**JSS COLLEGE OF ARTS, COMMERCE AND SCIENCE**
**(An autonomous College of University of Mysuru)**
**Re-accredited by NAAC with 'A' grade**
**Ooty road, Mysuru-570 025, Karnataka**

# DEPARTMENT OF BIOCHEMISTRY

## EDUCATIONAL VISIT TO THE CENTRAL MARINE FISHERIES RESEARCH INSTITUTE, KOCHI AND KANAN DEVAN HILLS PLANTATION MUNNAR

ON 12TH AND 14TH April 2024

**FOR**

**VI Semester B. Sc.**

**Program in Biochemistry**

**Biotechnology &Biochemistry -BScBtBc**

**Microbiology & Biochemistry -BScMbBc**

**Under**

NATIONAL EDUCATION POLICY -2020(NEP-2020)

# THE CENTRAL MARINE FISHERIES RESEARCH INSTITUTE, KOCHI

## INTRODUCTION

The Central Marine Fisheries Research Institute (CMFRI) is a premier research organization in India dedicated to marine fisheries research. Established in 1947 under the Ministry of Agriculture and Farmers Welfare, it has been instrumental in spearheading research, development, and management initiatives aimed at sustaining and enhancing marine fisheries resources in the country.

Based in Kochi, Kerala, CMFRI plays a pivotal role in understanding the complexities of marine ecosystems, species diversity, and the socio-economic dynamics of coastal communities reliant on fisheries. Its research encompasses a wide array of areas including stock assessment, biodiversity conservation, ecosystem modeling, aquaculture technologies, marine biotechnology, and climate change impacts on fisheries.

The institute operates through a network of regional research centers along the Indian coastline, enabling it to conduct region-specific studies and provide tailored solutions to local challenges. Through collaborative efforts with national and international agencies, CMFRI contributes significantly to policy formulation, capacity building, and sustainable management practices in marine fisheries.

Over the years, CMFRI has been at the forefront of innovation, introducing technologies and methodologies to improve fishery productivity, reduce post-harvest losses, and enhance livelihood opportunities for coastal communities. Its research findings are disseminated through publications, workshops, and training programs, fostering knowledge exchange

and empowerment among stakeholders in the fisheries sector.

# OBJECTIVES:

1. **Research and Development:** Conducting research to understand marine ecosystems, fisheries biology, aquaculture practices, and related aspects to develop sustainable methods for fisheries management and enhancement.
2. **Resource Assessment:** Assessing the status of marine fishery resources including fish stocks, their distribution, abundance, and health, to provide scientific advice for sustainable fisheries management.

3. **Technology Development:** Developing and improving fishing gear, fishing methods, aquaculture techniques, and post-harvest technologies to enhance efficiency, reduce environmental impact, and increase productivity in the fisheries sector.
4. **Capacity Building:** Providing training and education to fisheries stakeholders including fishers, Aqua culturists, policymakers, and scientists to build capacity and enhance their skills and knowledge in fisheries and aquaculture management.
5. **Extension Services:** Disseminating research findings, technologies, and best practices to the fishing community, policymakers, and other stakeholders through extension programs, workshops, publications, and advisory services.
6. **Conservation and Management:** Contributing to the conservation and sustainable management of marine ecosystems and biodiversity through research, monitoring, and advocacy for policy interventions.
7. **International Collaboration:** Collaborating with national and international research organizations, universities, and agencies to exchange knowledge, share resources, and address common challenges in marine fisheries and aquaculture.

## CMFRI KOCHIN;

## RESEARCH AREA OF CMFRI:

* **Marine Fisheries Management**: This includes research on sustainable fisheries management practices, stock assessment methodologies, and policy recommendations for the conservation and management of marine fish stocks.

* **Marine Biodiversity Conservation**: CMFRI conducts research on marine biodiversity, including studies on the distribution, abundance, and conservation status of marine flora and fauna.

* **Marine Ecology**: Research in this area focuses on understanding marine ecosystems, their structure, functioning, and dynamics. This includes studies on coastal and offshore ecosystems, coral reefs, mangroves, seagrasses, etc.

***Marine Biotechnology**: CMFRI conducts research on the biotechnological applications in marine sciences, including bioprospecting of marine organisms for pharmaceuticals, nutraceuticals, and industrial products.

