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18/11/2024

To Whom It May Concern

The following documents are related to Criterion 3.5.1 - Collaborative activities for research, Faculty exchange, Student exchange/ internship during the year (July, 2, 2023-June 30, 2024).

Dr. Manas Kabi
Principal
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Summer Internship (2024) under Curriculum and Credit Framework (CCF) of the

University of Calcutta

3-Year Multidisciplinary Course (BA/BSc)

Name (BLOCK LETTERS) : SNEHA DUBEY

CU Roll Number : 232012-12-0007

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EXAMINED
01/8/24

Document Verified
by.....
Date.....1/8/24
Asutosh College

Certificate of Completion

for

Summer Internship (2024) under Curriculum and Credit Framework (CCF) of the University of Calcutta

This is to certify that sneha Dubey. (student name), student of MDC (BA/ BSc), Semester II, University Roll No 232012-12-0003 (CU Roll No.) and Reg. No. 012-1211-1312-23 (CU Reg. No.), of Asutosh College, successfully completed the 15-day summer internship programme on *CAREER-ORIENTED* SUSTAINABLE PRACTICES from 13.06.2024 to 27.06.2024, at Asutosh College.

Dr. Manas Kabi
Principal
Asutosh College

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Issued on : 27th of June 2024.

➢ COURSE CONTENT

MODULE 1

SUSTAINABILITY AND SUSTAINABLE PRACTICES: CONCEPT AND PERSPECTIVES

i. Sustainability

- Concept and need
- Dimensions of Sustainability: – Environmental, Economic and Social

ii. Sustainable Practices

- Renewable Energy Sources: Bio-Gas Plant
- Conservation of Water: The Role of Rainwater Harvesting in Sustainable Water Management
- Renewable Energy: Solar Power (Solar Panel)

MODULE 2

FUNDAMENTALS OF HORTICULTURE: CONCEPT, TECHNIQUES AND APPLICATION

Economic Importance and Classification of Horticultural Crops

- Medicinal Plants Garden, Nutrition Garden and Kitchen Garden: Socio-economic Prospects
- Mushroom Cultivation: Basic Techniques and Socio-economic Prospects

MODULE 3

AQUACULTURE TECHNIQUES AND MANAGEMENT

Aquaculture: Techniques, Sustainability and Commercial Prospects

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- Day 6 Report 18.06.2024
- Day 7 Report 19.06.2024
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- Day 12 Report- 24.06.2024
- Day 13 Report-25.06.2024
- Day 14 Report-26.06.2024
- Day 15 Report-27.06.2024
- Conclusion

Acknowledgements

I would like to express my sincere gratitude to all those who have contributed to the success of this project. First I would like to thankful of our principle sir and all other teachers of different department who has given this opportunity to know how we can do sustainable development. Thank to all our teachers for their guidance, supports, and valuble feedback throughout the duration of this project. I would also thank to my colleagues and other coordinator sham for their dedication, guidance throughout the summer internship program. Their input and insights have greatly enriched the quality of this project. Finally, I would like to thanful my family and friends for their unwavering support and encouragement throughout to everyone who has worked a part in making this project a sucess.

SUMMER INTERNSHIP

13 -27 June, 2024

CAREER-ORIENTED SUSTAINABLE PRACTICES

ASUTOSH COLLEGE

MAIN BUILDING

2nd CAMPUS (BHASA)

CENTENARY BUILDING

➢ Day 2 Report

Day 2: Field Trip to Vasa Campus (June 14th)

On the second day of our internship program, June 14th, we embarked on an exciting field trip to the Vasa campus, also known as the second campus of Ashutosh College.

Our journey began at 10:00 AM with a bus ride departing from the main building of Ashutosh college. Upon arrival at the Vasa campus, after a brief five-minute break, we dived straight into the day's activities.

The first session focused on plant propagation techniques. We were fortunate to have a guest lecturer from Green mall nursery, who provided a hands-on demonstration on grafting and cutting propagation methods. This practical experience offered valuable insights into plant reproduction techniques.

