semester
3.	B.Sc.Computer Application (Degree)	Ist and IInd semester
4.	B.Sc.Computer Science (Degree)	Ist and IInd semester
5.	B.Sc.Horticulture (Optional)	Ist to VIth semester
6.	B.Sc.Botany (Optional)	Ist to VIth semester
7.	B.Sc. Agrochemical & fertilizer (Optional)	Ist to VIth semester
8.	B.Sc.Home Science (Optional)	Ist and IInd semester
9.	B.Sc.Automobile Technology (Degree)	Ist and IInd semester
10.	B.Sc.Workshop Technology (Degree)	Ist and IInd semester
11.	B.Sc.Refrigeration and Air Conditioning (Degree)	Ist and IInd semester
12.	B.Sc.Environmental Science (Optional)	Ist and IInd semester
13.	B.Sc.Biotechnology (Degree)	Ist and IInd semester
14.	B.Sc.Biotechnology (Optional)	Ist and IInd semester
15.	B.Sc.Dairy Sci.& Tech (Optional)	Ist and IInd semester
16.	B.Sc.Zoology (Optional)	Ist to VIth semester
17.	B.Sc.Polymer Chemistry (Optional)	Ist and IInd semester
18.	B.Sc.Fisheries Science (Optional)	Ist and IInd semester
19.	B.Sc.Instrumentation Practice (Optional)	Ist semester
20.	B.Sc.Biochemistry (Optional)	Ist and IInd semester
21.	B.Sc.Non Conventional & Conventional Energy (Degree)	Ist and IInd semester

This is effective from the Academic Year 2022-23 and onwards.

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
Ref.No. SU/B.Sc./2022/ 8428-35
Date:-29.08.2022.

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[Signature]
**Deputy Registrar,
Academic Section**

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Copy forwarded with compliments to :-

- 1] **The Principal, concerned affiliated College,**
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.
- 2] **The Director, University Network & Information Centre, UNIC, with a
request to upload this Circular on University Website.**

Copy to :-

- 1] The Director, Board of Examinations & Evaluation,
- 2] The Section Officer, [B.Sc.Unit] Examination Branch,
- 3] The Programmer [Computer Unit-1] Examinations,
- 4] The Programmer [Computer Unit-2] Examinations,
- 5] The In-charge, [E-Suvidha Kendra],
Rajarshi Shahu Maharaj Examination Branch,
- 6] The Public Relation Officer,
- 7] The Record Keeper,

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



**Syllabus for
B.Sc First Year (Semester I and II)
B.Sc Second Year (Semester III and IV)
UNDER CHOICE BASED CREDIT SYSTEM
Under
FACULTY OF SCIENCE AND TECHNOLOGY**

w.e.f Academic Year .2022-23

Yash
6/8/2022

[Signature]
8/08/22
Dean
Faculty of Science & Technology,
Dr. Babasaheb Ambedkar Marathwada
University, Aurangabad

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
Course Structure and Examination Scheme
B. Sc. First Year (Semester – I)

1 credit =15 Hours

Class / Semester	Code	Course Title	Credits	Period/week	Examination Scheme			
					Maximum Marks	UA	CA	Minimum Passing
B.Sc. F.Y Semester First	ZOL- 101	Animal Diversity -I Protozoa To Echinodermata	2	(3p/week)	50	40	10	20
	ZOL- 102	Cell Biology	2	(3p/week)	50	40	10	20
	ZOL- 103	Practical Paper based on Paper 101 & 102	2	(3p /week/ Batch)	50	50 Annual Exam.	-	20

B. Sc. First Year (Semester –II)

Class / Semester	Code	Course Title	Credits	Period/week	Examination Scheme			
					Maximum Marks	UA	CA	Minimum Passing
B.Sc. F.Y Semester Second	ZOL- 105	Animal Diversity-II (Protochordata to Mammals)	2	(3p/week)	50	40	10	20
	ZOL- 106	Genetics	2	(3p/week)	50	40	10	20
	ZOL- 107	Practical Paper based on Paper 105& 106	2	(3p /week/ Batch)	50	50 Annual Exams.	-	20

Theory = 45 periods for each theory paper
Practical: 3periods /week/batch

B. Sc. First Semester
Zoology Paper: I
ZOL-101: ANIMAL DIVERSITY- I
(PROTOZOA TO ECHINODERMATA)

Total Credit : 2

Contact Hours : 30 Clock hours

Marks : 50

Periods = 45

Learning Objective-To know the general characters and classification of non chordates and understand the diversity and complexity of life from Protista to Echinodermata.

Learning Outcome- On completion of the course the students will be able to understand the general organization, diversity and adaptation of Non Chordates. The Student will learn the importance of biodiversity conservation.

Unit I :

- **Protista: -** **6**

General characters and classification.

- A. Animal like Protist E.g. Amoeba, Noctiluca
- B. Plant like Protist E.g. Diatoms, Stentor
- C. Fungi like E.g. Water molds, Phytophthora infestans, Yellow slime mold
- D. Euglena like E.g. Euglena
- Locomotory organelles and locomotion in Euglena and Amoeba.

Reproduction in protozoa; Asexual and Sexual conjugation

- **Porifera :-** **04**

General characters and classification up to classes

Spicule and Gemules in Porifera

Canal system in Porifera.

Unit II:

- 3. **Cnidaria:-** **10**

- General characters and classification up to classes
- Polymorphism in Coelenterates.

- 4. **Platyhelminths :-**

- General characters and classification up to classes
- *Taenia solium*- Life history, pathogenicity, Parasitic adaptation and control measures

Unit III:

- 5. **Nemathelminthes :-** **06**

- General characters and classification up to classes
- *Ascaris lumbricoides*: - Life history, Pathogenicity & control measures.

- 6. **Annelida: -**

- General characters and classification up to classes
- Metamerism in Annelids.

Unit IV:

7. Arthropoda:- **8**

- General characters and classification up to classes
- Arthropods Eyes and Vision
- Metamerism in insects

Unit V :

8. Mollusca:- **06**

- General characters and classification up to classes
- Torsion in Gastropods

9. Echinodermata:-

- General characters and classification up to classes
- Water vascular system in Star fish (Asterias)

- **Periods to be used for tutorials/ assignments** **05**

Zoology Paper: II
ZOL-102: Cell Biology

Total Credit : 2

Contact Hours : 30 Clock hours

Marks : 50

Periods = 45

Learning Objective- To understand the structure and function of animal cell

Learning Outcome - The student will understand the architecture and functions of cell.

Unit I

1. Introduction to cell biology- **10**

- General structure of Prokaryotic cell
- General structure Eukaryotic cells
- Energy efficiency of small cell
- Cell Cycle
- Mitosis and Meiosis

Unit II

2. Cell environment- **08**

- Chemical bonds, Inorganic - water, salts and ions
- Organic compounds- Proteins, Carbohydrates, Lipids, Nucleic acids, Vitamins.

Unit III

3. Cell organelles- **12**

- Plasma Membrane: - Structure, function and Fluid mosaic model
- Mitochondria: - Structure, function and Electron Transport Chain
- Structure and function of Endoplasmic reticulum, Ribosomes, Golgi Bodies and Lysosomes, Microtubules, microfilaments and centrioles

Unit IV

4. Nucleus:-

05

- Structure and Function of Nucleus
- Structure of DNA and Types of RNA

Unit V

5. Cancer biology and Ageing:-

05

- Characteristics of cancer cell
- Types of Cancer:-Carcinomas, Sarcomas, Lymphomas, Leukemia etc.
- Introduction to cell ageing
- Effect of radiations on cells (UV radiations, photodynamic sensitization)

- **Periods to be used for tutorials/ assignments**

05

ZOL 103 -III PRACTICAL Based on ZOL-101 and ZOL-102

(PROTOZOA TO ECHINODERMATA & Cell Biology)

Marks : 50

Credit 1.5

1. **Study of animals belonging to** Protozoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes, Aschelminthes and Annelida with special reference to systematic position up to class level, habit, habitat, characteristic features and economic importance (one example of each class and Local examples are to be given more emphasis) with the help of Museum specimens, models, charts, Microslides, Photographs and Digital sources.

2. **Study of animals belonging to** - Onychophora, Arthropoda, Mollusca, Echinodermata with special reference to systematic position up to class level, habit, habitat, characteristic features and economic importance. (one example of each class and Local examples are to be given more emphasis) with the help of Museum specimens, Models, Charts, Microslides, Photographs and Digital sources.

3. Method of protozoan culture (Any one)

4. Identification of Protozoan's and Coelenterates in pond water sample

5. Temporary mounting of :-

- Gemules and Spicules of sycon
- Obelia colony
- Parapodium of Neries

6. Study of diversity of mouth parts in insect:- Mosquito, Housefly, Honey bee, Cockroach, Butterfly

7. Digestive and Nervous system of Earthworm (Museum specimen/Charts/digital sources)

8. Digestive system of Cockroach (Museum specimen/digital sources)

9. Study of Prokaryotic cells –Grams staining technique

10. Study of Eukaryotic cells using suitable staining technique (Buccal epithelial cells)
11. Study of cytoplasmic movements in paramecium
12. Localization of Mitochondria by Janus Green stain
13. Study of cancer cells through permanent slides
14. Study of cell organelles through electron micrographs/charts
15. Study of Mitosis using suitable material /Meiosis using permanent slides.

Note: Demonstration of animal dissections through Computer Aided Techniques as per U.G.C Guidelines.

Suggested Readings:

1. Jordan E.L., Verma P. S. (1987) Invertebrate Zoology. S. Chand and Company Pvt. Ltd. New Delhi.
2. Kotpal R.L. (2000) Invertebrates. Rastogi Publi. Meerut
3. EkambaranathaAyyar, M. Ananthakrishnan, T N. Outlines of Zoology, S. Vishwanathan, Madras
4. Prasad S.N. (Reprint 1992) Life of Invertebrates. VikasPublishing House Pvt. Ltd.
5. Dhama P.S., Dhama J.K. Invertebrate Zoology. S. Chand and Company Pvt. Ltd. New Delhi.
6. Parker A.J., Haswell W. A. A. (2002) Textbook of Zoology Vol. I . Mc millan
7. Ganguly B. B., Sinha A.K. and Adhikari S. (2000) Introduction to biology of Animals. New Central Book Agency, Calcutta
8. Barnes R.D. (2000) Invertebrate Zoology. Saunders College Publishing
- 9.Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition. John Wiley and Sons. Inc.
- 10.De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology. VIII Edition. Lippincott Williams and Wilkins, Philadelphia.
- 11.Cooper, G.M. and Hausman, R.E. (2009). The Cell: A Molecular Approach. V Edition.
- 12.S.V.Nikam and T.T.Shaikh Protozoology 2011, Oxford Publication house ,Jaipur
- 13.Kotpal, R.L. Modern Text Book of Zoology Invertebrates, Rastogi Publication, Meerut.
14. Parker &Hashwell, Textbook of Zoology Vol. I (Invertebrates) A.Z.T.B.S. Publishers &Distributors. New Delhi.
- 15.E.L. Jordan and P.S. Verma, Invertebrate Zoology, S. Chand & Co. Ltd. New Delhi
- 16.Cytology, Genetics and Evolution – P.K. Gupta (Rastogi Publications, Delhi)

17. Cytology and genetics – Dyansagar V. R. (Tata McGraw Hill Pub. 1992 Reprint)
 18. Manual of Practical Zoology – P. K. G. Nair and K. P. Achar (Himalaya Publication)

B. Sc. Second Semester
Zoology Paper: IV
ZOL-105: DIVERSITY OF CHORDATA-II
Protochordata to Mammals

Total Credit : 2

Contact Hours : 30 Clock hours

Marks : 50

Periods = 45

Learning Objective: To know the general characters and classification of Chordates and Understand the increasing complexity of organization of life from lower to higher chordates.
Learning Outcome: On completion of the course the student should be able to know the General organization of Chordates as a group and know the taxonomy and characteristic features of the various Chordate phyla.