## METHODOLOGY OF CMFRI:

1. **Surveys and Sampling**: CMFRI conducts regular surveys and sampling expeditions to collect data on various aspects of marine fisheries such as fish abundance, diversity, and distribution. These surveys often involve using research vessels equipped with specialized gear for sampling fish populations.

2. **Stock Assessment**: CMFRI employs various methods for assessing the status of fish stocks, including age-structured stock assessment models, surplus production models, and statistical catch-

at-age analysis. These assessments are crucial for sustainable fisheries management.

3. **Ecosystem Studies**: CMFRI conducts research on marine ecosystems to understand the interactions between different species and their environment. This includes studying habitat preferences, trophic relationships, and the impacts of environmental factors on fish populations.
4. **Fisheries Management**: CMFRI develops and evaluates management strategies for sustainable fisheries, including measures such as fishing quotas, gear regulations, and marine protected areas. They also provide scientific advice to policymakers and stakeholders on effective fisheries management practices.
5. **Data Analysis and Modeling**: CMFRI employs advanced statistical methods and modeling techniques to analyze fisheries data and make predictions about future trends. This includes using computer-based simulation models to assess the impacts of different management scenarios on fish populations.

## FUTURE DIRECTIONS OF CMFRI:

1. **Sustainable Fisheries Management:** With increasing pressure on marine ecosystems due to overfishing, habitat destruction, and climate change, CMFRI may continue to research and develop sustainable fisheries management practices. This could involve studying fish population

dynamics, implementing regulations, and promoting responsible fishing practices among stakeholders.

2. **Climate Change Adaptation:** Climate change poses significant challenges to marine ecosystems, affecting fish stocks, habitats, and coastal communities. CMFRI might focus on studying the impacts of climate change on fisheries and developing adaptation strategies for fishers and coastal communities.
3. **Aquaculture Development:** With wild fish stocks under pressure, aquaculture has become an increasingly important source of seafood. CMFRI could explore ways to improve aquaculture practices, develop new species for aquaculture, and address environmental and social sustainability issues associated with aquaculture expansion.
4. **Marine Biodiversity Conservation:** Protecting marine biodiversity is essential for maintaining ecosystem health and supporting fisheries. CMFRI might conduct research on marine biodiversity hotspots, endangered species, and ecosystem services provided by marine habitats, advocating for their conservation and sustainable use.

**5. Technology and Innovation:** Advancements in technology offer new opportunities for fisheries research and management. CMFRI may invest in developing and adopting technologies such as remote sensing, GIS, underwater robotics, and molecular genetics for monitoring marine ecosystems, studying fish behavior, and improving fishing efficiencies


## REFERENCES:


- **Official Website**: The official website of CMFRI (http://www.cmfri.org.in/) provides comprehensive information about the institute, its research projects, publications, and activities.
- **Research Papers**: CMFRI researchers regularly publish their findings in peer-reviewed journals. Searching for articles authored by CMFRI scientists in databases

like Google Scholar or PubMed can provide insights into their research areas and contributions.

- **Annual Reports**: CMFRI publishes annual reports summarizing its research activities, achievements, and future plans. These reports are available on the institute's website or can be obtained directly from CMFRI.
- **Books and Monographs**: CMFRI researchers have authored or contributed to several books and monographs on various aspects of marine fisheries, aquaculture, and related topics. These publications can be found in libraries or online bookstores.
- **Media Coverage**: Articles, interviews, and press releases about CMFRI's research findings and activities can be found in newspapers, magazines, and online news portals.

# KANAN DEVAN HILLS PLANTATION

## MUNNAR

### INTRODUCTION

The Kanan Devan Hills Plantations Company (KDHP) is an iconic entity nestled in the lush landscapes of the Western Ghats in South India. Established in the late 19th century, this plantation has a rich history steeped in the tradition of tea cultivation. The story of Kanan Devan Hills Plantations begins with its founders, the British, who recognized the fertile soil and favorable climate of the region for tea cultivation.

