



**SARVODAYA KELAVANI SAMAJ MANAGED,
SHREE MANIBHAI VIRANI & SMT. NAVALBEN VIRANI SCIENCE COLLEGE
AN AUTONOMOUS COLLEGE- AFFILIATED TO SAURASHTRAUNIVERSITY,
RAJKOT**

Re-accredited at the 'A' Level (CGPA 3.28) by NAAC
'STAR' College Scheme & Status by MST-DBT
A College with Potential for Excellence - CPE (Phase-II) by UGC
UGC-DDU KAUSHAL Kendra
Accredited at the G-AAA Highest Grade 'A-1' Level by KCG, Govt. of Gujarat
UGC-DDU KAUSHAL Kendra
GPCB-Government of Gujarat approved Environment Audit Centre

Board of Studies (BoS)

Department of Biology

MoM

| Academic Year | Meeting Number | Date |
|----------------------|-----------------------|----------------|
| 2021 - 2022 | Eighth | 18 - 12 - 2021 |

**Shree Manibhai Virani & Smt. Navalben Virani Science College, Rajkot
(Autonomous)**

Affiliated to Saurashtra University, Rajkot

Department of Biology

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SHREE MANIBHAI VIRANI & SMT. NAVALBEN VIRANI SCIENCE COLLEGE

Affiliated to Saurashtra University, Rajkot

8th Meeting of Board of Studies in Botany / Zoology

Faculty of Science

Department of Biology

Date: 18 /12 / 2021

Time: 12 – 00 noon

Venue: Board Room

MINUTES OF THE MEETING

Agenda & notes

1 Syllabus of IDC course for,

1.1 – B.Sc. Biochemistry Programme Semester II.

1.2 – B.Sc. Microbiology Programme Semester II.

2. Syllabus of VAC course for all B.Sc. Programme Semester II.

3. List of Paper setter and Examiner for IDC course to semester II of B.Sc. Biochemistry and B. Sc. Microbiology.

4. List of for Practical and Theory paper evaluation offered to semester II of B.Sc. Biochemistry and B. Sc. Microbiology.

5. Any other matter with the permission of the Chair.

BoS Memebers:

| Sr. No. | Name | Membership | Present/Absent |
|----------------|-------------------------------|--|-----------------------|
| 1 | Dr. Reena P. Dave | Chairman | Present |
| 2 | Dr. Rahul S. Gohel | Member Secretary | |
| 3 | Dr. B. B. Radadia | Member from the Department | |
| 4 | Dr. Y. M. Kadiyani | AC nominated subject expert | |
| 5 | Dr. Nikesh Kotadiya | AC nominated subject expert | |
| 6 | Dr. Anvay Upathyay | VC Nominated Subject expert | |
| 7 | Dr. Manish Vishavadiya | Co-opt member | |
| 8 | Dr. Neha T. Patel | Member from the department | |
| 9 | Dr. Manish N. Jani | AC nominated subject expert | |
| 10 | Dr. R. S. Patel | AC nominated subject expert | |
| 11 | Dr. Rutva Dave | VC Nomineted | |
| 12 | Dr. B. A. Jadeja | Co-opt member | |

The chairperson, **Dr. Reena P. Dave**, well-comed all the members of BoS.

Minutes of Meeting:

The Board of Studies in Biology (Boptany / Zoology) met as indicated above and discussed on the aforementioned Agenda. Sharing the expertise of all the members and with very proactive inputs, the members unanimously resolved the following:

1. Common Agenda
 - a. NEP 2020 for adoption – **Appreciated and Recommended**
 - b. OBE concepts specific to UG programs Semester - II IDC Botany and IDC Zoology **Appreciated and Recommended.**
 - c. Models of conceptual frameworks for UG programs under Choice Based Credit System (CBCS) – **Agreed and Recommended**
 - d. General note on Concept to Practice component – **Appreciated and Recommended**
 - e. General Academic Rules and Regulations – **Recommended**

