NUTAN MAHAVIDYALAYA,SAILU-431503
DIST.PARBHANI
Affiliated to Swami Ramanand Teerth Marathwada University, Nanded.
NAAC Re-accredited B+ Grade

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NUTAN MAHAVIDYALAYA SAILU

CROSS-CUTTING ISSUE (PROFESSION ETHIES)

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Zoology

B.Sc. Second Year, Semester – III

SECZ –I (A): HAEMATOLOGY

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.

UNIT – I

1. Introduction- Definition, Components, Cells – Structure and Functions of cells, Lymph.

Collection of Blood- Collection of capillary blood by skin puncture, Collection of blood by Venipuncture, Collection of arterial blood, Criteria for sample collection.

- Practical- Collection of blood by Venipuncture and arterial blood. Determination of blood group of provided blood sample.

UNIT – II

2. Anticoagulants - Definition, Action of EDTA, Oxalates, double oxalates, fluorides, acid citrate, detxtrose-trisodium citrate, heparin - Effect of anticoagulants on blood cell morphology.

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3. Haemoglobin - Normal structure and various haemoglobin, Determination of haemoglobin by various methods - Anaemia.

- Practical - Determination of haemoglobin from given blood sample, Clotting and bleeding

time of blood.

UNIT – III

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

Eosinophil Count, Reticulocyte Count.

- Practical – Determination of Total Count of RBC, WBC.

UNIT – IV

5. Study of Blood Smear for differential WBC Count - Preparation and Staining of smears,

Counting Methods, Morphology of White cells, Types of White Cells, Abnormalities in morphology of blood cells and related diseases.

- Practical – Determination of differential WBC Count by blood Smear.

Outcomes

1. Ability to explain composition and functions of blood.
2. Knowledge about compounds used in processing and storage of blood.
3. Skill to be able to use different techniques used in study of blood cells.
4. Ability to collect, preserve and analyze blood samples.
5. Knowledge of changes in blood composition in disease.

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. Chatterjee

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CROSS-CUTTING ISSUE (PROFESSION ETHIES)

Zoology

B.Sc. Second Year, Semester – IV

APICULTURE

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.

UNIT- I: BIOLOGY OF BEES

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

- Practical – Study of different species of locally available honey bees.

UNIT- II: REARING OF HONEY BEES

3. Artificial Bee Rearing (Apiary), Bee hives- 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, Submission of report about different equipment and procedures used in keeping of artificial bee hives.

UNIT- III: DISEASES AND ENEMIES

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

- Practical- Study of different parasites and predators of honey bees.

UNIT- IV: ECONOMY OF BEES AND ENTREPRENEURSHIP

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, honey etc.
- Practical- Extraction of bees wax from bee hive.

Outcomes

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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.
4. To identify and take remedial measures against the different bee diseases and predators.

REFERENCE BOOKS:

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

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CROSS-CUTTING ISSUE (*Environment and Sustainability*)
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B.Sc. THIRD Year, Semester – V

VERMICULTURE AND VERMICOMPOSTING

Objectives:
1. Study the morphology and biology of different species of earthworms used in vermiculture.
2. Acquire knowledge and skill of rearing earthworms and using them in vermicomposting at
different scales and under different culture conditions.
3. Train in the operation and use of implements and equipment used in vermicomposting.

UNIT – I 11
1. Vermiculture – Definition, History, scope and economic importance.
2. Earthworms-Taxonomic Position and Diversity of different species of earthworms.
3. *Eisenia fetida*- Systematic position, Morphology and Life cycle.

Practicals:
1. To Study different species of earthworms.
2. To Study morphological features of composting earthworm, *Eisenia fetida*
3. To study Life cycle of *Eisenia fetida.*
4. Identification of Earthworm cocoons and vermi casts

UNIT – II 11
1. Common species for Vermiculture; Environmental requirements; culture methods
2. Applications of Vermiculture. 3. Earthworm Pests and Diseases.

Practicals:
1. Collection and identification of common species of earthworms for vermiculture.
2. Study of Earthworm Pests and diseases.

UNIT – III 12
VERMICOMPOSITING
1. Vermicomposting Materials
2. **Types of vermicomposting:**

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a) Small Scale Vermicomposting b) Large Scale Vermicomposting
3. **Methods of Vermicomposting:** Bed Method, Pit Method.
4. Phases and Steps of Vermicomiposting.

Practicals:

1. Study of Vermicompost equipments, devices.
2. Preparation of Vermibeds.
3. Demonstration of preparation pit method.
4. Preparation of vermicomposting pits at local area (college or home gardens)

UNIT- IV 11

VERMICOMPOSTING

1. Harvesting
2. Nutrient Content of Vermicompost
3. Advantages of Vermicompost
4. Vermiwash, Preperation and Applications
5. Prospects of vermi-culture as self employment venture

Practicals:

1. Collection of vermiwash and use of vermiwash.
2. To study the effect of vermicompost on any plant.
3. Visit to Agricultural Farm/Field to nearby Krishi Vidnyan Kendra to study vermicultures and
vermicomposting Units.