Over time, the plantations expanded, covering the vastest of the picturesque hillsides. Today, it stands as one of the largest tea estates in the region, renowned for its high-quality tea production. Beyond its commercial success, KDHP is intertwined with the cultural and social fabric of the local communities. The plantations have been a source of livelihood for generations of workers, who meticulously tend to the tea bushes, plucking the leaves with skillful hands' is

not just about tea; it's a beacon of sustainable agriculture and responsible stewardship of the land

The company has embraced eco-friendly practices, prioritizing biodiversity conservation and minimizing its environmental footprint. Tourism also plays a significant role in the Kanan Devan Hills Plantations experience. Visitors are treated to guided tours, where they can witness firsthand the tea-making process, from plucking to processing. The scenic beauty of the hills, coupled with the aroma of fresh tea leaves, creates an unforgettable sensory experience. An essence, Kanan Devan Hills Plantations is more than just a tea estate; it's a testament to the harmonious coexistence of nature, tradition, and progress. With its legacy of excellence and commitment to sustainability, KDHP continues to be a symbol of pride for the region and a destination for tea enthusiasts and nature lovers alike.

# HISTORY AND BACKGROUND:

1. **Early Years:** The story of KDHP begins in the late 19th century when British planters identified the high-altitude regions of Munnar as ideal for cultivating tea. Large swathes of land were acquired by British companies for this purpose.

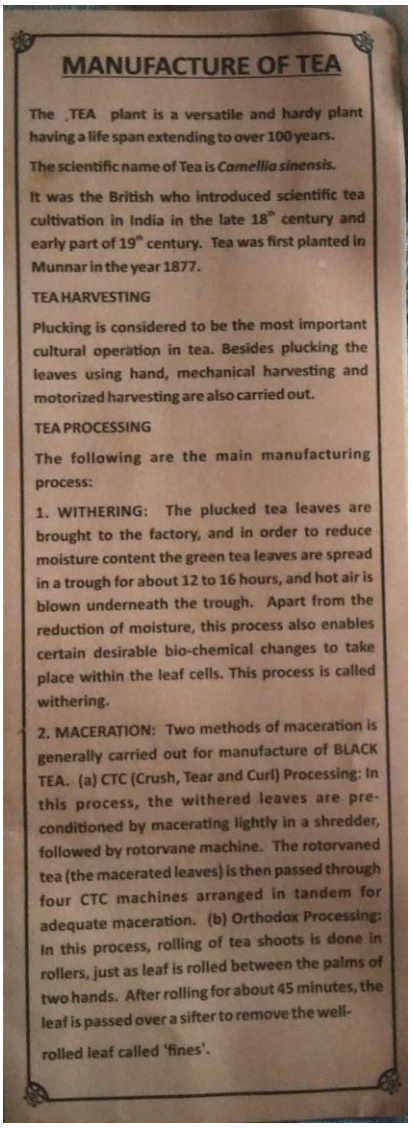
2. **Formation of Tata Tea**: Over time, several smaller tea estates emerged in Munnar, one of which was Kannan Devan Hills Estates. In 1964, Tata Tea, one of India's largest tea producers, acquired several tea estates, including Kannan Devan Hills Estates, and formed KDHP Company Pvt Ltd.

3. **Expansion and Growth**: Under the management of Tata Tea, KDHP continued to expand its operations and modernize its tea production processes. The company focused on producing high-quality tea while also implementing sustainable practices to preserve the natural beauty of the Munnar hills.

4. **Community Development**: KDHP has played a significant role in the socio-economic development of the Munnar region. It has implemented various initiatives aimed at improving the living

standards of tea estate workers and their families, including healthcare, education, and housing projects.

## PRODUCTION PROCESS:



**MANUFACTURE OF TEA**

The TEA plant is a versatile and hardy plant having a life span extending to over 100 years.

The scientific name of Tea is *Camellia sinensis*.

It was the British who introduced scientific tea cultivation in India in the late 18th century and early part of 19th century. Tea was first planted in Munnar in the year 1877.

TEA HARVESTING

Plucking is considered to be the most important cultural operation in tea. Besides plucking the leaves using hand, mechanical harvesting and motorized harvesting are also carried out.

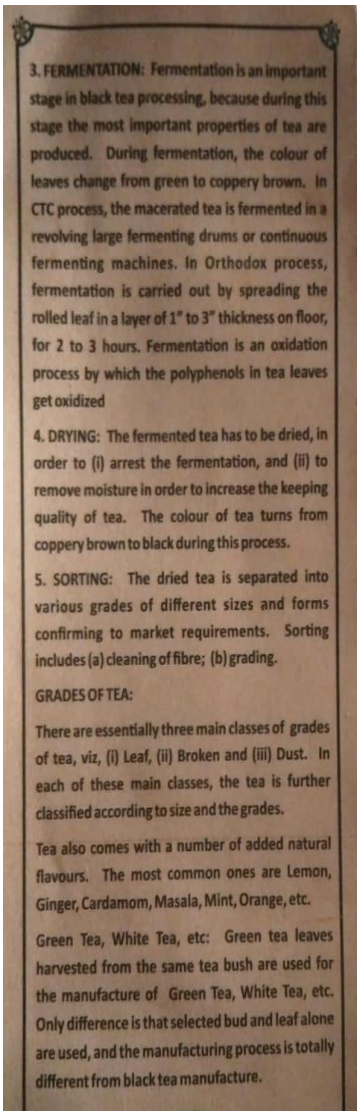
TEA PROCESSING

The following are the main manufacturing process:

1. WITHERING: The plucked tea leaves are brought to the factory, and in order to reduce moisture content the green tea leaves are spread in a trough for about 12 to 16 hours, and hot air is blown underneath the trough. Apart from the reduction of moisture, this process also enables certain desirable bio-chemical changes to take place within the leaf cells. This process is called withering.

2. MACERATION: Two methods of maceration is generally carried out for manufacture of BLACK TEA. (a) CTC (Crush, Tear and Curl) Processing: In this process, the withered leaves are pre-conditioned by macerating lightly in a shredder, followed by rotorvane machine. The rotorvaned tea (the macerated leaves) is then passed through four CTC machines arranged in tandem for adequate maceration. (b) Orthodox Processing: In this process, rolling of tea shoots is done in rollers, just as leaf is rolled between the palms of two hands. After rolling for about 45 minutes, the leaf is passed over a sifter to remove the well-

rolled leaf called 'fines'.



3. FERMENTATION: Fermentation is an important stage in black tea processing, because during this stage the most important properties of tea are produced. During fermentation, the colour of leaves change from green to coppery brown. In CTC process, the macerated tea is fermented in a revolving large fermenting drums or continuous fermenting machines. In Orthodox process, fermentation is carried out by spreading the rolled leaf in a layer of 1" to 3" thickness on floor, for 2 to 3 hours. Fermentation is an oxidation process by which the polyphenols in tea leaves get oxidized

4. DRYING: The fermented tea has to be dried, in order to (i) arrest the fermentation, and (ii) to remove moisture in order to increase the keeping quality of tea. The colour of tea turns from coppery brown to black during this process.

5. SORTING: The dried tea is separated into various grades of different sizes and forms confirming to market requirements. Sorting includes (a) cleaning of fibre; (b) grading.

GRADES OF TEA:

There are essentially three main classes of grades of tea, viz, (i) Leaf, (ii) Broken and (iii) Dust. In each of these main classes, the tea is further classified according to size and the grades.

Tea also comes with a number of added natural flavours. The most common ones are Lemon, Ginger, Cardamom, Masala, Mint, Orange, etc.

Green Tea, White Tea, etc: Green tea leaves harvested from the same tea bush are used for the manufacture of Green Tea, White Tea, etc. Only difference is that selected bud and leaf alone are used, and the manufacturing process is totally different from black tea manufacture.

# TECHNOLOGY AND EQUIPMENT:

**1 Withering Machines**: These machines are used to remove excess moisture from freshly plucked tea leaves, typically by blowing warm air over them. This process helps in making the leaves more pliable for subsequent processing steps.

**2 Rolling Machines**: Rolling machines are employed to roll and crush the withered leaves, releasing the juices and enzymes that initiate the oxidation process, which is crucial for developing the tea's flavor.

**3.Fermentation Tanks**: After rolling, the tea leaves are placed in fermentation tanks where they undergo controlled oxidation. This step is essential for developing the characteristic flavor and color of the tea.

**4 Drying Equipment**: Once the desired level of oxidation is achieved, the leaves are dried to halt the oxidation process. Drying is typically done using large ovens or drying machines that blow hot air over the leaves.

**5 Sorting and Grading Machinery**: Tea leaves are sorted and graded based on size, shape, and quality using specialized sorting machinery. This ensures consistency in the final product.

**6 Packaging Equipment**: Finally, the processed tea is packaged into various sizes and formats for distribution. Packaging equipment may include machines for filling, sealing, and labeling tea bags or containers.

**7Automation and Computerization**: Many tea factories are increasingly incorporating automation and computerization into their processes to improve efficiency and consistency. This may include automated control systems for temperature and humidity, as well as computerized monitoring of processing parameters.