The above will be effective for students admitted from **AY 2021-22** & onwards

2. The Syllabi for IDC offered to below stated programmes of the Department were **discussed & framed.**

- Semester II B.Sc. Microbiology (**Enclosure –I A1**)
- Semester II B. Sc. Biochemistry (**Enclosure –I A2**)

3. The Syllabi for Value Added Course offered to below stated programmes of the Department were **discussed & framed.**

- **Regional Medicinal plants and Herbal Remedies (Enclosure - I A3)**
- **Aquarium Management (Enclosure - I A4)**

Discussions:

List of courses where syllabus is modified 20% & more in terms of content

List of the courses whose title got changed

- (1). IDC II Botany Medicinal Botany.
- (2) IDC II Zoology Taxonomy, Histology and Applied Zoology.

The detailed syllabi in the new format for adoption of OBE indicating course outcomes with K levels, pedagogical & assessment tools as appended.

The above will be effective for students admitted from **AY 2021-22** & onwards

4. List of Paper Setter and Examiner for the 2nd semester courses were discussed and finalized as indicated in (**Enclosure – II**)

5. Question paper pattern for 2nd semester theory & practical courses were discussed and finalized (**Enclosure – III**)

| Sr. No. | Name | Membership | Present/Absent |
|----------------|-------------------------------|--|-----------------------|
| 1 | Dr. Reena P. Dave | Chairman | |
| 2 | Dr. Rahul S. Gohel | Member Secretary | |
| 3 | Dr. B. B. Radadia | Member from the Department | |
| 4 | Dr. Y. M. Kadiyani | AC nominated subject expert | |
| 5 | Dr. Nikesh Kotadiya | AC nominated subject expert | |
| 6 | Dr. Anvay Upathyay | VC Nominated Subject expert | |
| 7 | Dr. Manish Vishavadiya | Co-opt member | |
| 8 | Dr. Neha T. Patel | Member from the department | |
| 9 | Dr. Manish N. Jani | AC nominated subject expert | |
| 10 | Dr. R. S. Patel | AC nominated subject expert | |
| 11 | Dr. Rutva Dave | VC Nominated | |
| 12 | Dr. B. A. Jadeja | Co-opt member | |

| Semester – II | | |
|---------------|--|-----------|
| Course Code | Course Title (Ap) | Credits |
| 21UMBID201 | IDC-II Botany Botany-Medicinal Botany | 3 Credits |

Course Description:

The course “**Botany-Medicinal Botany**” is specially designed to supplement and enhance the understanding of students about different dimensions of plant identification as a resource for self-sustenance, their domestication, commercialization based on the need and induction of modification using modern application and remedies.

Course Purpose:

This course is required for life science majors with a focus in fundamentals, plant resources and applied medicinal botany education. This course introduces student’s concepts and techniques and remedies for working and guiding both plant diversity and plant medicinal plant resource utilization. Course materials relate to several theories of medicinal plant resources, plant anatomy, Plant physiology, plant pathology, plant diversity and medicinal botany, and how those theories contribute to identify morphological attributes and interrelation with medicinal botany utilization. The goal of the course is to development of personal perception of medicinal botany resources and applied phyto Pathology.

Course Outcomes: Upon completion of this course, the learner will be able to

| CO No. | CO Statement | Blooms taxonomy Level (K ₁ to K ₆) |
|-----------------|--|---|
| CO ₁ | Describe a basic knowledge of plant diversity. | K ₁ & K ₂ |
| CO ₂ | Develop skill to understanding and functioning fundamental concept of plant anatomy and physiology. | K ₂ and K ₃ |
| CO ₃ | Develop skill to understanding plant recourses and medical importance. | K ₂ and K ₁ |
| CO ₄ | Increase the awareness and appreciations of plants and medicinal plant product encountered in everyday life. | K ₁ & K ₃ |
| CO ₅ | Explain conceptual understanding of Phytopathology as commercial aspects. | K ₂ and K ₃ |

