Dr.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

CIRCULAR NO.SU/B.Sc./CBC&GS /65/2023

It is hereby inform to all concerned that, the syllabi prepared by the Board of Studies, Ad-hoc Boards and recommended by the Dean, Faculty of Science & Technology, the Hon'ble Vice-Chancellor has accepted the **following syllabi of Bachelor of Science with Practical Pattern of Question Paper under the scheme of Choice Based Credit & Grading System** in his emergency powers under section 12(7) of the Maharashtra Public Universities Act, 2016 on behalf of the Academic Council as appended herewith.

Sr.No.	Courses	Semester
1.	**B.Sc. Home Science (Degree)**	**IIIrd & IVth semester**
2.	**B.Sc. Information Technology (Degree)**	**IIIrd & IVth semester**
3.	**Bachelor of Computer Application (Degree)**	**IIIrd & IVth semester**
4.	**B.Sc.Botany (Optional)**	**IIIrd & IVth semester**
5.	**B.Sc.Dairy Science & Technology(Optional)**	**IIIrd & IVth semester**
6.	**B.Sc.Fisheries Science (Optional)**	**IIIrd & IVth semester**
7.	**B.Sc.Computer Science (Optional)**	**IIIrd & IVth semester**
8.	**B.Sc.Zoology (Optional)**	**IIIrd & IVth semester**

This is effective from the Academic Year 2023-24 and onwards.

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

University Campus,
Aurangabad-431 004.
REF.NO.SU/2023/30210-26
Date:- 26.05.2023.

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Deputy Registrar,
Academic Section

Copy forwarded with compliments to :-

1] **The Principal of all concerned Colleges,**
Dr. Babasaheb Ambedkar Marathwada University,

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, Dr.BAMU,A'bad.

2] The Section Officer,[B.Sc.Unit] Examination Branch,Dr.BAMU,A'bad.
3] The Programmer [Computer Unit-1] Examinations, Dr.BAMU,A'bad.
4] The Programmer [Computer Unit-2] Examinations, Dr.BAMU,A'bad.
5] The In-charge,[E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr.BAMU,A'bad.
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7] The Record Keeper, Dr.BAMU,A'bad.

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.

B.Sc.Zoology(Optional)

IIIrd & IVth Semester

Course Structure and Curriculum

Choice Based Credit and Grading System

Under the Faculty of Science & Technology

From the Academic Year 2023-24 & Onwards/-

Dr. S. N. Borde

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Semester Pattern Curriculum under, Choice based Credit System (CBCS)
Under Graduate Bachelor Degree Programme (B.Sc.)
Faculty of Science and Technology
Subject- Zoology
Course Structure and Curriculum with Examination Scheme
(Effective from academic year 2022-23)
B. Sc. Second Year (Semester –III)

Semester III								
	Course code	Course Title	Total Periods (Teaching period/weeks)	Credits	Scheme of theExamination			
					Max. Marks	CIA	UA	Min. Marks
Optional I (DSC-1C) Core courses	ZOL-311	Core Course (Theory Paper-V) **Developmental Biology**	45(3/week)	2	50	10	40	20
	ZOL -312	Core Course (Theory paper -VI) **Ecology**	45(3/week)	2	50	10	40	20
	ZOL -321	Lab Course 3-	45(3/week)	1.5	50	10	40	20
		(Practical paper based ZOL-311 on **Developmental Biology**)						
	ZOL -322	Lab Course 4 (Practical paper based on ZOL -312)- **Ecology**)	45(3/week)	1.5	50	10	40	20
Skill Enhancement Course (SEC1)	ZOL -313	SEC-1.Any one skill to be chosen outof two- **SEC-1(A) Haematology , SEC-1(B) Urinology.**	45(3/week)	2	50	10	40	20
Ability Enhancement compulsory courses (AECC-3)	XXX-331	Communication Skill in English-III	45(3/week)	3	50	10	40	20
	XXX-332	Marathi/Hindi/Urdu/Sanskrit A Studentcan for any one of these language (SL- III)	45(3/week)	3	50	10	40	20
			315	15	350	70	280	140

23/5/2023
Chairman
BOS in Zoology.