Following this session, we delved into the fascinating world of mushroom. Another guest lecture, Founder of Earth Star mushroom company, enlightened us on the economic importance of mushroom cultivation. He shared valuable information on how to start a mushroom cultivation business with with a minimal investment, sparking entrepreneurial inspiration among the interns.

Next, Dr. Pradyut Biswas sir took us on a nature walk through the Vasa campus grounds. He pointed out a variety of plants, enriching our knowledge about their uses and ecological significance.

The afternoon continued with a session on bio-gas production. We had the privilege of witnessing a functional biogas plant located behind the Vasa campus kitchen. Professors explained the process of bio waste conversion to biogas and its application in cooking for the college canteen.


GPS Map Camera


GPS Map Camera


GPS Map Camera
Bhasa, West Bengal, India
Google


GPS Map Camera


GPS Map Camera


GPS Map Camera
Bhasa, West Bengal, India
Google

➢ Day 1 Report

Day 1 : Internship Program Orientation (June 13th, 12:00Pm)

The first day of our summer internship program at Agutosh college commenced on June 13th, 2024, at 12:00 pm. The program was held virtually on Google meet, which facilitated participated from all interns.

The day began with introductions from the faculty members who would be guiding us throughout the internship. The provided a valuable opportunity to meet the instructors and learn about their areas of expertise.

The curriculum was divided into three main modules, each focusing on a distinct area of sustainability and environmental practices.

- module 1: Renewable Energy and Resource management: This module delved into the principles and applications of biogas production, rainwater harvesting, and solar power. We gained a foundational understanding of these technologies and their potential to contribute to a sustainable future.
- module 2: Sustainable Horticulture: This module explored the cultivation practices of various crops, with a particular emphasis on medicinal plants. We learned about the importance of horticulture in promoting food security and the therapeutic benefits of medicinal plants.
- module 3: Aquaculture and Aquarium management: This module introduced us to the fascinating world of aquaculture, the practice of raising fish and other aquatic organisms. We gained insights into the economic significance of aquaculture and the basic principles of setting up and maintaining an aquarium.

The online making on Google meet provided a convenient and interactive platform for the faculty to introduce us to the program structure and the exciting modules that lay ahead. We took forward to delving deeper into these topics and gaining practical knowledge throughout the internship.

➢ INTRODUCTION

Sustainable practices have become increasingly important in today's world as we strive to protect and preserve our environment for future generation. As a result many industries, including ~~on implementing~~ aquaculture and horticulture, are focusing on implementing sustainable practices to ensure this internship are can learn more about sustainable practices in horticulture and aquaculture. I hope to gain a better hoticulture including plant propagation, to learning cultivation techniques. I also look forward and management, sustainable farming practices. By gaining hands-on experience In these fields, I hope to develop the skills and In this field who are dedicated to implementing sustainable practices and I am eager to work with these professionals. I belive that this internship will provide that will help me contribute to a more sustainable future

➢ Day 6 Report

Day 6 : Advanced Exploration of Renewable Energy (June 18th)

Day 6 of the internship program build upon the foundation of Day 3, focusing on renewable energy with solar panels as the central theme. However this session went beyond the initial hands-on training and delved deeper into the subject.

The session likely took place at the main building of Asutosh college, with the same expert team: Professor Surya Sarathi Bhattacharya sir from the physics department and professors Sourav Kumar sir and Arnab Bhowmik sir from the Electronics department. Here's a breakdown of what you might have learned on Day 6 :

- Advanced Solar Panel Technology : The professors might have introduced you to more advanced concepts like different solar panel types and their efficiency considerations.
- Solar Energy Applications : you may have explored the broader applications of solar power beyond basic electricity generation, such as solar water heating or solar irrigation systems.
- Challenges and solutions : The discussion might have shifted towards the practical challenges associated with solar energy adoption, like

➢ Day 5 Report

Day 5: Independent project work (June 17th - Eid al-Fitr)

We celebrated Eid al-Fitr on June 17th. While enjoying this festive occasion, we also dedicated time to work on our internship project reports. This independent work allowed us to make further progress on the reports while maintaining a healthy balance while celebrating Eid. We likely continued with activities like:

- Research and Analysis: Delving deeper into specific topics related to the chosen project focus.
- Drafting and Editing: Continuing to write and refine the project report content.