| Course Content | Hours |
|---|--------------|
| Unit I: Plant Kingdom and diversity | 9Hrs |
| <ul style="list-style-type: none"> • General characters and outline classification of Algae. • General characters and outline classification of Fungi. • General account and outline of classifications of Bryophyta. • General account and outline of classifications of Pteridophyta. • General account and outline of classifications of Gymnosperms. | |
| Unit-II Plant Physiology and Plant Anatomy | 9 Hrs |
| <ul style="list-style-type: none"> • Plant-water relations • Photobiology • Components & Classification of Simple Tissue. • Components & Classification of Complex Tissue. • Techniques to study Plants Tissue – Microtomy. | |
| Unit- III Plants product and Medicinal Importance | 9 Hrs |
| <ul style="list-style-type: none"> • Alkaloids yielding plants – Sarpgandha, Tobacco • Dye yielding plants – Heena, Kesudo • Oil yielding plants – Ground nut, Nilgiri • Resin yielding plants – Pinus, Gugal • Gum yielding plants – Neem, Baval | |
| Unit- IV Medicinal Plant and Wellness of Diseases | 9 Hrs |
| <ul style="list-style-type: none"> • Usage of plants for wellness of respiratory disease – Ardusi, Tulsi • Usage of plants for wellness of gastrointestinal disease – Kariyatu, Kadu • Usage of plants for wellness of dermatological disease –, Turmaric, Chandan • Usage of plants for wellness of cancer disease – Kuvarpathu, Barmasi • Scope and future of medicinal plants | |
| Unit-V Phyto Pathology | 9 Hrs |
| <ul style="list-style-type: none"> • General symptoms of disease and Different methods of plant disease control • TMV | |

| | |
|---|--|
| <ul style="list-style-type: none"> • Tikka disease of ground nut • Red rot of sugar cane • Citrus canker | |
|---|--|

Text Books:

- Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R. (2005). Biology. Tata McGraw Hill, Delhi (For Unit 1, 2, 3, 4).
- Sharma, P.D. (2011). Plant Pathology, Rastogi Publication, Meerut, India. (For Unit 5)

Reference Books:

- Agnes Arber (1999). Herbal plants and Drugs. Mangal Deep Publications.
- Taiz, L., Zeiger, E., Miller, I.M. and Murphy, A (2015). Plant Physiology and Development. Sinauer Associates Inc. USA. 6th edition.

PRACTICALS:

**IDC – II Practical
Botany – Medicinal Botany**

| | | | |
|------------|--|-------------------|------------------|
| 21UMBID202 | IDC-II Botany Botany-Medicinal Botany | 6 Hrs/Week | 2 Credits |
|------------|--|-------------------|------------------|

- Observational study of Blue green algae – Nostoc through specimen and slides.
- Observational study of Green algae – Spirogyra through specimen and slides.
- Observational study of Brown algae – Sargassum through specimen and slides.
- Observational study of Red algae – Batrachospermum through specimen and slides.
- Observational study of Fungi- Mucor through specimens and slides.
- Observational study of Fungi- Peziza through specimens and slides.
- Observational study of Fungi- Agaricus through specimens and slides.
- Observational study of Bryophyta – Marchantia through specimens and slides.
- Observational study of Bryophyta – Funaria through specimens and slides.
- Observational study of Pteridophyta – Adiantum through specimens and slides.
- Observational study of Gymnosperm – Cycas through specimens and slides.
- Study of Rotary Microtome.

13. Demonstrate water potential of given tissue (potato tuber).
14. To study evaluation of oxygen during photosynthesis.
15. To study of simple and complex tissue.
16. To study of plant products – Alkaloids.
17. To study of plant products – Dye.
18. To study of plant products – Oil.
19. To study of plant products – Resin.
20. To study of plant products – Gum.
21. To study of medicinal plants - wellness of respiratory disease.
22. To study of medicinal plants - wellness of Gastrointestinal disease
23. To study of medicinal plants - wellness of dermatological disease.
24. To study of medicinal plants - wellness of Cancer disease.
25. To study of Phytopathology - through specimen and slides

References:

- Bendre & Kumar, A text book of Practical Botany part I & II, 2010, Rastogi Publication, Meerut.
- Dr. B. P. Pandey, Modern Practical Botany (Vol-I, II & III), 2012, S. Chand Publication, New Delhi.