B. Sc. Third Semester
Course Code - ZOL- 311
Zoology Paper: V
DEVELOPMENTAL BIOLOGY OF VERTEBRATES
Credits- 02

Total No. of Period – 45 (3 per week)

Evaluation - External 80%, Internal 20%

Marks-50

Learning objectives:

1. To provide a comprehensive understanding of the concepts of early development of animals.

2. To develop a critical appreciation of methodologies those use to study the process of embryonic development in animals.

Learning outcomes: Students should be able to know the basic concepts related to embryonic development and to understand the basis of life of animal.

Unit 1: Basics of Developmental Biology **08**

Introduction, scope and concept of developmental biology

Theories of developmental biology: Preformation, Epigenesis, Germplasm.

Unit 2: Gametogenesis, Fertilization and Cleavage **15**

Spermatogenesis, Oogenesis, Structure of human sperm and ovum Vitellogenesis, Types of eggs.

Mechanism of Fertilization, Monospermic and polyspermic fertilization, Significance of Fertilization.

Salient features of cleavage, Types & Pattern of Cleavage

Unit 3: Blastulation and Gastrulation **10**

Morulation, blastulation, fate map, gastrulation process up to the formation of germ layers with respect to frog.

Unit 4: General Topics of Chick and Mammal embryology **12**

Structure of Hen's egg, fertilization and cleavage, formation of primitive streak in chick.

Development of foetal membrane in mammals, Placentation in mammal

SUGGESTED READINGS

Gilbert, S. F. (2006). Developmental Biology, VIII Edition, Sinauer Associates, Inc, Publishers, Sunderland, Massachusetts, USA.
Balinsky, B.I. (2008). An introduction to Embryology, International Thomson C. Press.
Carlson, Bruce M (1996). Patten's Foundations of Embryology, McGraw Hill, Inc
Sastry & Shukal (2012) Developmental Biology, Rastogi Publication, Meerut India.
Jordan E. L. & Verma P. S. (2014). Chordate Zoology, S. Chand Publication. New Delhi, India

B. Sc. Third Semester
Course Code - ZOL- 312
Zoology Paper: VI

Ecology

Credits- 02

Total No. of Period – 45 (3 per week)

Evaluation - External 80%, Internal 20%

Marks-50

Learning Objectives:

1. Understand and appreciate interactions of organisms with environment and the ecosystem dynamics.

2. Awareness of current environmental issues, and understanding of relation between structure and function of ecosystems.

3. Knowledge of local and geographical distribution and abundance of organisms.

4. Develop an appreciation of scope of modern scientific inquiry in the field of Ecology.

5. Study structural and functional adaptations of organisms to their environment.

6. Study conservation of natural resources and management of pollution.

Learning Outcomes:

1. Demonstrate knowledge of biotic and abiotic interactions.

2. Express understanding of environmental issues, and inter-relation between different components of an ecosystems.

3. Ability to elaborate about distribution and abundance of organisms.

4. Apply different experimental techniques to study any ecosystem or its components.

5. Describe the relation between structure and function species in environment.

Unit-1 Introduction of Ecology **10**

Definition, Introduction and Scope of Ecology

Abiotic Components- Temperature, Light and Water

Biotic Components-Producer, Consumer and Decomposers

Unit-2 Ecosystem: **13**

Types of ecosystem- Marine ecosystem, Pond ecosystem, Forest ecosystem and Desert ecosystem. Food chain, Food web, Energy of flow and Ecological pyramids.

Structure of community, Ecological niche, Ecotone and edge effect

Community succession and climax.

Unit-3 Community and Biotic interaction **12**

Definition and basic concepts 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.

Biotic Interactions - Competition, Predation, Commensalism, Mutualism and Parasitism.

Unit-4 Population Ecology: **10**

Definition and basic concepts, Characteristics of population; Density, Natality, Mortality, Dispersion and Age distribution, Population growth, Population regulation.