# MARKET AND DISTRIBUTION:

**1.Distribution Channels**: KDHP utilizes a multi-channel distribution strategy to reach its target markets effectively:

a. **Retail Distribution**: The company distributes its tea through retail channels such as supermarkets, specialty tea shops, and convenience stores both domestically and internationally. KDHP may have its own retail outlets in strategic locations to directly engage with consumers.

b. **Online Sales**: In recent years, KDHP has likely expanded its presence in the online marketplace. The company may sell its teas through its official website as well as e-commerce platforms like Amazon, Flipkart, and specialty tea websites. This allows KDHP to reach a broader customer base and cater to the growing trend of online shopping.

c. **Wholesale Distribution**: KDHP may partner with distributors and wholesalers to supply its teas to bulk buyers such as tea retailers, hotels, restaurants, and catering companies. This ensures widespread availability of KDHP teas across various channels.

d. **Exports**: For international markets, KDHP collaborates with export partners, distributors, and agents who specialize in importing and distributing tea products. These partners help navigate the complexities of international trade regulations and ensure timely delivery to overseas customers.

**Brand Presence and Marketing**: KDHP invests in marketing initiatives to build and strengthen its brand presence both locally and globally. This may include advertising campaigns, participation in trade fairs and exhibitions, social media marketing, and collaborations with influencers and tea bloggers. KDHP's branding likely emphasizes its heritage, commitment to quality, and sustainable tea cultivation practices.

**Quality Assurance and Certification**: Given the competitive nature of the tea industry, KDHP prioritizes quality assurance to maintain its reputation as a premium tea producer. The company may adhere to international quality standards and certifications such as ISO, Fair Trade, and Rainforest Alliance to reassure consumers of the quality and sustainability of its products.


# CONCLUSION:

The conclusion on CMFRI (Central Marine Fisheries Research Institute) and KDHP (Kanan Devan Hills Plantations) would largely depend on the specific context or scope you're referring to. However, I can offer some general conclusions about these organizations:

1. **CMFRI**:

- CMFRI is a premier research institute under the Indian Council of Agricultural Research (ICAR), dedicated to marine fisheries research.
- Over the years, CMFRI has played a crucial role in advancing scientific knowledge related to marine resources, fisheries management, and sustainable aquaculture practices.
- Its research findings and technological interventions have contributed significantly to the socio-economic development of coastal communities and the sustainable management of marine resources.

2. **KDHP**:

- KDHP, or Kanan Devan Hills Plantations, is a significant player in the Indian tea industry, particularly known for its high-quality tea production.
- Situated in the picturesque Western Ghats of Kerala, KDHP's tea estates are renowned for their natural beauty and commitment to sustainable farming practices.
- The company has a rich heritage and a reputation for producing premium teas that are sought after both domestically and internationally.

In conclusion, both CMFRI and KDHP

have made substantial contributions to their respective fields, whether it's marine fisheries research or tea

production. Their efforts have not only advanced scientific knowledge but also had positive impacts on the communities they serve.

## REFERENCES:

KDHP or Kannan Devan Hills Plantations Company Private Limited is a renowned tea producing company based in the Indian state of Kerala. It was formed in 1964 as a joint venture between Tata Tea Ltd. and the Finlay Muir & Co. Ltd., with the aim of managing the tea estates owned by Tata Tea in the Munnar region of Kerala.

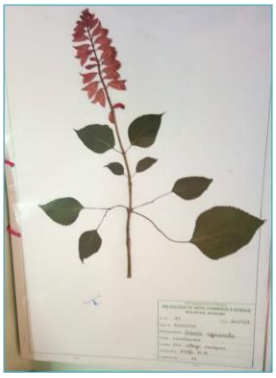
Here are some key points and references about KDHP:

1. **Ownership and Management**: Initially, KDHP was a joint venture between Tata Tea Ltd. and the Finlay Muir & Co. Ltd. Later, Tata Tea acquired Finlay's stake in the company.