Pedagogic tools:

- Chalk and Board.
- Power point presentation.
- Seminar.
- Videos.
- By field visit.
- e-learning – Facebook page Royal Botany.
- By models, specimens, charts, permanent slides.
- By workshop.

Methods of Assessment & Tools:

Components of CIE: 30 marks : Theory:

| Sr. No. | Component | Content | Duration (if any) | Marks | Sub Total |
|-----------------------|----------------|--|------------------------|-----------------|-----------|
| A | Test 1 | 1 st 2 units | 1 ^{1/2} hours | 5 (Set for 30) | 20 |
| | Test 2 | All 5 units | 3 hours | 15 (Set for 70) | |
| B | Assignment | | | 05 (Set for 20) | 10 |
| C | Class activity | | | 05 (Set for 20) | |
| Grand Total | | | | | 30 |
| Assignment | | <ul style="list-style-type: none"> • Question answer • Student generated hand book • Essay writing • Case study • Abstract and exclusive study • Power presentation • Chart/model • Herbarium preparation • Poster • Herbarium preparation | | | |
| Class activity | | <ul style="list-style-type: none"> • Quiz • One minute game on the base of the topic • Group discussion, • Student talk, etc... | | | |

Components of CIE: 40 marks : Practical:

| Sr. No. | Component | Content | Duration (if any) | Marks | Sub Total |
|--------------------|------------------------------|-------------------------|-------------------|-----------------|-----------|
| A | Test | 60% of Practical course | 2 hours | 30 (Set for 30) | 30 |
| B | Observation books and record | All Practicals | - | 10 (Set for 10) | 10 |
| Grand Total | | | | | 40 |

Department: Biology

Programme: B.Sc. Biochemistry

| Semester – II | | |
|---------------|--|-----------|
| Course Code | Course Title (Ap) | Credits |
| 21UBCID201 | IDC- II Zoology Zoology – Taxonomy, Histology and Applied Zoology | 3 Credits |

Course Description:

The course “**Zoology – Taxonomy, Histology and Applied Zoology**” is specially designed to understand the nature and basic concept of animal Taxonomy, Forms and functions, Histology, Parasitology, and Applied Zoology. Students can learn the amazing diversity of living forms from simple to complex one. It enlightens how each group of organisms arose and how did they establish themselves in the environment with their special characteristics. It also deals with the differences and similarities between organisms on the basis of their anatomy and histology. This course also emphasis the diseases which are arose by parasites and applied Zoology.

Course Purpose:

This course is required for life science majors with a focus in fundamentals of animal Taxonomy and anatomical structure. With this course, the students can understand the needs of zoology for life and it utilization for the conservation of Biodiversity. The goal of the course is to inspire the knowledge across diverse fields of zoology. By this course students get the complete awareness regarding the chronic disease which common among the society. Student can also get good practice in hands for self sustain economy.

Course Outcomes: Upon completion of this course, the learner will be able to

| CO No. | CO Statement | Blooms taxonomy Level (K ₁ to K ₆) |
|-----------------|--|---|
| CO ₁ | Describe a basic knowledge and understanding on the diversity of non-chordate and Chordate animals and its identification with Taxonomic status. | K ₁ and K ₂ |
| CO ₂ | Illustrate basics of anatomical characteristics and structure in invertebrates. | K ₂ and K ₃ |
| CO ₃ | Develop understanding and functioning of histological structures. | K ₂ and K ₁ |
| CO ₄ | Observe identification and functions of chronic parasitic human diseases and human health. | K ₁ and K ₃ |

| | | |
|-----------------|---|-----------|
| CO ₅ | Demonstrate application and principals of applied zoology for self-sustain economy, economical self-dependency and economical productivity. | K3 and K4 |
|-----------------|---|-----------|