B.Sc. III Semester

Course Code - ZOL- 321

PAPER:

DEVELOPMENTAL BIOLOGY OF VERTEBRATES

(PRACTICAL) Lab Course

Credits:1.5

Total No. of Period – 45 (3 per week)

Marks-50

1. Study of Whole mount of different types of Sperm (Slides/Charts)
2. Types of Egg and cleavage pattern (Slides/Charts)
3. Study of different stages of frog development.(Slides/Charts/Models/Specimen)
4. Study of types of placenta in Mammals (Charts/Slides)
5. Study of whole mount of 24 Hrs., 36 Hrs., 48 Hrs., 72 hrs., 96 Hrs. Chick embryo (Through Permanent Slide)
6. Slide preparation of Chick Embryo from the Incubated Egg

B.Sc. III Semester

Course Code - ZOL- 322

PAPER:

Ecology and Environmental biology

(PRACTICAL) Lab Course

Credits:1.5

Total No. of Period – 45 (3 per week)

Marks-50

1. Estimation of Dissolved oxygen from given water sample.
2. Estimation of Water Alkalinity from given water sample.
3. Estimation of population density by quadrate method.
5. Study of microscopic fauna of freshwater ecosystem (from pond).
6. Estimation of water holding capacity of given soil sample.
7. Estimation of Salinity/Chlorinity from water sample.
8. **Preparation of permanent slides of the following:**

   a) Spirogyra b) Verticella c) Oedogonium d) Daphnia e) Cyclop f) Mysis

9. Visit to Ecosystem: Marine/Fresh water/Desert Ecosystem
10. Study of animal associasionship with example Competition, Mutualism, Parasitism, Predation and Commensalism.

Recommended Reference Books:

1. Colinvaux, P. A. (1993). Introduction to Ecology. II Edition. Wiley, John and Sons, Inc.
2. Krebs, C. J. (2001). Ecology: The Experimental Analysis of Distribution and Abundance, 6th Edition, ©2009, Pearson
3. Odum, E.P., (2008). Fundamentals of Ecology. Indian Edition. Brooks/Cole
4. Robert Leo Smith Ecology and field biology Harper and Row publisher
5. Ricklefs, R.E., (2000). Ecology. V Edition. Chiron Press
6. Sharma P.D. (2002) Ecology and Environment, Himalaya Publication
7. Verma and Agarwal- Principal of Ecology
8. Dutta- Fundamentals of Ecology
9. Clarke,G.L. Elements of Ecology

Skill Enhancement Course (SEC)

Learning Objectives:

1. The subject aims to provide a broad multidisciplinary course in zoology.

2. To promote training in practical and conceptual skills in biology.

3. To equip students with adequate practical knowledge that will enable them be self reliant and biomedical, agro-aqua cultural, environmental and human development industries.

4. To equip students with adequate research techniques that will enable them towards the perfection for national and global economics.

Learning Outcome:

At the end of course, student should be –

1. Able to analyze, study and report on material learned.

2. Able to assess the scope of animal biology and select appropriate area for further study.

3. Able to integrate related topic from separate parts of the course

PROPOSED SKILLS IN ZOOLOGY FOR B.SC. II YEAR
CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER PATTERN
, Semester – III
SEC – I(A) : Hematology
Skills for 02 Credits
Total No. of Period – 45 (3 per week)

Skill Enhancement Course
ZOL-SEC-313: HAEMATOLOGY

Marks-50

Learning Objectives

1. To understand the composition and functions of human blood.

2. To appreciate different types of compounds used in processing and storage of blood.

3. To learn different techniques used in study of blood cells.

4. To develop skill of collecting, preserving and analyzing blood samples.

5. To learn about changes in blood composition in disease.

Learning Outcomes

1. Ability to explain composition and functions of blood.

2. Knowledge about compounds used in processing and storage of blood.

Unit – 1 **10**

Introduction - Definition, Components, Blood– Structure and Functions of blood cells, Lymph.