Unit I

Protochordata

08

General features and Phylogeny of Protochordata

Agnatha

General features of Agnatha, classification and affinities of cyclostomata up to classes

Unit 2: Introduction to Chordates

08

General features and classification of phylum Chordates upto classes

Pisces

General features, Migration and Parental care in Fishes.

Amphibia

General features and classification up to order, Parental care in Amphibia,

Unit 3: Reptilia

08

General features and classification up to order; Identification of poisonous and non- poisonous snakes.

Snake venom, symptoms, effect, and first aid treatment of snakebite.

Unit 4: Aves

08

General features and classification up to order, volant adaptations in Birds; Migration in birds

Adaptation in feet of birds.

Unit 5 : Mammals

08

General features and classification up to order; Origin of Mammals (Prototheria, Metatheria and Eutheria), Adaptive radiation in mammals

- **Periods to be used for tutorials/ assignments**

05

B. Sc. Second Semester
Zoology Paper: V: ZOL-106: GENETICS

Total Credit : 2

Contact Hours : 30 Clock hours

Marks : 50

Periods = 45

Learning Objective: To study the hereditary biology and mechanism involved in hereditary diseases and disorders.

Learning Outcome - The student will understand genetics and heredity.

Unit 1: Mendelian Genetics and its extensions **08**
- Overview of Mendelian genetics; - Epistasis and Hypostasis, multiple gene and multiple alleles

- Sex linked, Sex limited and Sex influence inheritance, Linkage – definition, types and significance

Unit 2: Chromosome structure **08**
- Eukaryotic chromosomes; -Types of Eukaryotic chromosomes (based on centromere position), Eukaryotic & Prokaryotic organization, giant chromosomes.

Unit 3: Gene mutation **08**
-Natural and induced mutation;- Types of gene mutation (base pair substitution and frame shift)

-Types of chromosomal aberrations, spontaneous and induced mutations (chemical mutagen and radiations)

Unit 4: Sex determination and Inheritance of human traits **08**

- Chromosome theory in sex determination;- Genic balance theory of sex determination

-Triploid inter sexes & Gynandromorphs in Drosophila;-Sex linked inheritance: X linked and Y linked , Human karyotype; -Pedigree analysis; -Inheritance of human traits: Brown eyes, Polydactyl, Diabetes insipidus, Sickle cell anemia PKU

Unit 5: Human Genetics and Population Genetics :- **08**
Dizygotic Twins and Monozygotic Twins, Use of human genetics in medical science, Gene Therapy and DNA Fingerprinting Gene Pool., Gene Frequency, Hardy-Weinberg's Law.

• **Periods to be used for tutorials/ assignments** **05**

B. Sc. Second Semester
ZOL-107: Practical based on ZOL-105 and ZOL-106) Animal Diversity II and Genetics

Marks : 50

Credit : 1.5

1. **Protochordata:** Study of specimens: *Balanoglossus, Herdmania, Branchiostoma, Salpa, Doliolum, Oikopleura, Botryllus*
2. **Agnatha:** Study of specimens: *Petromyzon, Myxine*
3. **Fishes:** Study of specimens: *Scoliodon, Sphyrna, Pristis, Torpedo, Chimaera, Mystus, Heteropneustes, Labeo, Exocoetus, Echeneis, Anguilla, Hippocampus, Tetraodon/ Diodon, Anabas.*
4. **Amphibia:** Study of specimens: *Ichthyophis/Ureotyphlus, Necturus, Bufo, Hyla, Alytes, Salamandra*
5. **Reptilia:** Study of specimens: *Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Zamenis, Crocodylus.* Key for Identification of poisonous and non-poisonous snakes
6. **Aves:** Study of six common birds from different orders. Types of beaks and claws
7. **Mammalia:** *Sorex*, Bat (Insectivorous and Frugivorous), *Funambulus, Loris, Herpestes, Erinaceus.*
8. Visit to Zoological survey of India/ Museum/National Park and submit the project Report
9. Observation of common mutants of drosophila
10. Determination of human blood groups A, B, AB, and O, Rh factor.
11. Major and minor problems in genetics
12. Study of preparation of Normal Karyotype of human.
13. Karyotypic study of Down's syndrome, Turner's syndrome & Klinefelter Syndrome
14. Detection of Barr body from epithelial cell.
15. Problems on sex linked inheritance.
- 16.. **Study of gene frequency and mutants of man**
 - Attached and free ear lobe.
 - Colour of eye.
 - Rolling of tongue.
 - Blood group frequency.
17. Human pedigree analysis- various symbols used.
18. Study of permanent slide of sickle cell anemia

Reference Books:

1. Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press.
2. Pough H. Vertebrate life, VIII Edition, Pearson International.
3. Darlington P.J. The Geographical Distribution of Animals, R.E. Krieger Pub Co.
4. Strickberger s Evolution. IV Edition. Jones and Bartlett
5. A life of Vertebrate – K.Z.Young, ELBS Oxford University Press.
6. Modern Text Book of Zoology Vertebrate – R.L.Kotpal, Rastogi Publication Meerut.
7. A Text Book of Chordate Zoology – R.C.Dalela –Jaiprakashnath Publication Meerut.
8. Chordate Zoology – E.L.Jordan and P.S.Verma, S.Chand and Company New Delhi.
9. Kotpal R L (2009): Modern textbook of Zoology Vertebrates, Rastogi Publication .
10. Lal S.S. (1996): Textbook of Practical Zoology Vertebrates, Rastogi Publications

11. Manual of Practical Zoology – P. K. G. Nair and K. P. Achar (Himalaya Publication)

Reference books

1. Genetics – P.K. Gupta (Rastogi Pub. Meerut)
2. Genetics – Verma P.S. and Agarwal V.K. (S. Chand Pub. Delhi.)
3. Cytology, Genetics and Evolution – P.K. Gupta (Rastogi Pub. Delhi)
4. Elementary Genetics – Single tone
5. Genetics – Winchester (Oxford LBH Pub.)
6. Genetics and Evolution – A.P. Jha (Macmillon India)
7. Concepts of Genetics – W.S. Clug (Pearson Education ISBN)
8. Genetics – Strickberger (Prentice – Hall)
9. Principle of Genetics – R.H. Tamarin (Tata Mc Graw Hill Pub. India)
10. Concepts of Genetics – R. L. Kotpal (Rastogi Pub.)
11. Foundations of Genetics – Pai A.C. (Mc Graw Hill Pub.)
12. Manual of Practical Zoology – P. K. G. Nair and K. P. Achar (Himalaya Publication)

डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद

परिपत्रक क्रमांक/एस.यु./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 सुधारित 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

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[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.

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	02
2. Pisces : - Out line classification and general characters. <i>Scoliodon</i> : - External characters, Digestive system, Respiratory system, Blood Vascular System and Nervous System.	08
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.	06
4. Reptilia: - Out line classification and general characters. <i>Calotes</i> :-External features, Respiratory system and Blood vascular system. Poisonous and non- poisonous snakes.	06
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.	10
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.	13
Total Periods: -	45

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

1. Genes and its expression :- 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.	08
2. Population Genetics :- Gene Pool., Gene Frequency. Herdy-weinberg's Law. Application of Herdy-weinberg's Law.	05
3. Human Genetics: - 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.	12
4. Microbial Genetics: - Transformation. Conjugation. Transduction.	05
5. Genetic Engineering: - Introduction: - Definition, Concept and significance. Restriction enzymes: - Concept and types. Cloning vectors: - Plasmid, cosmid, phase. Construction of r-DNA. Application of r-DNA technology.	10
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.
OR
Long answer question. | Based on chapter 1&2
OR
Based on chapter 1&2 |
| Q.2. Long answer question.
OR
Long answer question. | Based on chapter 3&4
OR
Based on chapter 3&4 |
| Q.3. Long answer question.
OR
Long answer question. | Based on chapter 5&6
OR
Based on chapter 5&6 |
| 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 |

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.
OR
Long answer question. | Based on chapter 1&2
OR
Based on chapter 1&2 |
| Q.2. Long answer question.
OR
Long answer question. | Based on chapter 3
OR
Based on chapter 3 |
| Q.3. Long answer question.
OR
Long answer question. | Based on chapter 4&5
OR
Based on chapter 4&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 |

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

B- ENDOCRINOLOGY

- | | |
|--|-----------|
| 1. Endocrine system of vertebrates: -
Introduction: - Definition of endocrine, Paracrine and Autocrine system.
Significance of endocrine and neuro - endocrine system. | 04 |
| 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 Langerhans- Histological structure
Hormones and their function. | 02 |

Total Periods: - 45

RECOMMENDED BOOKS
ANIMAL PHYSIOLOGY

- 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 waste product from the extract of different animals	01
7. Detection of nitrogenous waste 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: XIV****BIOCHEMISTRY AND ENDOCRINOLOGY (PRACTICAL)**

1. Preparation of solutions of given percentage, normality and molarity.	02
2. Study of analytical instrument principle and applications. pH meter, Colorimeter, Centrifuge Electrophoresis	04
3. Factors affecting enzymes activity temperature and pH.	02
4. Detection of amino acid by paper chromatography.	01
5. Qualitative test for organic compound. Carbohydrate. Protein. Fats.	03
6. Quantitative estimation of protein from animal tissue using Lawry's method.	02
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	02

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.
OR
Long answer question. | Based on chapter 1 & 2
OR
Based on chapter 1 & 2 |
| Q.2. Long answer question.
OR
Long answer question. | Based on chapter 3, 4 & 5
OR
Based on chapter 3, 4 & 5 |
| Q.3. Long answer question.
OR
Long answer question. | Based on chapter 6 & 7
OR
Based on chapter 6 & 7 |
| 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 |