The independent work on Eid al-Fitr ensured steady progress towards completing the project reports.

This practical training session provided a valuable opportunity to bridge the gap between theoretical knowledge and real-world application. By actively engaging with the technology, we gained a deeper appreciation for the potential of solar power as a renewable energy source.

➢ Day 4 Report

Day 4: Independent project work (June 16th – Sunday)

Sunday, June 16th, provided us with a dedicated day to focus on our internship projects. As the program wasn't scheduled for weekends, we utilized this time effectively by working on our project reports from the comfort of our homes. This independent work allowed us to consolidate the knowledge gained throughout the first few days of the internship. We likely spent this day on activities such as:

- Compiling Information: Organizing the notes, data, and information gathered during the initial sessions.
- Structuring the Report: Developing a clear outline and structure for the project report.
- Drafting Content: Starting to write the report, incorporating the knowledge gained throughout the program.

This dedicated day for independent work allowed us to make significant progress on our project reports, setting the stage for a successful completion.

our final session of the day focused on rainwater harvesting. mr. Gaurab Bora sir provided a comprehensive explanation of the system, detailing the collection methods, filtration process, and potential uses of harvested rainwater. we also had the opportunity to observe the rainwater harvesting plant situated behind the student hostel on the vasa campus.

Day 3 Report

Day 3 : Hands-on Training with Renewable Energy (June 15th)

Day 3 of our internship program focused on a practical exploration of renewable energy, specifically solar panels. The session took place at the main building of Nsutosh college.

we were fortunate to have a team of experts guide us through the intricacies of solar power. professor surya sarathi Bhattacharya sir from the physics department provided a theoretical foundation, explaining the principle of solar energy conversion and its role in a sustainable future.

following this theoretical grounding, professors sourav kumar sir and Arnab Bhowmik sir from the Electronics department took the lead in a hands-on training sessions. They guided us through the process of using solar panels, potentially demonstrating:

- **understanding solar panel components:** we may have learned about the various components of a solar panel, such as photovoltaic cells, inverters, and batteries.
- **solar panel setup and operation:** The session could have involved observing the setup of a solar panel on the college building and understanding how it functions to generate electricity.
- **Data monitoring and Analysis:** The professors might have introduced us to the equipment used to monitor and analyze the performance of the solar panel system.

- The process of biogas production from organic waste.
- The design and function of a biogas plant.
- The environmental and economic benefits of biogas technology.
- The challenges associated with biogas implementation and maintenance.

By successfully completing these assessments, we showcased the knowledge and skills acquired during the internship program.

➢ Day 10 Report

Day 10: Exploring Economic and Social Impacts of Sustainable Horticulture (June 22nd)

The 10th day of the internship program delved into the fascinating world of sustainable horticulture and its impact on our society. The session took place from 12:00 pm to 4:00 pm and focused on module 2, which covered the following areas:

- Horticulture and medicinal plants: We likely revisited the practices of cultivating various crops, with a specific emphasis on medicinal plants. The discussing might have explored the economic importance of medicinal plants, highlighting their potential as:

(i) Sources of natural medicine:- providing raw materials for the pharmaceutical industry and traditional medicine practices.

(ii) Income Generation for Farmers:- Creating new income streams for farmers who cultivate and sell medicinal plants.

- Discussed Functionality: Discussed the process of rainwater collection, storage, and potential uses based on the specific system pictured.
- Compared System: If we had visited a rainwater harvesting system at the centenary Building on Day 7, we might have compared the two system, identifying similarities and potential differences in design and application.