| Course Content | Hours |
|---|-------|
| Unit -I: Animal Taxonomy | 9Hrs |
| <ul style="list-style-type: none"> • Taxonomy of phylum Protozoa to Coelentereta. • Taxonomy of phylum Platyhelminthes to Annelida. • Taxonomy of phylum Arthropoda to Mollusca. • Taxonomy of phylum Echinodermata to Hemichordata. • Taxonomy of Chordate Animals. | |
| Unit-II Human Anatomy | 9 Hrs |
| Type Study: Earth worm. <ul style="list-style-type: none"> • Habit, Habitat and External Characters • Digestive system • Reproductive system • Nervous system • Structure of Septal Nephridia | |
| Unit- III Organ Histology | 9 Hrs |
| <ul style="list-style-type: none"> • Integumentary glands. • Histology of Gastro-intestinal track. • Pancreas. • Thyroid gland • Muscles. | |
| Unit- IV Pathogenic Animals | 9 Hrs |
| <ul style="list-style-type: none"> • Entamoeba • Trypanosoma • Filarial worm • Guinea worm • Ascariasis | |
| Unit-V Applied Zoology | 9 Hrs |
| <ul style="list-style-type: none"> • Aquarium Management • Shrimp culture • Pearl culture • Apiculture • Taxidermy and preservation. | |

Text Books:

1. Jordan E. L. & Varma P.S. (2010) Non-chordate Zoology, S.Chand & Co. Ltd. New Delhi, 4th edition. (for unit 1, 2 & 5).
2. Powar Nagendra S. (2018) Applied Zoology 2nd edition, Adhyayan Publisher and Distributor.
3. Kotpal R. L. Modern Text Book of Zoology: Invertebrate, Rastogi Publications, Merrut.
4. Rastogi, V. B. (1994) Organic evolution. Kedarnath Ramnath, India. (for unit 4).

References:

1. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The Invertebrates: A New Synthesis*, III Edition, Blackwell Science .
2. Walter, H.E. and Sayles, L.P; *Biology of Vertebrates*, Khosla Publishing House

PRACTICALS:

IDC II– Zoology Practical
Zoology – Taxonomy, Histology and Applied Zoology

| | | | |
|------------|---------------------------|----------------------|-----------------|
| 21UBCID202 | Zoology Practicals | 6 Hrs/Week | 2 Credit |
|------------|---------------------------|----------------------|-----------------|

Practicals

1. Identification and Classification of Protozoa and Coelenterata.
2. Identification and Classification of Phylum Platyhelminthes to Annelida.
3. Identification and Classification of Arthropoda.
4. Identification and Classification of Mollusc & Echinodermata.
5. Identification and Classification of Protochordate and Pisces.
6. Identification and Classification of Amphibia & reptiles.
7. Identification and Classification of Aves and Mammal.
8. Study of Connective links.
9. Systems of Earthworm.

10. Histological structure of mammalian organs.
11. Microtomy and its utility.
12. Study of staining technique for permanent slide.
13. Study of Pathogenic Animals.
14. To study the aquarium tank set up and its proper arrangement.
15. To study the types of Aquarium fishes and plants.
16. Study of Aqua culture.
17. Instrumentation in Pearl culture and Api culture.
18. Study of Taxidermy and animal preservation.
19. Digestion of Starch through salivary Amylase.
20. Study of Mitosis.
21. Study of Meiosis.
22. To identify adulteration in Turmeric and Chilli powder.

Reference books

- Lal S. S., Practical book of Non-chordate.,.
- Lal S. S., Practical book of Chordate., 2014, Rastogi publication, Meerut .
- Jaysurya, Arumugam A., Zoology Practical, 2015, Saras Publication, South India.