Outcomes:

1. Knowledge of morphology and biology of earthworms used in vermiculture.
2. Ability and skill of rearing earthworms and using them in vermicomposting.
3. Proper operating of implements and equipment used in vermicomposting.

REFERENCE BOOKS

1. R.K. Bhatnagar & R.K. Palta- Earthworm Vermiculture and Vermicomposting, Kalyani Publishers, No. 1, Mahalakshmi Street, T. Nagar, Chennai -600 017.
2. P.K. Gupta - Vermi Composting for Sustainable Agriculture. AGROBIOS (India), Agro House,
Behind Nasrani Cinema, Chopasani Road, Jodhpur – 342 002.
3. Sathe, T. V.- Vermiculture and Organic Farming. Daya Publishing House
4. Sultan Ahmed Ismail, - The Earthworm Book, Second Revised Edition. Other India Press, Goa,
India.
5. Bhatt J.V. & S.R. Khambata (1959)- Role of Earthworms in Agriculture. Indian Council of Agricultural Research, New Delhi.
6. Dash, M.C., B.K.Senapati, P.C. Mishra (1980) - Verms and Vermicomposting. Proceedings of the
National Seminar on Organic Waste Utilization and Vermicomposting Dec. 5-8, 1984, (Part
7. Edwards, C.A. and J.R. Lofty (1977)- Biology of Earthworms. Chapman and Hall Ltd., London.

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B.Sc. THIRD Year, Semester – VI

AQUARIUM KEEPING

Objectives:

1. Explore different types of aquariums and material used to fabricate them.
2. Acquire skill to handle and process material and accessories for aquarium fabrication and installation.
3. Study water parameters for a healthy aquarium.

Unit- I 11

Introduction to Aquarium Keeping, Aquarium – Definition, Shape and size

Types of aquarium- wooden, Steel, fibre glass, plastic acrylic, iron frame, full glass, garden pool etc.

Practicals:

1. To study different types of aquarium
2. Visit to Aquarium

Unit- II 12

Construction of aquarium- Design and fabrication

Materials - Aluminum/ Iron angle, Hack sow, blade, drilling machine, Hammer, glass, glass cutter, tape, file, set square, angle cutter, sticky tape, aquarium cement, silicon tube, silicon gun etc.

Practicals:

1. Angle cutting for frame of aquarium.
2. Rivetting of angle to form a side of aquarium.
3. Fixing of glass of one side in the frame of aquarium with the help of bitumen/ aquarium cement / silicon etc.
4. Cutting of glasses of given size

Unit III 11

Setting of Aquarium- Selection of place for aquarium, table or stand, cover for aquarium, light, watering, planting, preparation of bed-sand, gravels, rocks, coarals, back glass painting or poster,

Aquarium accessories- Aerator, air-stone, toys, filtration, hand net, rubber tube and connectors.

Thermometer, heater etc.

Practicals:

1. Identification of various aquarium tools

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2. Identification of various aquarium accessories
3. Preparation of aquarium bed.
4. Watering of aquarium
5. Planting of aquarium
6. Lighting of aquarium

Unit – IV 11

Maintenance

1. Water parameters/ test and monitor, cycling of water.
2. Cleaning of aquarium, light management
3. Food of feeding- live food and dry food/
4. Preparation of supplementary food for aquarium fishes.
5. Aquarium fishes
6. Significance of aquarium.

Practicals:

1. Cleaning of aquarium
2. Identification of aquarium fishes
3. Preparation of supplementary food from grains for aquarium fishes
4. Checking fish health
5. Marketing

Outcomes:

1. Describe different types of aquariums and raw material used to fabricate them.
2. Ability to properly handle material and accessories for aquarium fabrication and installation.
3. Identify water parameters and adjust them to normal conditions.

REFERENCE BOOKS

1. Guide to keeping and breeding the aquarium fishes (1968). Bombay aquarium Society,
Mumbai.
2. Fresh water aquarium, Dawes, J.A., Roberts Royee Ltd. London
3. A Text Book of Pisciculture and Aquarium Keeping- DhananjayJadhav, Mohan Babre.
4. Hand Book of Fish aquarium- Hiware and Sonwane,
5. A Text Book of Pisciculture & Aquarium Keeping- H. S. Jagtap, S. N. Mukherjee & V. K.Garad., Daya Publishing House, New Delhi.
6. Practical Manual of Pisciculture and Aquarium Keeping- H. S. Jagtap, S. N. Mukherjee & S. S.
Nanware, Daya Publishing House, New Delhi
7. The complete book of the Fresh water aquarium-Vincent Hargreaves
8. How to maintain your fresh water aquarium-ThomsRiggson
9. The Complete aquarium Book- Nilliam T. Innes.

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