Collection of Blood- Collection of blood by skin puncture, Collection of blood by Venipuncture, Collection of arterial blood..

Unit – 2 **12**

Anticoagulants - Definition, Action of E. D. T. A., Oxalates, double oxalates, fluorides, acid citrate, dextrose-trisodium citrate, heparin.
Effect of anticoagulants on blood cell morphology.

Hemoglobin - Normal structure and various hemoglobin, Determination of hemoglobin by various methods.

Unit-3 **10**

Study of Blood Cell Count - Total WBC Count, Total RBC Count, Platelets Count, Absolute Eosinophil Count, Reticulocyte Count.

Unit-4 **13**

Study of Blood Smear for differential WBC Count - Preparation and Staining of smears, Counting Methods, Morphology of White cells, Types of White Cells, Abnormalities inmorphology of blood cells and related diseases.

REFERENCE BOOKS:

1. Medical Laboratory Technology - Ramnik Sood
2. Medical Lab Technology Vol. I, II & III – Kanai Mukherjee
3. Hand Book of Medical Technology - Mrs. Chitra
4. Medical Laboratory Technology – A. Ananthanarayan
5. Manual for Laboratory Technician of Primary Health by Minister of Health
6. Human Physiology Vol. I & II – C. C. Chatterji

CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER PATTERN
B. Sc. Second Year, Semester – III
SEC – I (B):
Skills for 02 Credits

Skill Enhancement Course
ZOL--313 SEC-1 (B): URINOLOGY

Marks-50

Learning Objective

1. Understanding structure and function of human urinary system.

2. Learning about formation and composition of urine.

3. Appreciate importance of urine composition in detecting disease.

4. Instill skill to perform basic urinary system function tests.

5. Develop ability to handle and process urine samples.

Learning Outcomes

1. Ability to describe function of human urinary system.

2. Skill to collect, preserve, process and store urine samples

Unit – 1 **10**

Definition, Structure and Functions of Urinary System, Physiology of Mechanism of Urine formation.

Unit - 2 **12**

Constituents and composition of Urine, Normal constituents and abnormal constituents of Urine-Qualitative tests for sugar,albumin, ketone bodies, bile salts and bile pigments.

Unit - 3 **12**

Renal Function Tests, Definition, importance of tests like urea, creatinine, uric acid, proteins

Importance of Dialysis

Unit– 4 **11**

Collection and preservation of Urine Sample, Physical and Chemical Examinations of abnormal constituents.Microscopic Examination of urine,Preparation of Urine Report, Urinometer.

REFERENCE BOOKS

7. Medical Laboratory Technology - Ramnik Sood
8. Medical Lab Technology Vol. I, II & III – Kanai Mukherjee
9. Hand Book of Medical Technology- Mrs. Chitra
10. Medical Laboratory Technology – A. Ananthanarayan
11. Manual for Laboratory Techniian of Primary Health by Minister of Health
12. Human Physiology Vol. I & II – C. C. Chatterjee

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Semester Pattern Curriculum under, Choice based Credit System (CBCS)
Under Graduate Bachelor Degree Programme (B.Sc.)
Faculty of Science and Technology
Subject- Zoology
Course Structure and Curriculum with Examination Scheme
(Effective from academic year 2022-23)
B. Sc. Second Year (Semester –IV)