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'ssystem	20
	OR	
	Dissect Frog / Ratso as to expose it'ssystem	
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 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	
	(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 least 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 |

S-30th May, 2015 AC after Circulars from Circular No.1 & onwards - 6 -

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY**CIRCULAR NO.ACAD/SU/Sci./B.Sc. & M.Sc. Syll./5/2015**

It is hereby notified for information to all the concerned that, on the recommendation of the Faculty of Science the Academic Council at its meeting held on 30-05-2015 has accepted the **revised semester-wise syllabi as mentioned against their names in the Faculty of Science as under :-**

Sr. No.	Name of the Subject	Semester
[1]	B.Sc. Computer Science Degree Course	III & IV
[2]	B.Sc. Information Technology Degree Course	III & IV
[3]	B.C.A. Science Degree Course	III & IV
[4]	B.Sc. Animation Degree Course	III & IV
[5]	B.Sc. Bioinformatics Degree Course	III & IV
[6]	B.Sc. Computer Science [Optional]	III & IV
[7]	B.Sc. Information Technology [Optional]	III & IV
[8]	B.Sc. Computer Applications [Optional]	III & IV
[9]	B.Sc. Computer Maintenance [Optional]	III & IV
[10]	B.Sc. Environmental Science [Optional]	V & VI
[11]	B.Sc. Bio-Chemistry [Optional]	V & VI
[12]	B.Sc. Forensic Science Degree Course	V & VI
[13]	B.Sc. Industrial Chemistry [Optional]	V & VI
[14]	B.Sc. Electronics [Optional]	V & VI
[15]	B.Sc. Zoology [Optional]	V & VI
[16]	B.Sc. Microbiology [Optional]	V & VI
[17]	B.Sc. Instrumentation Practice [Optional]	V & VI
[18]	B.Sc. Statistics [Optional]	V & VI
[19]	B.A. Statistics [Optional]	V & VI
[20]	B.A. / B.Sc. Mathematics [Optional]	V & VI
[21]	B.Sc. Home Science Degree Course	V & VI
[22]	B.Sc. Textile Interior Decoration Degree Course	V & VI
[23]	B.Sc. Fishery Science [Optional]	V & VI
[24]	B.Sc. Dairy Science & Technology [Optional]	V & VI
[25]	B.Sc. Botany [Optional]	V & VI
[26]	B.Sc. Physics [Optional]	V & VI
[27]	M.Sc. Computer Science	III & IV
[28]	M.Sc. I.T.	III & IV

This is effective from the Academic Year 2015-16 & onwards as appended herewith.

All concerned are requested to note the contents of the circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO.ACAD/SU/SCI./
2015/3761-4160
Date:- 16-06-2015.

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Director,
Board of College and
University Development.

S-30th May, 2015 AC after Circulars from Circular No.1 & onwards

- 7 -

:: 2 ::

Copy forwarded with compliments to:-

- 1] The Principals, affiliated concerned colleges,
Dr. Babasaheb Ambedkar Marathwada University

Copy to :-

- 1] The Controller of Examinations,
- 2] The Director, [E-Suvidha Kendra], in-front of Registrar's Quarter,
Dr. Babasaheb Ambedkar Marathwada University,
- 3] The Superintendent, [B.Sc. Unit],
- 4] The Superintendent, [M.Sc. Unit],
- 5] The Programmer [Computer Unit-1] Examinations,
- 6] The Programmer [Computer Unit-2] Examinations,
- 7] The Record Keeper.

==*-

S*/-160615/-

Dr. Babasaheb Ambedkar Marathwada
University, Aurangabad.



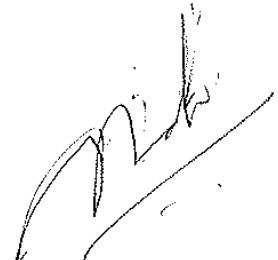
पुस्तक प्रकाशक
डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ

B.Sc. (Zoology) Semester System

Third Year (Optional)
(Fifth Semester and Sixth Semester 2015-2016)

put before
A.C.
7/3/15




Dr. S. S. Shinde

B.S.D.S. Chairman
Zoology

B. Sc. III Year Zoology

V	ZOL-501	Paper -XV	Ecology		50
	ZOL-502	Pape XVI (Elective)	A	Fishery sciences -I	50
			B	Animal culture -I	
			C	Entomology-I	
			D	Parasitic protozoa & helminthes-I	
			E	Computer Application & Laboratory Technology-I	
			F	Biotechnology-I	
			G	Dairy sciences -I	
ZOL-503	Paper XVII	Practical based upon Paper XV		50	
ZOL-504	Paper XVIII	Practical based upon Paper XVI		50	
VI	ZOL-601	Paper XIX	Evolution		
	ZOL-602	Paper XX	A	Fishery sciences -II	50
			B	Animal culture -II	
			C	Entomology-II	
			D	Parasitic protozoa & helminthes-II	
			E	Computer Application & Laboratory Technology-II	
			F	Biotechnology-II	
			G	Dairy sciences -II	
	ZOL-603	Paper XXI	Practical based upon Paper XIX		50
ZOL-604	Paper XXII	Practical based upon Paper XX		50	

B.Sc. V Semester
Course Code - ZOL- 501
PAPER: XV
ECOLOGY

- | | |
|---|-----------|
| 1. Introduction :- | 02 |
| ➤ Definition, basic concept, terminology used in ecology. | |
| 2. Abiotic environmental factors. | 08 |
| ➤ Temperature; Concept, temperature fluctuation in different environment. Range of temperature tolerance, effect of temperature on animals, Thermal adaptation. | |
| ➤ Light-Concept, Light variation in different environment, effect of light on animals. | |
| ➤ Adaptation to salinity and moisture | |
| 3. Biotic environmental factors :- | 08 |
| ➤ Competition: - Definition, types, intraspecific and interspecific composition. | |
| ➤ Predation: - Definition, characteristics of predation. | |
| ➤ Commensalisms: - Definition and types with examples. | |
| ➤ Mutualism: - Definition and example. | |
| ➤ Parasitism: - Definition and types with examples. | |
| 4. Population :- | 06 |
| ➤ Definition and basic concepts | |
| ➤ Characteristics of population; Density, Natality, Mortality, Dispersion and Age distribution. | |
| ➤ Population growth. | |
| ➤ Population regulation. | |
| 5. Community :- | 06 |
| ➤ Definition, basic concept and types. | |
| ➤ Structure of community; producer, consumers and decomposers. | |
| ➤ Characters; ecological niche, diversity, abundance, dominance, ecotone, edge effect. | |
| ➤ Community succession; example of succession and climax | |
| 6. Ecosystem :- | 15 |
| ➤ Definition, concept and types. | |
| ➤ Components of ecosystem, | |
| ➤ Dynamics of ecosystem: - primary production, secondary production, food chain, food web, trophic level, energy of flow, ecological pyramids. | |
| ➤ Brief introduction to major ecosystems: - Marine ecosystem, Pond ecosystem, Forest ecosystem and Desert ecosystem. | |

Total Periods 45



B.Sc. V Semester
Course Code - ZOL- 502
PAPER: XVI - A
FISHERY SCIENCE – I
(Elective Paper)

CAPTURE FISHERIES IN INDIA

1.	Introduction Definition and history General characters and classification Concept of blue revolution Importance of fishes.	05
2.	Freshwater fisheries. Status of freshwater fisheries, past, present and future Freshwater capture fisheries, cat fishes, rohu. Effect of aquatic pollution on fisheries.	10
3.	Revering and reservoir fisheries. Major river systems of India Important fisheries of Indian rivers system Major reservoirs of Maharashtra Reservoir fisheries and its management. Exploitation of reservoir fisheries	10
4.	Brackish water fisheries Principle fisheries of brackish water, milkfish, mullet, tilapia. Fisheries of the chilka, pulicat and Kolleru Lake	08
5.	Marine water fisheries. Oil-sardine Mackeal Ribbon fish fisheries. Bombay-duck Pomfret-fishery	08
6.	Application of remote sensing technique in pelagic fisheries.	04
	Total periods	45

B.Sc. V Semester

Course Code - ZOL- 502

PAPER: XVI – B

**ANIMAL CULTURE - I
(Elective Paper)**

APICULTURE

1.	Introduction and history	02
2.	Status, problems and prospects of Bee-keeping practices	02
3.	Systematic position and distribution of different honey bees.	06
	a) Wild species	
	b) Domesticated species	
	c) Brief account of honey production	
4.	Organization in colony and polymorphism in Wild species	06
	Caste differentiation	
	Division of work	
5.	Life cycle of honey bees	06
	Morphology of queen, worker and drone	
6.	Behavior of domesticated bees	08
	a) Nesting behavior	
	b) Swarming and colony production	
	c) Communication	
	d) Defense, foraging	
	e) Mating	
	f) Comb construction	
	g) Humidity and temperature control	
7.	Food plants and plant –bee relations.	04
	a) Pollination by honey bees.	
8.	Disease, pests, parasites and predators of bees and their control.	08
	a) Protozoan diseases-Nosem	
	Bacterial disease- American and European foul brood	
	Viral disease- sac brood	
	Fungal disease- chalk brood and stone brood	
	b) External mites and dipterans, internal mites	
	c) Bats –was math	
	d) predators- wasps, brinks, rats, lizard, mantis, bears etc.	
	e) Poisoning and pestisidal hazards in bees	
9	bee products and their uses	03
	Total periods	45



B.Sc. V Semester

Course Code - ZOL- 502

PAPER: XVI - C

**ENTAMOLOGY-I
(Elective Paper)**

ECONOMIC ENTAMOLOGY

I	Introduction to Economic entamology.	03
II	Methods of collection and preservation of insect.	05
III	Type study of grasshopper- systematic position, external morphology, digestive, nervous, reproductive system including development.	08
IV	Insect –orders (general characters)	12
	Thysanura	
	Collembella	
	Lepidoptera	
	Diptera	
	Coeloptera	
	Hymenoptera	
V	House hold and Human insect pest:-	06
	Bed bugs, Mosquito, Rat Flea, and House fly, Cockroach, Pediculus.	
VI	Metamorphosis in insect, types of metamorphosis with example.	05
VII	Insect Culture (gross study)	06
	Apiculture, Sericulture and lac culture	
	Total periods	45