2. **Sustainability Efforts**: KDHP has been actively involved in various sustainability initiatives, including organic farming practices, waste management, and social welfare programs for the local communities.
3. **Certifications**: The company has obtained various certifications such as ISO 22000:2005 for food safety management and ISO 14001:2004 for environmental management systems.
4. **Products**: KDHP produces a wide range of teas including black tea, green tea, orthodox tea, and specialty teas.
5. **Market Presence**: The company's teas are not only popular in the domestic market but also exported to several countries around the world

# Experiential Learning

Hands on Training



Herbarium

Collection of Plant materials

# Participatory Learning

Special lecture

Vermicomposting

Mushroom cultivation

Skill activity

Field visits


**Botanical Tour**

## Problems Solving Approaches

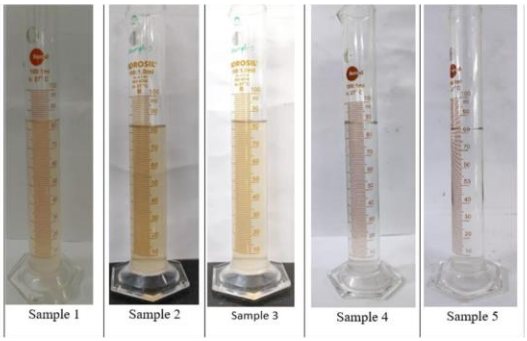
Quadrat method

BOD

Seed viability test

# Experiments related to physiology and ecology

Pollen germination




Water holding capacity


Soil texture study

From,
Dr. Ramyashree M
HOD, PG Department of Zoology
JSSCACS
Mysuru

Date: 21/11/23
Place: Mysuru

To,
The Principal
JSSCACS,
Mysuru

Respected Ma'am,

**Subject: Request for permission for one day visit to Sri Chamarajendra Zoological gardens.**

I am writing to seek permission for a one-day educational visit to Sri Chamarajendra Zoological gardens with III semester students, PG Department of Zoology. The purpose of this visit is to enhance our understanding of wildlife and biodiversity, aligning with our course paper HC 3.3 Ecology and Wildlife.

Date of Visit: 25/11/2023
Number of Students: 28
Accompanying Faculty: Dr. Ramyashree M and Mrs. Akhila M P

I kindly request your permission for this educational excursion and oblige.

Thanking you,

Yours faithfully
21/11/23
Dr. Ramyashree M
HOD
Postgraduate Department of Zoology
JSS College of Arts, Commerce & Science
Ooty Road, MYSURU-570 025

PS: Attached herewith, list of students going to the Zoo visit.

23/11/23

Student Roster for Educational Zoo Visit:

| Sl. No | Names |
|---|---|
| 1 | Aishwarya H V |
| 2 | Ambika Kattimani |
| 3 | Anusha Kanakapur |
| 4 | Bhoomika B |
| 5 | Chandana S |
| 6 | Chinmayi M S |
| 7 | Ganashree G A |
| 8 | Guruchethan M |
| 9 | Jacqueline Vincy M D |
| 10 | Jeethendra G H M |
| 11 | K. Sanjana Hiremath |
| 12 | Meghana G |
| 13 | Niranjanamma |
| 14 | P Mounika |
| 15 | Pooja B M |
| 16 | Pooja S K |
| 17 | Priyadarshini K N |
| 18 | Priyanka K N |
| 19 | R Anusha |
| 20 | Ramya V |
| 21 | Sahana C |
| 22 | Sapna S Patil |
| 23 | Sharath S |
| 24 | Shuguftha Ayub |
| 25 | Sneha H G |
| 26 | Sushmitha V L |
| 27 | Varshini D M |
| 28 | Vindhya A P |

21/11/23

HOD

Postgraduate Department of Zoology
JSS College of Arts, Commerce & Science
Ooty Road, MYSURU-570 025

23/11/23

Date: 17/01/24
Place: Mysuru

From,
Dr. Ramyashree M
HOD, PG Department of Zoology
JSSCACS
Mysuru

To,
The Principal
JSSCACS,
Mysuru

Respected Ma'am,

**Subject: Request for Permission for Study Trip – PG Department of Zoology**

I am writing to seek your approval for a study trip for the PG Department of Zoology students. The proposed trip is scheduled to take place from January 26, 2024, night 9pm to January 29, 2024, and will cover destinations in Dandeli, Gokarna, Murudeshwara and Honnavara.

Purpose of the Study Trip: The primary objective of this study trip is to provide our first and second-year students with practical exposure to the rich biodiversity and ecosystems present in Dandeli and Honnavara. These regions offer unique opportunities for students to observe and study various species in their natural habitats, contributing significantly to their academic and practical knowledge.

Date of trip: 26/01/2024 - 29/01/2024
Number of Students: 32
Accompanying Faculty: 02

I kindly request your permission for this educational excursion and oblige.