Semester IV								
	Course code	**Course Title**	**Total Periods (Teaching period/weeks)**	**Credits**	**Scheme of the Examination**			
					Max. Marks	**CIA**	**UA**	**Min. Marks**
Optional I (DSC-1C) Core courses	ZOL -411	Core Course (Theory Paper-VII) **Biochemistry and Endocrinology**	45(3/week)	2	50	10	40	20
	ZOL -412	Core Course (Theory paper -VIII) **Evolution**	45(3/week)	2	50	10	40	20
	ZOL -421	Lab Course 4 (Practical paper based onZOL -411) **Biochemistry and Endocrinology.**	45(3/week)	1.5	50	10	40	20
	ZOL -422	Lab Course 5 (Practical paper based onZOL -412) **Evolution.**	45(3/week)	1.5	50	10	40	20
Skill Enhancement Course (SEC1)	ZOL -413	SEC-2 Any one skill to be chosen out of two- **SEC-2(C) Microtechnique, SEC-2(D) Apiculture**	45(3/week)	2	50	10	40	20
Ability Enhancement compulsory courses (AECC-3)	XXX-431	Communication Skill in English-III	45(3/week)	3	50	10	40	20
	XXX-432	Marathi/Hindi/Urdu/Sanskrit A Student can for any one of these language (SL-III)	45(3/week)	3	50	10	40	20
Additional credits		Environmental Studies						
			315	15	350	70	280	140
Total Credit for Semester III: 15 (Theory:12:Laboratory:3)								

Dr. S.N. Borde

Core Course (Theory Paper-VII)

B.Sc. IV Semester

Course Code - ZOL- 411

PAPER:

BIOCHEMISTRY AND ENDOCRINOLOGY

Credits- 02

Total No. of Period – 45 (3 per week)

Evaluation - External 80%, Internal 20%

Marks-50

Learning objective:

1.To understand the structure and function of biomolecules inanimals .

2.To understand and identify the structure and function of endocrine system.

Learning outcome :

Students will learn the fundamentals of biochemical process and their applications and will understand the structure and function of endocrine system.A-

BIOCHEMISTRY

Unit 1. Carbohydrates: - **08**

Monosaccharide's, Disaccharides, Polysaccharides and Oligosaccharides

Metabolism: - Glucogenesis, Gluconeogenesis, Glycolysis, TCA. & oxidative phosphoration.

Unit 2. Proteins: - **12**

Classification -simple, conjugated and derived proteins,

Structure of proteins: - Primary, secondary, tertiary and quarterly.

Metabolism: - Deamination and transamination.

Structure of amino acid & peptide bond formation

Immunoglobulin's-biological significance

Unit 3. Lipids **08**

Types of Lipid & Biological role.
Metabolism: B-Oxidation and cholesterol biosynthesis
Ketosis, Ketogenesis and Ketolysis.

Unit 4 Enzymes and Vitamin **05**

Factor affecting enzyme activity and Mechanism of enzyme action

Sources and deficiency of vitamins

B. ENDOCRINOLOGY

Unit-5 Endocrine system of vertebrates: - **12**

Significance of endocrine and neuro - endocrine system.Endocrin glands- Morphology, Structure and function Pituitary gland, Thyroid gland Adrenal gland, Pancreas, Pineal Gland,Testis and Ovaries,

Core Course (Theory Paper-VIII)

B.Sc. IV Semester
Course Code - ZOL- 412
PAPER:
Evolution

Credits- 02

Total No. of Period – 45 (3 per week)

Evaluation - External 80%, Internal 20%

Marks-50

Learning Objectives:

1. To know the history and concept of evolution.

2. To understand the mechanisms and factors involving in evolution process .

3. To acquire increased theoretical and practical knowledge of various processes of Molecular Genetics.

4.To study the techniques for obtaining genetically modified organisms.

Learning Outcome :

On successful completion of the course, the students will be able to

1. Understand the theories and concepts of evolution.

2. Learn the process of evolution in animals.

3. Understand the patterns of evolutionary changes in animals.

4. Understand the organization and functions of genetic material in the living world.

5. Understand the Recombinant DNA Technology

Unit-1 Concept of organic evolution and Origin of life. 14

Defination and concept organic evolution, Theories of Organic evolution in brief , Preformation theory ,Bear's Law, Biogenetic law, catastrophism, Lamarckism, Darwinism and Germplasm theory.

Origin of Life – Definition, Abiogenesis, Biogenesis, Chemical evolution of life.

Unit-2 Evidences and basic patterns of Evolution: 14

Anatomical evidences, Embryological evidences, Paleontological evidences.

Adaptations:-Aquatic, Terrestrial, Fossorial, Volant and Desert.

Sequential and Divergent evolution.