B.Sc. V Semester

Course Code - ZOL- 502

PAPER: XVI – D

**PARASITIC PROTOZOA AND HELMINTHES - I
(Elective Paper)**

A- PARASITIC PROTOZOA

- | | |
|---|-----------|
| 1. Introduction to parasitology :- Definition-Parasite &host, Parasitism,
Types of parasites, host-parasite relationship | 05 |
| 2. Classification of protozoan parasites. | 02 |
| 3. Structure, life cycle, Pathogenecity and control measure of the following; | |
| ➤ <i>Entamoeba coli</i> | 03 |
| ➤ <i>Entamoeba gingivalis</i> | 03 |
| ➤ <i>Giardia intestinalis</i> | 03 |
| ➤ <i>Trichomonas vaginalis</i> | 04 |
| ➤ <i>Trypanosoma gambiense</i> | 04 |
| ➤ <i>Balantidium coli</i> | 03 |
| ➤ <i>Plasmodium vivax</i> | 04 |
| ➤ <i>Plasmodium falciparum</i> | 04 |
| ➤ <i>Plasmodium ovale</i> | 04 |
| ➤ <i>Plasmodium malariae</i> | 03 |
| ➤ <i>Eimeria tenella</i> | 03 |

Total Periods 45



B.Sc. V Semester

Course Code - ZOL- 502

PAPER: XVI – E

**COMPUTER APPLICATION AND MEDICAL LABORATORY TECHNOLOGY- I
(Elective Paper)**

A- COMPUTER APPLICATION

1. History of computer and their application to biology.	03
2. Operating systems DOS, WINDOWS: Windows XP, Windows 7, and UNIX	07
3. System Units: Mother board, Microprocessor and memory.	05
4. Storage Devices, Input/ output devices.	04
5. Microsoft office (2007): MS-word, MS-Power point, MS- Excel, MS- Publisher.	05
6. Internet: Basics, Internet services, WWW services, E-mail services, Search engines.	05
7. Demonstration of web utilities in biology.	05
8. The introduction to programming.	01
9. Programming using 'C'.	02
10. 'C' Data types.	03
11. Simple programs using C.	05

Total Periods 45

B.Sc. V Semester

Course Code - ZOL- 502

PAPER: XVI – F

**BIOTECHNOLOGY – I
(Elective Paper)**

1. Introduction to biotechnology	03
Definition and concept	
Old and new biotechnology	
Scope and importance, Biotechnology in India.	
2. Genetic engineering	04
Concept and definition	
Steps involved in gene cloning	
Application	
3. Isolation & amplification of desired gene	04
Isolation of DNA from cell	
Genomic library, cDNA library	
In vitro synthesis of gene	
Polymerase chain reaction	
4. Enzymes in gene cloning	04
Restriction enzymes (Nomenclature, type)	
DNA Ligase, taq polymerase, alkaline phosphates	
Polymerase etc	
5. Cloning vectors	04
Plasmid, bacteriophage, cosmid	
YAC, BAC, shuttle vector, Agro bacterium etc	
6. Gene transfer methods	05
Transformation, conjugation, Electrophoration, transfection	
Liposome mediated gene transfer, Gene gun, microinjection etc	
7. Screening of cloned gene	05
Direct selection, Insertional inactivation method	
Immunological assay, Autoradiography	
Colony and plaque blotting	
8. Problems and solutions for gene cloning	02
Total periods	45



B.Sc. V Semester

Course Code - ZOL- 502

PAPER: XVI - G

**DAIRY TECHNOLOGY – I
(Elective Paper)**

1. Milk:-Definition, Composition, Factors affecting composition of milk	05
➤ Food and Nutritive value of milk	
➤ Physico-chemical properties of milk.	
2. Microbiology of milk:-Introduction	05
➤ Growth and Destruction of microorganisms	
➤ Classification of microorganism.	
3. Milk and public health: Introduction	03
Safe guarding of milk supply	
➤ Clean milk production.	
4. Buying and collection of milk :-	04
➤ Introduction , Method of buying, Method of collection	
➤ Cooling of milk	
➤ Transportation of milk.	
5. Manufacture, Packaging and storage of Pasteurized milk :-	09
➤ Introduction., Milk reception operation, Standardization	
➤ Pasteurization, Homogeuration.	
➤ Packing and storage of milk.	
6. Judging and grading of milk:-Introduction	06
➤ Importance and procedures.	
7. Indian dairy products :-	04
➤ Introduction	
➤ Importance and Classification	
8. Khoa :-	
➤ Introduction, definition classification and Composition.	
➤ Food and Nutritive Value.	
➤ Methods of production and defects of khoa.	
9. Channa :-	04
➤ Introduction, definition and Composition.	
➤ Channa Based sweets, Food and Nutritive Value.	
➤ Methods of production.	
10. Dahi :-	04
➤ Introduction, definition and Composition.	
➤ Channa Based sweets, Food and Nutritive Value.	
➤ Methods of production.	
Total Periods	45

B.Sc. V Semester

Course Code - ZOL- 502

PAPER: XVI - H

**POULTRY SCIENCE- I
(Elective Paper)**

1. Introduction to poultry science.	02
2. Classification of poultry breeds;	08
➤ American	
➤ Asiatic	
➤ English	
➤ Mediterranean.	
3. Digestive, circulatory, Respiratory and Male and female reproductive system of poultry.	15
4. Formation, structure and nutritive value of eggs.	06
5. Breeding of poultry;	10
➤ Selection	
➤ Objective	
➤ Methods of Selection	
➤ Mating system.	
6. Management of incubators	02
7. Hatching of eggs.	02
Total Periods	45



B.Sc. V Semester

Course Code - ZOL- 503

PAPER: XVII

ECOLOGY (PRACTICAL)

1. Estimation of productivity of pond ecosystem using white and dark bottle method. **02**
2. Determine the following parameters of soil. **04**
 - pH
 - Alkalinity
 - Chlorinity
 - Salinity
3. Analysis of DO, CO₂, Salinity, Chlorinity of water sample. **04**
4. Study of animal association ship with example (Charts/photo) -Competition, mutualism, parasitism, predation and commensalisms. **01**
5. Estimation of population density by Quadrate method on field and by Simulation method. **04**
6. Preparation of permanent slides of following
Spirogyra, Verticella, Odogonium, Daphnia, Cyclops, Mysis, Cypris, keretella
7. Project report: - Forest or fresh water ecosystem.

Total practical periods: - 15

B.Sc. V Semester

Course Code - ZOL- 504

PAPER: XVIII - A

**FISHERY SCIENCE – I (PRACTICAL)
(Elective Paper)**

- | | | |
|----|---|-----------|
| 1. | Study of freshwater fishes. | 03 |
| | Major carps | |
| | Other carps. | |
| | Cat fishes | |
| | Clupoides | |
| 2. | Study of brackish water fishes. | 02 |
| | <i>Hilsa hilsa, Chanos chanos (milkfish), Latis calcarifer, Tilapia</i> | |
| 3. | Study of marine ware fishes. | 03 |
| | Oil sardine | |
| | Mackerel | |
| | Ribbon -fish | |
| | Bombay-duck | |
| | Pomfret | |
| | Sole | |
| | Polynemus | |
| 4. | Water analysis | 05 |
| 5. | Visit to local or any reservoir and marine fish landing centre and student should be submit a project report at the time of practical examination | 02 |

Total practical periods: - 15

B.Sc. V Semester

Course Code - ZOL- 504

PAPER: XVIII - B

**ANIMAL CULTURE – I (PRACTICAL)
(Elective Paper)**

1.	Identification of members of bee family	03
2	.study of bee hive	02
3	study of different types of bees.	02
4	mounting of mouth parts and sting apparatus of honey colony.	04
5.	Identification of different types of hives and equipment used in apiculture.	04

Total practical periods: - 15

B.Sc. V Semester

Course Code - ZOO- 504

PAPER: XVIII - C

**ENTAMOLOGY – I (PRACTICAL)
(Elective Paper)**

1. Collection and preservation of insects	02
2. Dissection –grasshopper-Digestive system, Nervous system, Reproductive system.	03
3. Mounting: - Mouth parts of Grasshopper, Mosquito, Housefly, Cockroach.	02
4. Museum study- five Human insect pest and representatives of orders: Lepidoptera, coleopteran, Odoneta, Hymenoptera, Orthoptera, with examples.	04
5. Collection of insects (at least 15 specimens should be collected and submitted at the time of examination by students)	04
Total practical periods	15

B.Sc. V Semester

Course Code - ZOO- 504

PAPER: XVIII - D

**PARASITIC PROTOZOA AND HELMINTHES – I (PRACTICAL)
(Elective Paper)**

Parasitic protozoa

- | | |
|---|-----------|
| 1. Study of microscopic structure of the following; | 03 |
| • <i>Entamoeba coli</i> | |
| • <i>Entamoeba histolytica</i> | |
| • <i>Opalina</i> | |
| • <i>Nyctotherus</i> | |
| • <i>Balantidium coli</i> | |
| • <i>Trichomonas</i> species | |
| • <i>Trypanosoma</i> species | |
| • <i>Plasmodium</i> species | |
| • <i>Eimeria</i> species. | |
| 2. Smear preparation:- Rat/ Fish blood smear (Giemsa stain) | 04 |
| 3. Flagellate parasite from rectum of frog and Calotes with giemsa stain. | 04 |
| 4. Ciliate parasite from rectum of frog, smear with iron haematoxyline or tungesto phosphoric acid for Balantidium Nyctotherus and Opalina. | 04 |

Total practical periods: - 15

B.Sc. V Semester

Course Code – ZOO - 504

PAPER: XVIII – E

**COMPUTER APPLICATION AND MEDICAL LABORATORY TECHNOLOGY- I (Practical)
(Elective Paper)**

- | | |
|---|-----------|
| 1. Demonstration of the use of the following devices:-
Visual Display Unit (VDU), Key board, Mouse, Light pen, Joystick, Printers,
Plotters, Disks, CD-Rom. | 03 |
| 2. Use of DOS and windows- manipulating files | 02 |
| 3. Use of internet, demonstration of various web sites related to biology. | 05 |
| 4. Introduction to programming, editing files, programming in "C". | 05 |

Total practical periods: - 15

B.Sc. V Semester

Course Code – ZOO - 504

PAPER: XVIII – F

**BIOTECHNOLOGY – I (PRACTICAL)
(Elective Paper)**

A) Principle and application of following equipments	04
1) gel electrophoresis	
2) column chromatography	
3) high pressure liquid chromatography	
4) centrifuge	
5) laminar flow	
6) spectrophotometer	
B) Estimation of total DNA from animal tissue using Diphenylamine method.	02
C) Estimation of total RNA from animal tissue using orcinol method	02
D) Isolation of messenger RNA from animal source using affinity chromatography	02
E) Isolation of total DNA from tissue	01
F) DNA electrophoresis by agarose gel	02
G) Demonstration of Animinated methods of following	02
• Gene cloning	
• Restriction digestion of DNA	
• Southern blotting techniques	
• Northern blotting technique	