Pedagogic tools:

- Chalk and Board
- Power point presentation
- Seminar
- Videos
- By field visit
- e-learning – Facebook page Royal Botany
- By models, specimens, charts, permanent slides
- By workshop

Methods of Assessment & Tools:

Components of CIE: 30 marks : Theory:

| Sr. No. | Component | Content | Duration (if any) | Marks | Sub Total |
|-----------------------|----------------|---|------------------------|-----------------|-----------|
| A | Test 1 | 1 st 2 units | 1 ^{1/2} hours | 5 (Set for 30) | 20 |
| | Test 2 | All 5 units | 3 hours | 15 (Set for 70) | |
| B | Assignment | | | 05 (Set for 20) | 10 |
| C | Class activity | | | 05 (Set for 20) | |
| Grand Total | | | | | 30 |
| Assignment | | <ul style="list-style-type: none"> • Question answer • Student generated hand book • Essay writing • Case study • Abstract and exclusive study • Power presentation • Chart/model • Poster • Herbarium preparation | | | |
| Class activity | | <ul style="list-style-type: none"> • Quiz • One minute game on the base of the topic • Group discussion, • Student talk, etc... | | | |

Components of CIE: 40 marks : Practical:

| Sr. No. | Component | Content | Duration (if any) | Marks | Sub Total |
|--------------------|------------------------------|-------------------------|-------------------|-----------------|-----------|
| A | Test | 60% of Practical course | 2 hours | 30 (Set for 30) | 30 |
| B | Observation books and record | All Practicals | - | 10 (Set for 05) | 10 |
| Grand Total | | | | | 40 |

| Semester – II | | |
|---------------|---|--------------------------------|
| Course Code | Course Title (Ap) | Credits |
| 21UBLVA01 | Regional Medicinal plants and Herbal Remedies | 1 Credits (40 hrs Duration) |

Course Description:

The course “**Regional Medicinal plants and Herbal Remedies**” is specially designed to supplement and enhance the understanding of students about The botanical wisdom accumulated by indigenous people has provided humankind with herbal drugs used in human healthcare for thousands of years. Although ancient texts are ceremonies indicate plants were used as medicine from the dawn of history, antibiotics and vaccinations developed in first half of the 20th century led conventional medicine to shun plant material for chemically synthesized replacements.

Course Purpose:

Concerns about modern medicine and changes in life style and research during the past 20 years, however, have led to increased interest in using plants and plant extracts as medicine. In this course, we will focus on a series of plants used in remedial medicines to treat diseases and improve health. Medicinal plants as remedy will be explored through class presentation and discussions, looking to the future of medicines from plants. The goal of the course is to development of personal perception of medicinal botany resources for human health and welfare.

Course Outcomes: Upon completion of this course, the learner will be able to

| CO No. | CO Statement | Blooms taxonomy Level (K ₁ to K ₆) |
|-----------------|--|---|
| CO ₁ | Describe a basic knowledge of medicinal plants and traditional medicinal plants. | K ₁ & K ₂ |
| CO ₂ | Develop skill to understanding and functioning fundamental concept of medicinal plants. | K ₂ and K ₃ |
| CO ₃ | Develop skill to understanding and utilization of plant remedy and plant recourses. | K ₂ and K ₁ |
| CO ₄ | Increase the awareness and knowledge of plants remedy and medical importance and application of plant product. | K ₁ & K ₃ |
| CO ₅ | Explain conceptual understanding importance regarding Nutritive and medicinal values of plants. | K ₂ and K ₃ |

| Course Content | Hours |
|---|--------------|
| Unit I: Ethnomedicine | 3Hrs |
| <ul style="list-style-type: none"> • Introduction of medicinal plants, • History of traditional medicine. • Scope and feature of Ethnomedicinal plants | |
| Unit-II Traditional knowledge and utility | 3 Hrs |
| <ul style="list-style-type: none"> • Traditional knowledge and utility of some medicinal plants in Gujarat • Tribal medicinal plants of Gujarat. • Methods of disease diagnosis and treatment. | |
| Unit- III Medicinal plants and remedies – I | 6 Hrs |
| <ul style="list-style-type: none"> • Cardiovascular diseases and its remedy from medicinal plants. • Respiratory diseases and its remedy form medicinal plants. • Kidney stone - remedy form medicinal plants. | |
| Unit- IV Medicinal plants and remedies – II | 6 Hrs |
| <ul style="list-style-type: none"> • Skin diseases and its remedy from medicinal plants. • Asthma and Bronchitis and its remedy from medicinal plants. • Urinogenital diseases and its remedy from medicinal plants. | |
| Unit-V Common Medicinal plants and remedies | 4 Hrs |
| <ul style="list-style-type: none"> • Plants in day to day life. • Nutritive and medicinal values of fruits and seeds. • Nutritive and medicinal values of Vegetables. | |