Microevolution- concept, silent features & Mechanism with example

Macroevolution- concept, silent features & Mechanism with exampleMega evolution- concept, silent features & Mechanism with example

Unit-3 Elemental forces of evolution **07**

Concept and role in Evolution- Mutation, Recombination Natural Selection,Isolation and Genetic Drift

Unit- 4 Species and Speciation **10**

Morphological, Genetical, Biological concept of Species.

Speciation- Defination, Concept, Mechanism

Allopatric, Sympatric and Parapatric speciation

B.Sc. II Year PRACTICAL SYLLABUS

B.Sc. IV Semester

Course Code - ZOL- 421 (Lab Course)

BIOCHEMISTRY AND ENDOCRINOLOGY

(Based on theory paper VII-ZOL-411)

Credits:1.5

B.Sc. III Semester

Marks-50

1. Preparation of solutions of given percentage, normality and molarity.

Study of analytical instrument principle and applications.

pH meter ,Colorimeter, Centrifuge ,Electrophoresis

2. Factors affecting enzymes activity temperature and pH.

3. Detection of amino acid by paper chromatography.

4. **Qualitative test for organic compound**.

Carbohydrate,. Protein .Fats.

5. Quantitative estimation of protein from animal tissue using Lawry's method.

6. **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 Pancreas. T.S. of Testis, T.S. of Ovaries.

SUGGESTED READINGS

- 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
- Rangnatha Rao K-Text Book of Biochemistry, Prentice-Hall of India
- C.B.Powar- Biochemistry – (Himalaya Pub.)
- Das.-Biochemistry
- Nelson and Cox - Principles of Biochemistry. Lehninger. 2nd Ed. CBS publishers.
- R.H. Williams, Textbook of Endocrinology, W.B. Saunders
- E.J.W. Barrington, General and Comparative Endocrinology, Oxford, Clarendon Press.

B.Sc. II Year PRACTICAL SYLLABUS

B.Sc. IV Semester

Course Code - ZOL- 422 (Lab Course)

Evolution

(Based on theory paper VIII-ZOL-412)

Credits:1.5 Marks-50

1. Study of evidences by using photograph/charts and models

a) Analogous and Homologous organs

b) Connecting link (*Peripatus and Archaeopteryx*)

c) Embryological evidences

2. **Study of adaptations** (Museum Specimens).

3. Study on patterns of speciation with the help of Charts/Models/Pictures

a) Allopatric Speciation

b) Sympatric Speciation

4. Study of successive stages of evolution with the help of Charts/models

a) Horse

b) Human

Recommended Reference Books:

1. Evolution – Moody
2. Evolution – Gopalkrishnan
3. Organic Evolution – M.P. Arora (Himalaya Pub. House)
4. Evolution – M.W. Strickberger (CB Publishers)
5. Organic Evolution – N. Armugam (Saras Pub.)
6. Evolution- Surjeet Publication, Delhi
7. Jha,A.P. Genes & Evolution, John Publication, New Delhi
8. P.K. Gupta-Ecology, Genetics and Evolution
9. Tomer and Singh-Organic evolution, Rastogi Publication, Meerut

CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER PATTERN
B. Sc. Second Year, Semester – IV
SEC2–(C)
Skills for 02 Credits

Skill Enhancement Course
ZOL- 413: Micro technique

Marks-50

Learning Objective

1. Learning the methods in storage and histochemical processing of tissue Samples

2. Appreciation of structure of cells in different types of tissues

3. Acquired the ability and skill to prepare histological slides of different tissues

4. Learn about tools used in microtechnique.

Learning outcomes

1. To identify different types of tissues and distinguish between different componentsof cells. Handle and catalogue slides of different tissues .
2. To acquire the skill related to different processes in microtechnique.

Unit - 1 **08**

1. Introduction – Definition of Histotechnology.

2. Methods of examination of tissues and cells, Collection and labeling of specimens, Methods of preparation and examination of tissues (fresh and fixed tissue)

Unit- 2 **12**

3. Fixation of tissue - Definition, Criteria for an ideal fixative, types (Simple and Compound), Properties of Simple and Compounds fixatives (Microanatomical, cytological, histochemical)

Practical – Isolation and collection of tissue, fixing and block preparation.