Total practical periods 15

B.Sc. V Semester

Course Code - ZOO-504

PAPER: XVIII – G

**DAIRY TECHNOLOGY- I (PRACTICAL)
(Elective Paper)**

1. Study of steps for clean and safe milk production.	01
2. Sampling of milk	01
3. Platform test for judging the quality of milk;	01
✓ Organoleptic test	
✓ Temperature	
✓ COB test	
✓ Alcohol test	
✓ Sediment test.	
4. Determination of fat of milk.	01
5. Determination of SNF and TS of milk.	01
6. Determination of Specific gravity of milk	01
7. Determination of acidity and ph of milk.	01
8. Staining of Bacteria.	02
9. Methylene blue reduction test (MBR) for milk.	01
10. Standard plate count (SPC) of milk. Detection of adulterants and preservative in milk.	01
11. Preparation of khoa.	01
12. Preparation of Chhans	01
13. Preparation of Dahi.	02
Total practical periods	15

B.Sc. V Semester

Course Code – ZOO - 504

PAPER: XVIII – H

**POULTRY SCIENCE- I (PRACTICAL)
(Elective Paper)**

1. To study American Class poultry breeds.	01
2. To study Asiatic Class poultry breeds	01
3. To study English Class poultry breeds.	01
4. To study Mediterranean Class poultry breeds.	01
5. To Study the Circulatory system of Poultry.	02
6. To Study the Respiratory system of Poultry.	02
7. To Study the Digestive system of Poultry.	02
8. To Study the Reproductive (Male and Female) system of Poultry	02
9. To Study Formation of egg.	02
10. To Study Structure of egg.	01
Total practical periods	15

Pattern of Question Paper
B.Sc. V Semester
Course Code - ZOL- 501
PAPER: XV
ECOLOGY

Time: 02:00 hours

Max. Marks: 50

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

-
- | | |
|---|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 to 3
OR
Based on chapter 1 to 3 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 4 & 5
OR
Based on chapter 4 & 5 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 6
OR
Based on chapter 6 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Multiple choice questions:
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

Pattern of Question Paper
B.Sc. V Semester
Course Code - ZOL- 502
PAPER: XVI - A
FISHERY SCIENCE – I (Elective Paper)

Time: 02:00 hours

Max. Marks: 50

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

- | | |
|--|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 & 2
OR
Based on chapter 1 & 2 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 3 & 4
OR
Based on chapter 3 & 4 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 5 & 6
OR
Based on chapter 5 & 6 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Short Questions: (Answer in One Sentence)
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

Pattern of Question Paper
B.Sc. V Semester
Course Code - ZOL- 502
PAPER: XVI – B
ANIMAL CULTURE - I (Elective Paper)

Time: 02:00 hours

Max. Marks: 50

N.B. 1) Attempt all questions.

2) All question carry equal marks.

3) Illustrate your answer with suitable labeled diagram.

-
- | | |
|--|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 to 3
OR
Based on chapter 1 to 3 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 4 & 5
OR
Based on chapter 4 & 5 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 6 & 7
OR
Based on chapter 6 & 7 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Short Questions: (Answer in One Sentence)
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

Pattern of Question Paper
B.Sc. V Semester
Course Code - ZOL- 502
PAPER: XVI - C
ENTAMOLOGY - I (Elective Paper)

Time: 02:00 hours

Max. Marks: 50

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

- | | |
|--|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 to 3
OR
Based on chapter 1 to 3 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 4 & 5
OR
Based on chapter 4 & 5 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 6 & 7
OR
Based on chapter 6 & 7 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Short Questions: (Answer in One Sentence)
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

Pattern of Question Paper
B.Sc. V Semester
Course Code - ZOL- 502
PAPER: XVI - D

PARASITIC PROTOZOA AND HELMINTHS – I (Elective Paper)

Time: 02:00 hours

Max. Marks: 50

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

- | | |
|--|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 & 2
OR
Based on chapter 1 & 2 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 3
OR
Based on chapter 3 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 3
OR
Based on chapter 3 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Short Questions: (Answer In One Sentence)
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

Pattern of Question Paper
B.Sc. V Semester
Course Code - ZOL- 502
PAPER: XVI – E

COMPUTER APPLICATION & LAB. TECHNOLOGY- I (Elective Paper)

Time: 02:00 hours

Max. Marks: 50

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

- | | |
|--|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 to 4
OR
Based on chapter 1 to 4 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 5 to 7
OR
Based on chapter 5 to 7 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 8 to 11
OR
Based on chapter 8 to 11 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Short Questions: (Answer in One Sentence)
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

Pattern of Question Paper
B.Sc. V Semester
Course Code - ZOL- 502
PAPER: XVI – F
BIOTECHNOLOGY – I (Elective Paper)

Time: 02:00 hours

Max. Marks: 50

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

- | | |
|--|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 to 3
OR
Based on chapter 1 to 3 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 4 & 5
OR
Based on chapter 4 & 5 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 6 to 8
OR
Based on chapter 6 to 8 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Short Questions: (Answer in One Sentence)
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

Pattern of Question Paper
B.Sc. V Semester
Course Code - ZOL- 502
PAPER: XVI - G
DAIRY TECHNOLOGY- I (Elective Paper)

Time: 02:00 hours

Max. Marks: 50

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

- | | |
|--|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 to 3
OR
Based on chapter 1 to 3 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 4 to 6
OR
Based on chapter 4 to 6 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 7 to 10
OR
Based on chapter 7 to 10 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Short Questions: (Answer in One Sentence)
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

Pattern of Question Paper
B.Sc. V Semester
Course Code - ZOL- 502
PAPER: XVI – H
POULTRY SCIENCE - I (Elective Paper)

Time: 02:00 hours

Max. Marks: 50

N.B. 1) Attempt all questions.

2) All question carry equal marks.

3) Illustrate your answer with suitable labeled diagram.

-
- | | |
|--|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 & 2
OR
Based on chapter 1 & 2 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 3
OR
Based on chapter 3 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 4 to 7
OR
Based on chapter 4 to 7 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Short Questions: (Answer in One Sentence)
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

**B.Sc. VI Semester
Course Code – ZOL - 601
PAPER: XIX
EVOLUTION**

1. Concept of organic evolution :-	06
<ul style="list-style-type: none"> ➤ Definition and concept. ➤ Theories of organic evolution in brief; Preformation theory, Bear's Law, Biogenetic law, catastrophism, Lamarckism, Darwinism and Germplasm theory. 	
2. Origin of Life :-	03
<ul style="list-style-type: none"> ➤ Definition, Abiogenesis, Biogenesis. ➤ Chemical evolution of life. 	
3. Evidences of Organic Evolution :-	04
<ul style="list-style-type: none"> ➤ Anatomical evidences. ➤ Embryological evidences. 	
4. Darwinism :-	05
<ul style="list-style-type: none"> ➤ Introduction :- Natural selection theory, ➤ Artificial selection theory and sexual selection theory. 	
5. Elemental forces of evolution :-	07
<ul style="list-style-type: none"> ➤ Mutation: - Concept and role in evolution. ➤ Recombination: - Concept and role in evolution. ➤ Natural selection: - Concept and role in evolution. ➤ Isolation: - Concept and role in evolution. ➤ Genetic Drift. : - Concept and role in evolution. 	
6. Basic patterns of evolution :-	09
<ul style="list-style-type: none"> ➤ Sequential and divergent evolution. ➤ Microevolution: - Concept, silent features and mechanism with example. ➤ Macro evolution: - Concept, silent features and mechanism with example. ➤ Mega evolution: - Concept, silent features and mechanism with example. 	
7. Species and speciation:-	07
<ul style="list-style-type: none"> ➤ Species: - Morphological concept, Genetical concept, biological concept of species ➤ Speciation: - Definition, concept, mechanism of speciation. ➤ Allopatric, Sympatric and Parapatric speciation. 	
8. Fossils :-	04
<ul style="list-style-type: none"> ➤ Definition , fossil formation ➤ Types of fossils. 	
Total Periods	45

**B.Sc. VI Semester
Course Code - ZOL- 602
PAPER: XX - A
FISHARY SCIENCE – II
(Elective Paper)**

FISH CULTURE AND FISH TECHNOLOGY

A. fish culture		
1.	Introduction	15
	a) Types of freshwater ponds-perennial and seasonal.	
	b) Different types of ponds-nursery, rearing and stoking ponds.	
	c) Design, contruction and maintenance of nursery, rearing and stocking ponds.	
	d) Productivity of ponds	
	e) principles of fish collection	
	f) Fish culture methods	
	g) Culture – cat fisheries	
	h) Sewage fed fisheries	
2.	Fish crop production (fish diseases)	06
	Protozoan, fungal, bacterial, viral worms diseases	
3.	Breeding of fishes	08
	a) Natural spawning of carps	
	c) Artificial breeding by hypophysation	
	d) Common carp breeding	
B. fish technology		
4.	Fish preservation and processing	08
	a) Fish processing methods	
	b) Fish –spoilage	
	c) Value added products	
	d) Sanitation and HACCP	
5.	Crafts and gears	08
	a) Different types of gears	
	b) Different types of crafts	
	c) Preservation of gears	
Total Periods		45

B.Sc. VI Semester
Course Code - ZOL- 602
PAPER: XX - B
ANIMAL CULTURE – II (Elective Paper)

SERICULTURE

1. History and general account of sericulture industry	02
Status, scope and problems of sericulture industry in India and Maharashtra.	02
1. Different types of silkworms, their systematic position and distribution.	03
2. life cycle of mulberry silk worm	
3. Morphology of different stages of B. mori. - Egg and types, larva, pupa, adult.	03
4. structure and working of silk gland	02
5. Food plants.	10
Brief account of food plants required for non –mulbabary silk worms.	
Systematic position mad morphology of mulberry plant.	
Selection of variety, preparation of planting material	
Agro climate condition required for plantation	
Methods of plantation (mulberry cultivation)	
Maintenance of mulberry garden (irrigation and rainfed)	
Common diseases and pest of mulberry and their control.	
Harvesting and preservation of leaves	
6. Silk worm rearing	10
Rearing house, model rearing house and others.	
Rearing equipments and their uses.	
Disinfection of rearing house and equipments	
Egg incubation, buck boding and its importance.	
Hatching and brushing of larvae, methods of brushing	
Feeding and its schedule	
Bed cleaning, methods of bed cleaning	
Role of environmental conditions in rearing	
Moulting, care taken during moulting	
Spacing and its schedule	
Mounting spinning, harvesting of cocoon	
Transportation and marketing of cocoon.	
7. Important diseases, pest of silk worm and their control:-	04
Bacterial, fungal, viral, protozoan	
Pest predators- beetle, mites, ants, lizards, birds, rats etc	02
10. Introduction to post harvesting technology (reeling)	06
Cocoon stifing, methods of stifing.Preservation and storage of cocoons.Cocoon cooking, methods of cocoon coking	
Reeling- country charkha, filature.	
11. Sericulture as agro cottage, employment generating village industry.	01
12. Economics of sericulture.	01