Practicals :

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1. Field study for identification of Medicinal plants.
2. Identification and medicinal values of locally available medicinal plants for Cardiovascular diseases.
3. Identification and medicinal values of locally available medicinal plants for Respiratory diseases.
4. Identification and medicinal values of locally available medicinal plants for Kidney stone..
5. Identification and medicinal values of locally available medicinal plants for Skin diseases and Asthma.
6. Identification and medicinal values of locally available medicinal plants for Urinogenital diseases.

7. Nutritive and medicinal values of fruits and seeds.
8. Nutritive and medicinal values of Vegetables.
9. To prepares powder drug of locally available medicinal plants.

References:

1. Ethnobiology – R.K.Sinha & Shweta Sinha – 2001. Surabhe Publications – Jaipur.
2. Tribal medicine – D.C. Pal & S.K. Jain 1998, Naya Prakash, 206, Bidhan Sarani, Calcutta – 700 006.

Text Books:

1. Kumar, N.C. (1993). An Introduction to Medical botany and Pharmacognosy. Emkay Publications, New Delhi.
2. Rao, A.P. (1999). Herbs that heal. Diamond Pocket Books (P) Ltd.,

Pedagogic tools:

- Chalk and Board.
- Power point presentation.
- Seminar.
- Videos.
- By field visit.
- e-learning – Facebook page Royal Botany.
- By models, specimens, charts, permanent slides.
- By workshop.

Methods of Assessment & Tools:

Components of CIE: 30 marks : Theory:

| Sr. No. | Component | Content | Duration (if any) | Marks | Sub Total |
|--------------------|---------------|-------------------------|------------------------|-----------------|-----------|
| A | Test 1 | 1 st 2 units | 1 ^{1/2} hours | 5 (Set for 30) | 20 |
| | Test 2 | All 5 units | 3 hours | 15 (Set for 70) | |
| B | Assignment I | | | 05 (Set for 20) | 10 |
| C | Assignment II | | | 05 (Set for 20) | |
| Grand Total | | | | | 30 |

| | |
|-----------------------|---|
| Assignment | <ul style="list-style-type: none">• Question answer• Student generated hand book• Essay writing• Case study• Abstract and exclusive study• Power presentation• Chart/model• Herbarium preparation• Poster• Herbarium preparation |
| Class activity | <ul style="list-style-type: none">• Quiz• One minute game on the base of the topic• Group discussion,• Student talk, etc... |

Department: Biology
Programmes

Programme: B.Sc. All

| Course Code | Course Title (Ap) | Credits |
|-------------|---------------------|-----------|
| 21UBLVA02 | Aquarium Management | 3 Credits |

Course Description:

This course introduces the freshwater hobbyist to various aspects of successful aquaria management. Rather than being an entertainment guide, which extols the virtues of one or other approach to aquaria management, this course presents the basic principles, themes and steps needed to set-up and maintain a freshwater aquarium.

Course Purpose:

The course provides the key skills needed to set up and operate the aquarium business. This course also fulfills the requirements in order to maintain fish health, quality water chemistry and nutritional requirements, aquarium plants and ornamental plants. The practical section of the course, taught to build new aquarium house, on how to keep fish and aquatic animals as pets, Which fish can live together and those that just don't get along. Students will also learn how to look after them including health care and managing water quality.