Thanking you,

Yours faithfully

Dr. Ramyashree M
HOD
Postgraduate Department of Zoology
JSS College of Arts, Commerce & Science
Ooty Road, MYSURU-570 025

PS: Attached herewith, list of students going on the study trip.

23-1-24

| SL NO | STUDENT NAME | REG NO. | CONTACT NO. | SIGNATURE |
|---|---|---|---|---|
| 1 | SHARATH.S | POLBE22S221021 | 7829707028 | S Sharath S |
| 2 | Jeethendra G.H.M | POLBE22S221015 | 8722535361 | Jit |
| 3 | Chinmayi M.S | POLBE22S221005 | 9632547539 | Chinmayi |
| 4 | P.MOUNIKA | POLBE22S221019 | 8073386186 | P.M.L |
| 5 | Sneha.H.G | POLBE22S221024 | 9353978968 | Sneha H G |
| 6 | Vasthini DM | POLBE22S221027 | 9353245785 | Vasthini D M |
| 7 | Priyanka K.N | POLBE22S221026 | 6366310294 | Priyanka K.N |
| 8 | Jacqueline Vincy M.J | POLBE22S221006 | 6364514403 | V. M.J |
| 10 | Chandana.S | POLBE22S221020 | 9353585929 | Chandana. |
| 11 | Amulika Kattimani | POLBE22S221004 | 8431195142 | Ganashree. |
| 12 | Ganashree | POLBE22S221018 | 8088294409 | Ganashree |
| 13 | Pooja.BM | POLBE22S221014 | 8451897581 | Pooja |
| 14 | Gurucheethan M | POLBE22S221022 | 9113089874 | G |
| 15 | Sanjana | POLBE22S221028 | 7892624464 | S |
| 16 | Vidya.K | POLBE23S221018 | 9019913838 | Vidya.K |
| 17 | Nayana.K | POLBE23S221010 | 9743959278 | Nayana.K |
| 18 | Selene Charles.S | POLBE23S221013 | 6364229637 | Selene |
| 19 | Nayana.P.B | POLBE23S221011 | 9880523501 | Nayana.P.B |
| 20 | Supreeth kumar D | POLBE23S221022 | 8867056153 | Supreeth |
| 21 | YUKTHAMUKHI.NS | POLBE23S221019 | 8861684584 | Yukthamukhi.NS |
| 22 | Keerthi Jayadhara | POLBE23S221008 | 6364549862 | Keerthi |
| 23 | Dhanalakshmi.A. | POLBE23S221021 | 7760910220 | Dhanalakshmi.A |
| 24 | Hanamesh. | POLBE23S221003 | 9632180267 | Hanamesh. SM |
| 25 | Harish kumar | POLBE23S221023 | 7411420079 | Harish kumar |
| 26 | Anupama | POLBE23S221004 | 9110879082 | Anupama |
| 27 | Harshitha T | POLBE23S221024 | 7483938394 | Harshitha |
| 28 | Suhas.M | POLBE23S221025 | 8904980076 | Suhas |
| 29 | Megha B.S | POLBE23S221006 | 9380154661 | Megha |
| 30 | Vijayalakshmi | POLBE23S221026 | 7892709963 | Vijayalaxmi |
| 31 | Sohan.K | POLBE23S221012 | 6361991894 | S Kandru |
| 32 | Mohith | POLBE23S221009 | 8073760115 | Mohith |
| 33 | | | | |

| TEACHERS ACCOMPANYING | |
|---|---|
| SL NO. | NAME |
| 1 | Mrs. Akhila. M.P |
| 2 | Mr. Sanjay. H.V |

Signature of HOD

Signature of PRINCIPAL

PRINCIPAL
JSS College of Arts, Commerce & Science
Ooty Road, MYSURU-25

# Credit Matrix, Course of Study and Scheme of Examination for M.Sc. Degree Programme in Biochemistry

(With effect from 2023-24 onwards)

Programme Code: BIC

| Course Type | Credits to be earned | | | | Total Credits |
|---|---|---|---|---|---|
| | I Semester | II Semester | III Semester | IV Semester | |
| Hard Core Course | 12 | 12 | 12 | 16 | 52 |
| Soft Core Course | 08 | 08 | 04 | – | 20 |
| Open Elective Course* | – | – | 04 | – | 04 |
| **Semester Total** | 20 | 20 | 20 | 16 | 76 |