Total Periods 45

**B.Sc. VI Semester
Course Code - ZOL- 602
PAPER: XX - C
ENTAMOLOGY – II
(Elective Paper)**

PEST MANAGEMENT

I	Pest –Definition, types of pest, agricultural, veterinary and medical pest.	06
II	Study of major crop pest: - Classification, Characters. Jawar- Stem borer, Midge flies Cotton- Red cotton bug, pink bollworm Groundnut-White grub, pod sucking bug Sugarcane- Pyrilla, Stem borer.	12
III	Study of Stored grain pests: Rice weevil, pulse beetle	08
IV	Control measures of insect pest. Methods of control measures-Chemical, Biological, integrated pest management.	08
V	Migration of insect.	03
VI	Insecticides and plant protection appliances like Hand compression spray, Hand rotating duster, bucket pump	08
	Total Periods	45

B.Sc. VI Semester
Course Code - ZOL- 602
PAPER: XX - D
PARASITIC PROTOZOA AND HELMINTHES – II
(Elective Paper)

B- PARASITIC HELMINTHES

1. General characters and classification of helminthes	02
2. Structure ,life history, pathogencity and control measure of the following;	
➤ <i>Schistosoma haematobium</i>	03
➤ <i>Amphilina</i>	02
➤ <i>Taenia Saginata</i>	02
➤ <i>Echinococcus granulossus</i>	02
➤ <i>Trichinella spiralis</i>	03
➤ <i>Enterobius vrmicularis</i>	03
➤ <i>Ancylostoma duodenale</i>	02
➤ <i>Wuchereria bancroftii</i>	03
➤ <i>Dracunculus medinensis.</i>	01
3. Gross morphology of Trematoda Cestoda and Nematode.	06
4. Reproductive organs of Trematodes Cestodes and Nematodes.	06
5. Body wall of Trematodes Cestodes and Nematodes.	06
Total periods: -	45

B.Sc. VI Semester

Course Code – ZOL - 602

PAPER: XX - E

**COMPUTER APPLICATION AND MEDICAL LABORATORY TECHNOLOGY - II
(ELECTIVE PAPER)**

B-MEDICAL LABORATORY TECHNOLOGY

- | | |
|---|-----------|
| 1. Basic Laboratory principles and procedure. | 08 |
| Introduction | |
| Laboratory management system. | |
| Responsibility of laboratory worker. | |
| Laboratory safety and aids and Training of technician. | |
| 2. Basic requirement of Laboratory. | 12 |
| Glassware, solution and reagent, equipment and instruments. | |
| (Autoclave, Hot air oven, Incubator, Water bath Centrifuge, Colorimeter, PH meter, Haemoglobometer, Micrometer, Glucometer.) | |
| 3. Routine examination of body fluids. | 10 |
| Collection and examination procedure /method with special reference to clinical significance. | |
| Blood, HB percentage, WBC, RBC count, Homeostasis (mechanism of blood coagulation). | |
| Urine- Physical examination (Color and Odour), Chemical examination
(Protein, Glucose, Bilurubin, Uroblinogene Blood, Ketone bodies, Acetone bodies) | |
| Sputum- Microscopic examination. | |
| Semen- Microscopic examination, Sperm count, Sperm motility, Sperm morphology, Examination for the presence of semen. | |
| 4. Basic histopathological techniques. | 10 |
| Collection, fixation, preparation of tissue for section | |
| Staining and observations with critical comments. | |
| 5. Scope and importance of laboratory technique in clinical field of medical science. | 05 |
| Total Periods: - 45 | |

B.Sc. VI Semester Course

Code - ZOL - 602

PAPER: XX – F

BIOTECHNOLOGY - II

(Elective paper)

1. Animal cell culture	06
Basic requirements, Culture media & sterilization	
Contamination and sterilization of laboratory.	
Application and limitations of cell culture	
2. Manipulation of reproduction and transgenic animals	05
Invitro fertilization, nuclear transplantation (Dolly sheep)	
Transgenic animals –methods	
(Retroviral vector method, microinjection and ES cell methods)	
3. Protein engineering	06
Site-directed mutagenesis (Cassette mutagenesis oligonucleotide directed)	
Applications of mutagenesis, Hybridoma technology	
Commercial production of enzymes	
4. Gene therapy and DNA fingerprinting	06
Introduction, ex vivo, in vivo gene therapy	
Antigene & antisense gene therapy	
DNA fingerprinting	
5. Human disease-diagnosis using biotechnology	02
6. Applications of biotechnology	06
Agriculture	
Medicine	
Industry	

Total Periods: - 45

**B.Sc. VI Semester
Course Code - ZOL- 602
PAPER: XX - G
DAIRY TECHNOLOGY – II
(Elective paper)**

- | | |
|---|-----------|
| 1. Concentrated indigenous dairy products :- | 08 |
| ➤ Definition, Composition, Methods of production and yield of Peda, Burfi, Rabdi, Basundi and Gulabjamun. | |
| 2. Fermented indigenous dairy product: - | 05 |
| ➤ Definition, Composition, Methods of production and yield of Chakka, Shrikhand and Shrikhand wadi. | |
| 3. Frozen indigenous dairy product: - | 06 |
| ➤ Definition Composition, Methods of production and yield of Kulfi, Malai ka Barfi. | |
| 4. Fat rich indigenous dairy product: - | 06 |
| ➤ Definition Composition, Methods of production and yield of Butter and Ghee. | |
| 5. Special milk :- | 10 |
| ➤ Definition Composition and Methods of production of Milk Shake, Flowered milk, Toned milk, Fortified milk, Recombined milk and Soya milk. | |
| 6. Study of microbial toxins in dairy products | 05 |
| 7. Role of dairy industry as an entrepreneur for development of small scale industry. | 05 |

Total Periods **45**

**B.Sc. VI Semester
Course Code - ZOL- 602
PAPER: XX - H
POULTRY SCIENCE - II
(Elective Paper)**

1. Poultry Management ;	10
➤ Brooder management.:- Housing, sanitation&hygine,litter, Temperature space	
➤ Grower management.	
➤ Layer management.	
➤ Rising of Broilers.	
2. Housing for poultry;	14
➤ selection site for poultry form	
➤ Free range or extensive system.	
➤ Semi intensive system.	
➤ Intensive system.	
➤ Folding System	
3. Feeding of poultry.	05
Requirement of poultry feed, feed ingredients, Conventional and nonconventional poultry feed	
4. Processing of poultry products. Preservation of poultry products.	05
5. Marketing of poultry products.	03
6. Poultry diseases;	08
Parasitic, Protozoan	
Bacterial, Fungal.	
Total Periods	45

B.Sc. VI Semester
Course Code – ZOL - 603
PAPER: XXI
EVOLUTION (PRACTICAL)

1. Embryological evidences of evolution with the help of slide/chart/pictures.	02
2. Adaptive modification in feet of birds and mouth parts of insects	02
3. Study of successive stages of evolution with the help of models/charts	02
➤ Horse	
➤ Human	
4. Discussion on patterns of speciation with the help of charts /pictures.	02
➤ Allopatric speciation	
➤ Sympatric speciation.	
5. Study the homologous and analogous organs.	04
6. Study of natural selection using <i>E.coli</i> bacteria against antibiotics (Tetramycin/ Penicillin)	01
7. Study of geographical era.	02
Total Practical periods	15

B.Sc. VI Semester Course
Code - ZOL- 604
PAPER: XXII – A
FISHARY SCIENCE – II (PRACTICAL)
(Elective Paper)

1.	Primary productivity of ponds (plankton studies).	02
2	identification, classification and culturaable significance of following. Catla, rohu, mrigal, catfishes, exotic canoj	03
3	Collection and identification of fish parasites and worms.	04
4	Removal of fish pituitary gland and preparation of pituitary extract	02
5	Identification of crafts and gears. Gill net, Rampanni, Satpalti, Machwa, Catamaran.	02
6.	A visit to fish farm and fish processing centre is compulsory.	02
	Total Practical Periods	15

B.Sc. VI Semester Course
Code - ZOL- 604
PAPER: XXII – B
ANIMAL CULTURE – II (PRACTICAL)
(Elective Paper)

- | | | |
|--------------------------------|--|-----------|
| 1. | Different stages of silk worm from egg to adult. stages (egg, sheet diff. ages of the larvae, pupa and adult.) | 03 |
| 2. | Dissection of the silkworm to study the internal anatomy and mounting the silk glands, mounting of mouth parts spinner ate spiracle etc. | 02 |
| 3. | Study of disease causing pests of larvae, pupa and adult. | 03 |
| 4. | Equipment needed in silkworm rearing centre. | 02 |
| 5. | mulberry leaves and utilization and study of mulberry varieties. | 02 |
| 6. | Preparation of model of life cycle of <i>bombex mori</i> and submission at the time of Examination. | 03 |
| Total Practical Periods | | 15 |

B.Sc. VI Semester Course
Code - ZOL- 604
PAPER: XXII – C
ENTAMOLOGY – II (PRACTICAL)
(Elective Paper)

- | | | |
|----|---|-----------|
| 1. | Collection, preservation and identification of Major crop pests (any five) | 05 |
| | Jawar- Stem borer, Midge flies. | |
| | Cotton- Red cotton bug, pink bollworm | |
| | Groundnut-White grub, pod sucking bug | |
| | Sugarcane- Pyrilla, | |
| 2. | Identification of common stored grain pests. | 02 |
| | A- Rice Weevil | |
| | B- Rice beetle | |
| | C- Grain moths | |
| 3. | Study of common plant protection appliances like Sprayers and dusters. | 02 |
| 4. | Collection of major crop pests in locality and submission at the time of examination. | 04 |
| 5. | Visit of an agricultural Field and field study report. | 02 |
| | Total Practical Periods | 15 |

B.Sc. VI Semester Course
Code – ZOL - 604
PAPER: – XXII - D
PARASITIC PROTOZOA AND HELMINTHES – II (PRACTICAL)
(Elective Paper)

B-PARASITIC HELMINTHES

1. Study of microscopic structure of the following; 03
 - ✓ *Schistosoma* Species
 - ✓ *Fasciola hepatica*
 - ✓ Redai larva
 - ✓ Cercaria larva
 - ✓ V.S. Body wall of Fasciola.
 - ✓ *Mehrorchis*
 - ✓ *Ganeo*
 - ✓ *Tremorchis*
 - ✓ *Paramphistomum*
 - ✓ *Taenia Saginata*
 - ✓ *Echinococcus granulosus*
 - ✓ Scolex of *Taenia solium* and *Taenia saginata*.
 - ✓ Mature proglottids
 - ✓ Gravid proglottids
 - ✓ Hexacanth Larva
 - ✓ Body wall of tape worm
 - ✓ *Enterobius vermicularis*
 - ✓ *Ascaris lumbricoides* (Specimen)
 - ✓ T.S. of Body wall of *Ascaris*
 - ✓ T.S. of *Ascaris* Male and Female
 - ✓ *Ancylostoma* W.M.
 - ✓ *Microfilaria* W.M.
 - ✓ *Trichinella spiralis*
2. Collection preservation staining and identification of the 04
Trematode parasite from the rectum of frog.
3. Collection preservation staining and identification of the 04
Cestode parasite from the chick intestine
4. Collection, preservation, mounting and identification of the 04
Nematode parasite from the vertebrate.