Course Outcomes: Upon completion of this course, the learner will be able to

| CO No. | CO Statement | Blooms taxonomy Level (K ₁ to K ₆) |
|-----------------|--|---|
| CO ₁ | Describe a basic knowledge and understanding on the Aquarium Tank, its arrangement and settings. | K1 and K2 |
| CO ₂ | Illustrate basics Knowledge of Aquarium fishes. | K2 and K3 |
| CO ₃ | Develop understanding of Aquarium plants and its importance. | K2 and K1 |
| CO ₄ | Basic knowledge, identification and functions of aquarium instruments and fish food. | K1 and K3 |
| CO ₅ | Gives awareness regarding to aquarium fish disease and its cure. | K2 and K3 |

| Course Content | Hours |
|---|--------------|
| Unit -I: Aquarium Tank and setting | 9Hrs |
| <ul style="list-style-type: none"> • Types of tank • Tank selection • Tank setting and position • Aquascaping. | |
| Unit-II Aquarium Fishes | 9 Hrs |
| <ul style="list-style-type: none"> • Characters of Aquarium fishes. • Community Aquarium fishes. • Ornamental fishes. • Marine Aquarium fishes. | |
| Unit- III Aquarium Plants | 9 Hrs |
| <ul style="list-style-type: none"> • Introduction to Aquarium plants. • Importance of Aquarium plants. • Types of Aquarium plants. • Arrangement of Aquarium plants. | |
| Unit- IV Aquarium Equipments and fish food | 9 Hrs |
| <ul style="list-style-type: none"> • Common Aquarium equipments. • Arrangement of Aerator and Filters. • Fish food management. • Fish food nutrition and its requirement. | |
| Unit-V Aquarium Fish Diseases | 9 Hrs |
| <ul style="list-style-type: none"> • Common aquarium diseases. • Types of aquarium fish diseases. • Cause, symptoms of aquarium diseases. • Cure and treatment for fish diseases. | |

Text Books:

5. Jordan E. L &Varma P.S.(2010) Non-chordate Zoology, S.Chand& Co. Ltd. New Delhi, 4th edition.(for unit 1, 2 &5).
6. PowarNagendra S. (2018) Applied Zoology2nd edition, Adhyayan Publisher and Distributor.
7. Kotpal R. L.Mordern Text Book of Zoology: Invertebrate, Rastogi Publications, Merrut.
8. Rastogi, V. B. (1994) Organic evolution. KedernathRamnath, India.(for unit 4).

References:

3. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The Invertebrates: A New Synthesis*, III Edition, Blackwell Science .
4. Walter, H.E. and Sayles, L.P; *Biology of Vertebrates*, Khosla Publishing House

Practicals :**16**

1. Study of different types of aquarium tanks.
2. Study to aquarium tank arrangement.
3. Aquarium tank setting.
4. Characteristics of Fish.
5. Study of common aquarium fishes.
6. Study of common aquarium plants.
7. Demonstration to fish feed.
8. Study of some aquarium diseases.

Pedagogic tools:

- Chalk and Board
- Power point presentation
- Seminar
- Videos
- By field visit
- e-learning – Facebook page Royal Botany
- By models, specimens, charts, permanent slides
- By workshop

Methods of Assessment & Tools:

Components of CIE: 30 marks : Theory:

| Sr. No. | Component | Content | Duration (if any) | Marks | Sub Total |
|---------|----------------|-------------------------|------------------------|-----------------|-----------|
| A | Test 1 | 1 st 2 units | 1 ^{1/2} hours | 5 (Set for 30) | 20 |
| | Test 2 | All 5 units | 3 hours | 15 (Set for 70) | |
| B | Assignment | | | 05 (Set for 20) | 10 |
| C | Class activity | | | 05 (Set for 20) | |

| | | |
|-----------------------|---|-----------|
| Grand Total | | 30 |
| Assignment | <ul style="list-style-type: none"> • Question answer • Student generated hand book • Essay writing • Case study • Abstract and exclusive study • Power presentation • Chart/model • Poster • Herbarium preparation | |
| Class activity | <ul style="list-style-type: none"> • Quiz • One minute game on the base of the topic • Group discussion, • Student talk, etc... | |

Components of CIE: 40 marks : Practical:

| Sr. No. | Component | Content | Duration (if any) | Marks | Sub Total |
|--------------------|------------------------------|-------------------------|-------------------|-----------------|-----------|
| A | Test | 60% of Practical course | 2 hours | 30 (Set for 30) | 30 |
| B | Observation books and record | All Practicals | - | 10 (Set for 10) | 10 |
| Grand Total | | | | | 40 |