*An Open Elective course offered by PG Dept. of Biochemistry to the students of other Depts.

| Course Code | Course Type | Course Title | Credit Pattern (L:T:P) | Credits |
|---|---|---|---|---|
| **Semester – I** | | | | |
| BCA040A | HC | Analytical Biochemistry–I | 4:0:0 | 4 |
| BCA050A | HC | Chemistry and Metabolism of Proteins and Nucleic Acids | 4:0:0 | 4 |
| BCA060 | HC | Experiments in Biochemical Techniques and Enzymology** and Seminar | 0:0:4 | 4 |
| BCA230A | SC | Enzymology | 4:0:0 | 4 |
| BCA250A<br>BCA260A<br>BCA270A | Choose any ONE from the following<br>SC | (i) Chemical Principles and Biochemical Reactions<br>(ii) Plant Biochemistry<br>(iii) Microbial Biochemistry | 4:0:0<br>4:0:0<br>4:0:0 | 4 |
| | | **Semester Total Credits** | | 20 |

| Course Code | Course Type | Course Title | Credit Pattern (L:T:P) | Credits |
|---|---|---|---|---|
| **Semester – II** | | | | |
| BCB040A | HC | Analytical Biochemistry–II | 4:0:0 | 4 |
| BCB050A | HC | Chemistry and Metabolism of Carbohydrates and Lipids | 4:0:0 | 4 |
| BCB060 | HC | Experiments in Immunology and Biochemical Estimations** and Seminar | 0:0:4 | 4 |
| BCB250A | SC | Immunology and Microbiology | 4:0:0 | 4 |
| BCB260A<br>BCB270A<br>BCB280A | Choose any ONE from the following<br>SC | (i) Human Physiology and Nutrition<br>(ii) Research Methodology and Biostatistics<br>(iii) Clinical Research Methods and Industrial Biochemistry | 4:0:0<br>4:0:0<br>4:0:0 | 4 |
| | | **Semester Total Credits** | | 20 |

| Course Code | Course Type | Course Title | Credit Pattern (L:T:P) | Credits |
|---|---|---|---|---|
| **Semester – III** | | | | |
| BCC070A | HC | Cell Biology, Endocrinology and Cell Signaling | 4:0:0 | 4 |
| BCC050A | HC | Clinical Biochemistry | 4:0:0 | 4 |
| BCC060 | HC | Experiments in Clinical Biochemistry and Molecular Biology** and Research Paper Presentation | 0:0:4 | 4 |
| | Choose any ONE from the following | | | |
| BCC230 | SC | (i) Biotechnology and Research Methodology | 4:0:0 | 4 |
| BCC240 | SC | (ii) Genomics, Proteomics and Bioinformatics | 4:0:0 | |
| BCC250 | SC | (iii) Pharmaceutical Biochemistry | 4:0:0 | |
| BCC740 | OE | Nutrition and Health | 4:0:0 | 4 |
| | | **Semester Total Credits** | | 20 |

| Course Code | Course Type | Course Title | Credit Pattern (L:T:P) | Credits |
|---|---|---|---|---|
| **Semester – IV** | | | | |
| BCD010A | HC | Molecular Biology and Gene Regulation | 4:0:0 | 4 |
| BCD070A | HC | Genetics and Genetic Engineering | 4:0:0 | 4 |
| BCD060 | HC | Project Work OR Dissertation*** | 0:0:8 | 8* |
| | | **Semester Total Credits** | | 16 |
| | | **Total CREDITS to be earned for M.Sc. BIOCHEMISTRY** | | 76 |

*Grade Point will be calculated with respect to the allotted credits

| | |
|---|---|
| HC | Hard Core Course |
| SC | Soft Core Course |
| OE | Open Elective Course |
| C1 | Component 1 of Internal Assessment (IA) |
| C2 | Component 2 of Internal Assessment (IA) |
| C3 | Component 3 (Semester-end Exam) |
| L | Lecture (1 Credit=1 hr) |
| T | Tutorial (1 Credit=1 hrs) |
| P | Practical (1 Credit=2 hrs) |

** Weekly Four hrs of practical for Two days

*** Project work OR Dissertation can be in-house OR outside the institution in any organization, Companies (private or Government or autonomous body) and may be allotted to the students in the 2nd/3rd semester

Note: Two Practical examinations of four hrs duration each for C3 (component 3) of Hardcore Course with Practical Component Only.