Total Practical periods: - 15

B.Sc. VI Semester Course
Code - ZOL- 604
PAPER: XXII - E
COMPUTER APPLICATION AND MEDICAL LABORATORY TECHNOLOGY – II
(PRACTICAL)
(Elective Paper)

MEDICAL LABORATORY TECHNOLOGY

- | | |
|---|-----------|
| 1. Study of laboratory equipments. | 02 |
| Autoclave, hot air oven, incubator water bath,
Centrifuge, refrigerator, colorimeter, PH meter,
Haemoglobinometer, microtome, and Glucometer. | |
| 2. Preparation of various reagents and fixatives. | 02 |
| 3. Histological techniques: preparation of biological material,
Fixing, embedding sectioning, staining, and mounting. | 02 |
| 4. Study of blood pressure apparatus, stethoscope. | 03 |
| 5. Blood analysis- Hb percentage
, Counting of WBC and RBC, Homeostasis. | 03 |
| 6. Urine analysis- Protein, Glucose, Bilurubin, Blood,
Ketone bodies, Acetone bodies,
Or any other normal and abnormal constituent. | 03 |

Total Practical periods: - 15

B.Sc. VI Semester Course
Code - ZOL- 604
PAPER: XXII – F
BIOTECHNOLOGY- II (PRACTICAL)
(Elective Paper)

A- Sterilization of glassware and chemicals in tissue culture	03
B- Preparation of culture media and sterilization	02
C- Assay of cell viability using dye.	02
D- Effect of pH on acid phosphatase activity	02
E- Study of chromosomal aberration	01
F- Pure Culture of airborne/water bacteria.	02
G- Study of antibiotic resistant /susceptibility of bacterial culture.	01
H- Demonstration of Animated methods of following Nuclear transplantation Hybroma technique DNA fingerprinting Bt- cotton	02
Total Practical Periods	15

B.Sc. VI Semester Course
Code - ZOL- 604
PAPER: XXII – G
DAIRY TECHNOLOGY- II (PRACTICAL)
(Elective Paper)

1. Preparation of Peda.	01
2. Preparation of Burfi.	01
3. Preparation of Rabdi.	01
4. Preparation of Bassundi.	01
5. Preparation of Gulab Jamun.	01
6. Preparation of Chakks.	01
7. Preparation of Shrikhand.	02
8. Preparation of Shrikhandwadi.	01
9. Preparation of Kulfi.	01
10. Preparation of Butter (Makhan).	01
11. Preparation of Ghee.	01
12. Preparation of Milk Shake.	01
13. Flavored milk.	01
14. Soya Milk.	01

Total Practical Periods 15

B.Sc. VI Semester
Course Code - ZOL- 604
PAPER: XXII - H
POULTRY SCIENCE – II (PRACTICAL)
(Elective Paper)

1. To study Poultry housing system.	03
2. To identify and study feed ingredients	02
3. To preservation of eggs.	02
4. To study Protozoan diseases.	01
5. To study parasitic diseases.	01
6. To study Bacterial diseases.	01
7. To study fungal diseases.	01
8. to compute ration for chicken	01
9. to identify equipments in poultry farm	01
10. visit to poultry farm	01

Total Practical Periods 15

Pattern of Question Paper
B.Sc. VI Semester
Course Code - ZOL- 601
PAPER: XIX
EVOLUTION

Time: 02:00 hours

Max. Marks: 50

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

- | | |
|---|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 to 4
OR
Based on chapter 1 to 4 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 5 to 6
OR
Based on chapter 5 to 6 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 7 to 8
OR
Based on chapter 7 to 8 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Multiple choice questions:
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

Pattern of Question Paper
B.Sc. VI Semester
Course Code - ZOL- 602
PAPER: XX - A
FISHARY SCIENCE - II (Elective Paper)

Time: 02:00 hours

Max. Marks: 50

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

- | | |
|---|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1
OR
Based on chapter 1 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 2 & 3
OR
Based on chapter 2 & 3 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 4 & 5
OR
Based on chapter 4 & 5 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Short Question (Answer in One Sentence):
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

Pattern of Question Paper
B.Sc. VI Semester
Course Code - ZOL- 602
PAPER: XX - B
ANIMAL CULTURE – II (Elective Paper)

Time: 02:00 hours

Max. Marks: 50

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

- | | |
|---|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 to 7
OR
Based on chapter 1 to 7 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 8 to 10
OR
Based on chapter 8 to 10 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 11 to 13
OR
Based on chapter 11 to 13 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Short Question (Answer in One Sentence):
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

Pattern of Question Paper
B.Sc. VI Semester
Course Code - ZOL- 602
PAPER: XX - C
ENTAMOLOGY – II (Elective Paper)

Time: 02:00 hours

Max. Marks: 50

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

-
- | | |
|---|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 & 2
OR
Based on chapter 1 & 2 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 3 & 4
OR
Based on chapter 3 & 4 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 5 & 6
OR
Based on chapter 5 & 6 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Short Question (Answer in One Sentence):
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

Pattern of Question Paper
B.Sc. VI Semester
Course Code – ZO - 602
PAPER: XX - D
PARASITIC PROTOZOA & HELMINTHS – II (Elective Paper)

Time: 02:00 hours

Max. Marks: 50

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

- | | |
|---|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 & 2
OR
Based on chapter 1 & 2 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 2
OR
Based on chapter 2 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 3 to 5
OR
Based on chapter 3 to 5 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Short Question (Answer in One Sentence):
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

Pattern of Question Paper
B.Sc. VI Semester
Course Code - ZOL- 602
PAPER: XX - E

COMPUTER APPLICATION & LABORATORY TECHNOLOGY – II (Elective Paper)

Time: 02:00 hours

Max. Marks: 50

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

- | | |
|---|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 & 3
OR
Based on chapter 1 & 3 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 2
OR
Based on chapter 2 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 4 & 5
OR
Based on chapter 4 & 5 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Short Question (Answer in One Sentence):
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

Pattern of Question Paper
B.Sc. VI Semester
Course Code - ZOL- 602
PAPER: XX - F
BIOTECHNOLOGY – II (Elective Paper)

Time: 02:00 hours

Max. Marks: 50

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

-
- | | |
|---|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 & 2
OR
Based on chapter 1 & 2 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 3 & 4
OR
Based on chapter 3 & 4 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 5 & 6
OR
Based on chapter 5 & 6 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Short Question (Answer in One Sentence):
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

Pattern of Question Paper
B.Sc. VI Semester
Course Code - ZOL- 602
PAPER: XX – G
DAIRY SCIENCE - II (Elective Paper)

Time: 02:00 hours

Max. Marks: 50

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

-
- | | |
|---|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1 & 2
OR
Based on chapter 1 & 2 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 3 & 4
OR
Based on chapter 3& 4 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 5 to 7
OR
Based on chapter 5 to 7 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Short Question (Answer in One Sentence):
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

Pattern of Question Paper
B.Sc. VI Semester
Course Code - ZOL- 602
PAPER: XX – H
POULTRY SCIENCE-II (Elective Paper)

Time: 02:00 hours

Max. Marks: 50

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

- | | |
|---|--|
| Q1. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 1
OR
Based on chapter 1 |
| Q2. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 2 & 5
OR
Based on chapter 2 & 5 |
| Q3. Long answer question.
OR
Short Notes on:
a)
b) | Based on chapter 3, 4 & 6
OR
Based on chapter 3, 4 & 6 |
| Q4. Long answer question.
OR
Short Notes on:
a)
b) | Based on all chapters
OR
Based on all chapters |
| Q5. Short Question (Answer in One Sentence):
1)
2)
3)
4)
5)
6)
7)
8)
9)
10) | Based on all chapters |

B.Sc. V + VI Semester
Course Code - ZOL- 503 + 603
PAPER: XVII + XXI
ECOLOGY + EVOLUTION (PRACTICAL)

Time: - 4:00 hrs

Total marks:-100

Q.1	Estimation ofof water sample. (DO/ CO ₂ /salinity/Chorinity) OR Estimation of primary productivity of pond water OR Estimation ofof Soil sample. (Alkalinity / Chlorinity / Salinity)	20
Q.2	study of natural selection of E.coli against.....antibiotics OR Comment on successive stages of evolution of Horse/ man	20
Q.3	Calculate the population density of given sample using Quadrat method. OR Identify and comment on homologous organs and analogous organs. (Any two)	10
Q.4	Identify the given spots and comment on it. (Embryological evidence -01, Adaptive modification- 02, Animal associationship- 02)	25
Q.5	submission of permanent slides (At least five)	10
Q.6	Record book	10
Q.7	Vivo-vice	05

Skeleton of question paper
B.Sc. V+VI Semester
Course Code - ZOL-504+604
PAPER: XVIII – A + XXII – A
FISHERY SCIENCES-I & II (PRACTICAL)
(Elective Paper)

Time: - 4:00 hrs

Total marks:-100

-
- | | | |
|-----|---|-----------|
| Q.1 | Estimation offrom given water sample.
(DO, Alkalinity, chlorinity, Hardness, etc.) | 15 |
| Q.2 | Identify any four primary producers from given sample | 15 |
| | OR | |
| | Dissection offish to expose its pituitary gland. | |
| Q.3 | Collection and Identification ofparasites from fish. | 15 |
| | OR | |
| | Identify and comments on crafts and gars. | |
| Q.4 | Identify and comments on given Spots.
(Major carp-03, brackish water-02, Marine water-03 culturable -02) | 30 |
| Q.5 | submission of project report | 10 |
| Q.6 | record book | 10 |
| Q.7 | Vivo-vice | 05 |

Skeleton of question paper
B.Sc. V+VI Semester
Course Code - ZOL-50 4+ 604
PAPER: XVIII – B + XXII – B
ANIMAL CULTURE –I& II (PRACTICAL)
(Elective Paper)