Unit - 3 **12**

4. Tissue processing - Manual and automatic tissue processing, Different embedding media, Steps of tissue processing (Dehydration, Clearing, Impregnation).

5. Embedding- Methods of Embedding, Embedding medium, names of medium and moulds, Automatic Tissue Processes (Structure and Working, Advantages and Disadvantages).

Practical – Tissue processing of prepared blocks.

Unit - 4 **13**

6. Section Cutting - Types of Microtome, Rotary Microtome -Parts and their functions, Microtome Knives- Types, Care and Maintenance Techniques of sharpening; Technique of Section Cutting, Preparation of Adhesive Mixture, Mounting.

7. Staining - Definition and Significance of Staining, Stain and Staining Types, Theory of Staining, Methods of Staining.

Practical – Section Cutting, fixing, alcohol grading, staining and preparation of permanent slide.

Reference book:

1. Histochemical Techniques – J. D. Bancrot.
2. Handbook of Histopathological and Histochemical Techniques - C.F.A. Culling.
3. Histological and Histochemical Methods 4th Edition – John Kiernan

CHOICE BASED CREDIT SYSTEM (CBCS)
SEMESTER PATTERN

B. Sc. Second Year, Semester – IV
SEC2 – (D)
Skills for 02 Credits

Skill Enhancement Course
ZOL-413 APICULTURE

Learning Objectives

1. To learn about life history and social structure of honey bee species.
2. To study bee rearing and farming methods and the equipment involved.
3. To learn about apiculture benefits and different byproducts & their economic scope.
4. To study the different bee diseases and predators and their control measures.

Learning Outcomes

1. Ability to understand and describe the life stages and social organization of honey bee species.
2. Ability to correctly explain and perform bee rearing, farming and harvesting practices.
3. Appreciate the economic importance of derivative benefits and byproducts of apiculture.

Unit – 1 : Biology of Bees. **08**

1. History, Classification and Biology of Honeybees.
2. Social Organization of Honey bees.

Unit– 2 : Rearing of honey bees. **14**

3. Artificial Bee Rearing (Apiary), Believes – Newton and Langstroth, Bee Pasturage, Selection of Bee Species for apiculture, Bee keeping equipment, Methods of extraction of honey (Indigenous and Modern).

Practical - Visit to the Apiculture centers, Collect practical information of artificial Bee Hives and its mechanism.

Unit –3 : Diseases and enemies **08**

4. Bee diseases and enemies, Control and preventive measures.

Unit– 4 : Economy of bees and entrepreneurship **15**

5. Products of Apiculture industry and its uses (Honey, Bee wax, Propolis, Pollen etc.).

6. Bee keeping industry – Recent efforts, Modern methods in employing artificial believes for Cross pollination in horticulture gardens.

Practical – Collection of natural bee hives, wax, honey etc.

REFERENCE BOOKS:

1. Apiculture - Prost, P. J. (1962), Oxford and IBH, New Delhi.
2. Apiculture - Bisht D. S., ICAR Publications.
   Bee Keeping in India - Indian Council of Agricultural Research, New Delhi

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
Semester Pattern Curriculum under, Choice based Credit System (CBCS)
Under Graduate Bachelor Degree Programme (B.Sc.)
Faculty of Science and Technology
Subject- Zoology
B.Sc. Second Year
(Semester III &IV)
Question paper pattern (Theory)
Paper No. :
Subject code No.:

Time 1.30 Hrs Max.Marks:40

All questions are compulsory. All question carry equal marks.

Q.1. Long Answer Question . 10

Or

Long Answer Question.

Q.2. Long Answer Question . 10

Or

Long Answer Question.

Q.3. Write Short Notes. (Any two) 10

Q.4. Write Short Notes . (Any two) 10

Dr. S.N. Barde