Time: - 4:00 hrs

Total marks:-100

- | | | |
|-----|--|-----------|
| Q.1 | Identify the types of bee hives and equipments used in apiculture. | 15 |
| | OR | |
| | Identify and comments on bee hive. | |
| Q.2 | Dissection of silkworm so as to expose its silk gland | 15 |
| Q.3 | Mounting of supplied material and write procedure followed. | 10 |
| Q.4 | Identification of given pests of silkworm and write their consequences. | 10 |
| Q.5 | Identify the given spots and comments on it
(Equipments in apiculture-02, silkworm stages-01, types of bee -02) | 25 |
| Q.6 | submission of model | 10 |
| Q.7 | record book | 10 |
| Q.8 | Vivo-vice | 05 |

Skeleton of question paper
B.Sc. V+VI Semester
Course Code - ZOL-504 + 604
PAPER: XVIII – C + XXII – C
ENTAMOLOGY – I & II (PRACTICAL)
(Elective Paper)

Time: - 4:00 hrs

Total marks:-100

- | | | |
|-----|--|-----------|
| Q.1 | Dissection of -----system of grasshopper. Leave the well labeled Diagram of the same. | 15 |
| Q.2 | study of major crop pest | 15 |
| Q.3 | Mounting / temporary preparation of supplied material | 10 |
| Q.4 | Identify and describe (any five)
(Stored grain pest-03, plant protection appliances-02) | 15 |
| Q.5 | Identify and comment on given spots.
(Insect specimen-03, human insect pest-02) | 20 |
| Q.6 | submission of collected insect and agricultural and field report | 10 |
| Q.7 | record book | 10 |
| Q.8 | vivo-vice | 05 |

Skeleton of question paper
B.Sc. V+VI Semester
Course Code - ZOL-504 + 604
PAPER: XVIII – D + XXII – D
PARASITIC PROTOZOA & HELMINTHS – I & II (PRACTICAL)
(Elective Paper)

Time: - 4:00 hrs

Total marks:-100

-
- | | | |
|-----|---|-----------|
| Q.1 | collect and identifyprotozoan from rectum of | 25 |
| | OR | |
| | Prepare the blood Smear and identify parasitic protozoa from it. | |
| Q.2 | Dissectand identify helminthes
(Frog rectum /chick intestine). | 20 |
| | OR | |
| | Dissect the given fish and identify the Helminthes from it. | |
| Q.3 | Identify the given helminthes larvae and comment on it. | 10 |
| Q.4 | identify the given spots and comments on it | 30 |
| Q.5 | record book | 10 |
| Q.6 | vivo-vice | 05 |

Skeleton of question paper
B.Sc. V+VI Semester
Course Code - ZOL- 504 + 604
PAPER: XVIII – E + XXII – E
COMPUTER APPLICATION AND
LABOLATORY TECHNIQUES –I & II (PRACTICAL)
(Elective Paper)

Time: - 4:00 hrs

Total marks:-100

-
- | | | |
|-----|--|-----------|
| Q.1 | Demonstrates any five DOS commands on computer and writes their syntax.
OR
Demonstrate and use of any two window commands | 20 |
| Q.2 | Give WBC/ RBC count of given blood sample write the procedure
OR
Find out the constitute of given urine sample and write the procedure | 20 |
| Q.3 | prepare the data sheet of given data on Excel sheet
OR
Search..... on internet and show to Examinar.
(Keyword related to zoology like ecosystem, urine formation, gene etc) | 10 |
| Q.4 | preparation of given solutions /fixative and write procedure followed for it.
OR
Preparation of block of given tissue for microtome | 10 |
| Q.5 | Identify the given Spots and comments on it.
(Computer hard-were - 03/ lab. Instruments -2) | 25 |
| Q.6 | Record book | 10 |
| Q.7 | Vivo-vice | 05 |

Skeleton of question paper
B.Sc. V+VI Semester
Course Code - ZOL-504+604
PAPER: XVIII – F + XXII – F
BIOTECHNOLOGY – I & II (PRACTICAL)
(Elective Paper)

Time: - 4:00 hrs

Total marks:-100

-
- | | | |
|-----|---|-----------|
| Q.1 | Estimation of total DNA fromtissue of
OR
Isolation of messenger RNA from.....tissue of.....
OR
Isolation of total DNA from..... tissue of | 25 |
| Q.2 | preparation of culture media for animal culture
OR
Sterilization of for tissue culture and write procedure.
(Chemical / glassware/ lab)
OR
Effect of pH on acid phosphatase activity and
Record the observation | 25 |
| Q.3 | writes principle and application of.....
OR
Assay of cell viability using.....dye.
OR
Observation of susceptibility/resistant of..... antibiotic
to bacterial stain. | 20 |
| Q.4 | study of chromosomal aberration | 15 |
| Q.5 | Record book | 10 |
| Q.6 | Vivo-vice | 05 |

Skeleton of question paper
B.Sc. V+VI Semester
Course Code - ZOL-504+604
PAPER: XVIII – G + XXII – G
DAIRY SCIENCES – I & II (PRACTICAL)
(Elective Paper)

Time: - 4:00 hrs

Total marks:-100

-
- Q.1 Insure the quality of given milk sample using.....methods 25
(At least two methods)
- OR
- Determine the amount of fat in given milk sample.
- Q.2 Preparefrom milk 20
- Q.3 Determine theof milk (any one) 10
(Acidity, TS, SNF, MBR, SPC)
- OR
- Prepare from milk.
- Q.4 Identify and comments on following spots. (Milk products) 30
- Q.5 Record book 10
- Q.7 vivo-vice. 05

Skeleton of question paper
B.Sc. V+VI Semester
Course Code - ZOL-504 + 604
PAPER: XVIII – H + XXII – H
POULTRY SCIENCES –I & II (PRACTICAL)

Time: - 4:00 hrs

Total marks:-100

-
- Q.1 Identify and comment of given poultry breed **20**
OR
Identify and comment onsystem of poultry.
Leave the well labeled diagram of it.
- Q.2 Identify and comment on equipments in poultry farm. **20**
- Q.3 Identify the Stages of egg formation and comment on it. **15**
OR
Explain the poultry house system.
- Q.4 Identify the given spots and comment on it. **30**
(Food ingredients-05/disease causing agents-05)
- Q.5 Record book **10**
- Q.6 vivo-vice **05**

RECOMMENDED BOOKS

ECOLOGY

- Chapman – Ecology- Cambridge low prize Edition.
- Verma and Agarwal- Principles of ecology
- Koromondy, E.J. Concepts of ecology. Prentice Hall, New Delhi.
- Clarke, G.L. Elements of Ecology, John Wiley & Sons, New York.
- Odum, E.P. -Fundamentals of Ecology. W.B. Saunders, Philadelphia.
- Krebs, C.J. -Ecology. Harper & Row, New York.
- Jorgensen, S.E.- Fundamentals of Ecological modeling. Elsevier, New York.
- P.D. Sharma- Ecology and Environment
- Dutta –Fundamentals of Ecology

EVOLUTION

- Dobzhansky, Th. Genetics and origin of Species. Colombia University Press
- Dobzhansky, Th., F.J. Ayala. G.L. Stebbens and J.M. Valentine.
- Evolution, Surjeet Publication, Delhi.
- Futuyama, D.J. Evolutionary Biology. Sinauer Associates, INS Publishers, Sunderland
- Jha, A.P. Genes and Evolution, John Publication, New Delhi
- King, M. Species Evolution – the role of chromosomal change. The Cambridge University Press, Cambridge.
- Merrel, D.J. Evolution and genetics. Oxford University Press, New York
- Strikberger, M.W. Evolution. Jones and Bartett Publishers, Boston, London.
- Moody –An introduction to evolution
- Lull organic evolution
- P.K.Gupta- Ecology, genetics and Evolution
- Savage- Evolution
- Tomer and Singh – organic evolution, Rastogi Publication, merrut

FISHERY SCIENCES-I AND II

- Fish and fisheries of India – V.G Jhingran, Hindustan pub. Cor.india.
- Tropica fish farming- D.K.Belsare, Environmental publication, karad.
- Aquaculture – J.E.Bardach, J.H. Ryther,W.O. McLarney, Wiley Inter science A science of John Wiley and sons INC, New York.
- Text book of Fish Culture – Breeding and Cultivation of Fish- Marcel Huet, Fishing News books ltd. Farhman, Survey, England.

- Fish Farming Hand Book- E.E. Brown and J.B. graatzek. VI Pub.
- Freshwater fish pond culture and management – M. Chakroff Scientific Publisher Jodhpur.
- A text book of aquaculture-M.S. Reddy, Discovery publication house New Delhi.
- Encyclopedia of Fishes and Fisheries in India –A.K. Pandey, G.S. Sandu.Vol.IV Anmol publication ,New Delhi
- Freshwater Aquaculture- R.K.Rathi, Scientific Publisher Jodhpur.
- A Hand Book of fish farming- S.C. Agarwal, Narendra publication house, New Delhi.
- Methods of physico chemical analysis of water- Gottermanet.al.
- Induced breeding of carps – H. Choudhary and S.B.Singh.
- An introduction to fishes- S.S.Khana, central book depot. Allahabad.
- Manual of Methods in Fish Biology- S.P. Biswas, South Asian Publ. new, Delhi.
- Diseases of fish- Van Duiten Jr. Jitte book Landan.

ANIMAL CULTURE [APICULTURE]

- Beekeeping in India – khadi and village industries board gov. of maharastra
- Techniques of bee keeping- CBR and training institute, pune.
- Invertebrate zoology –kotpal
- Anatomy of honeybee- syodross.R.E.

ANIMAL CULTURE [SERICULTURE]

- Hand book of practical sericulture-Narshiihannu and Ullal
- Agro cottage industry – sericulture – C.J.Hiware.
- Tropical sericulture – tazima
- Sericulture manuals- 1st to 4th FAO publication.
- Bulletins of CSR and IT, Mysore

BIOTECHNOLOGY I&II

- Primrose, S. B. and Twyman, R. M., -Principles of Gene Manipulation and Genomics, (7th Ed. 2006), Blackwell Publishing, West Sussex, UK
- Bernard R. and Jack- Molecular Biotechnology: Principles and application of recombinant DNA, ASM Press, Herndon, USA
- R.C.Dubey & Maheshori - Biotechnology, S.Chand Publication
- B.D.Singh- Biotechnology-Himalaya publication
- Verma & Agarwal -Genetic engineering-S.Chand Publication
- Click Molecular Biotechnology
- Mayer R.A.-Molecular biology and Biotechnology
- satyanarayana-biotechnology.-

DAIRY TECHNOLOGY I&II

- S.K.De – outline of Dairy technology
- R.P. Aneja And et.al-Indian milk products,
- P.R.Gupta – Dairy Indian yearbook.(2007)

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