This photo review activity served as a practical reinforcement of the rainwater harvesting concepts covered earlier in the program. It also provided a valuable opportunity to revisit the details of the system we might have observed during the campus visit.

➤ **Day 9 Report**

Day 9 Assessment Day – Aquaculture and Renewable Energy (June 21st)

The ninth day of the internship program was dedicated to assessing our knowledge gained throughout the program. The session took place at the main building of Asutosh college, specifically in room number 30, from 12:00pm to 4:00 pm. We faced two separate assessments:

- Aquaculture practices – MCQ Exam: The first part of the assessment was a multiple-choice (MCQ) exam focusing on aquaculture practices. This 10-question exam tested our understanding of fish farming, aquarium management, and the economic importance of aquaculture. It's great to see that you scored 8 out of 10, demonstrating a strong grasp of these concepts.
- Renewable Energy – Long Answer Questions: The second part of the assessment challenged us with long-answer questions related to renewable energy, specifically focusing on on bio-gas. This section allowed us to delve deeper into the topic, potentially addressing aspects like:

This Exploration could have involved:

- understanding Biogas plant Design: Learning about the different components of a biogas plant; such as the digester, gas holder, and purification system.
- Feedstock management: Discussing the types of organic waste suitable for biogas production and the importance of proper feedstock management.
- Benefits and challenges: Analyzing the environmental and economic benefits of biogas production, while acknowledging the challenges associated with its implementation and maintenance.

➢ Day 8 Report

Day 8: Rain water Harvesting Exam and Photo Review (June 20th)

on day 8 of the internship program, we faced a challenge in the form of an exam! The focus of the exam was rainwater harvesting, a key concept covered in module 1. The exam duration stretched from 12:00 pm to 4:00 pm, requiring us to demonstrate our understanding of the various techniques and applications of rainwater collection and storage.

After diligently completing the exam, we awaited the results. Once the answer sheets were reviewed, our instructors presented us with an interesting activity. They shared a photo of a rainwater harvesting system, likely taken during our visit to the vasa campus.

This photo review could have sparked a discussion where we:

- Recalled the System components: Analyzed the visible components of the rainwater harvesting system in the photo, such as collection tanks, gutters, and filtration units.

energy storage or initial investment costs. The professors could have also discussed potential solutions and ongoing research in these areas.

- Interactive Discussion: Building on the hands-on experience from Day 3, there might have been an interactive session where you could ask questions, discuss specific projects, or brainstorm potential applications of solar power in your local context.

➢ Day 7 Report

Day 7: Module 1 Review and Bio-gas Project Exploration (June 19th)

Day 7 of the internship program focused on revisiting and expanding your knowledge of module 1, which covered renewable energy and resource management. The session took place at the centenary Building of Asutosh college and was led by professors from the Environmental Science department. The day likely began with a review of the key concepts covered in module 1 including:

Revisiting module 1:

- Bio-gas production: Reviewing the process of converting organic waste into bio-gas and its applications as a clean and renewable fuel source.
- Rain water Harvesting: Recapping the techniques for collecting and storing raincwater for various uses, promoting water conservation.
- Solar power: Revisiting the principles of solar energy conversion and its potential to contribute to a sustainable future.

in different contexts, such as watering gardens, flushing toilets, or car washing.

- Solar panels: The discussion might have revisited the basics of solar energy conversion and the applications of solar panels. This could have involved:

(i) Policy and incentives: Exploring government policies or financial incentives that promote the adoption of solar power by individuals or businesses.

(ii) Community-Based Solutions: Discussing the potential for community-based solar power initiatives, where multiple households or businesses share a solar panel system.

- Bio-gas production: The final discussion topic likely focused on biogas as a renewable energy source. We may have covered:

(i) Benefits and Applications: Recapping the environmental and economic benefits of biogas production and its potential applications, in cooking, generating electricity, powering homes.

➢ Day 14 Report

Day 14: Project writing workshop and Guidance (June 26th)

Clarification: Based on the typical structure of a 15 day program, it's likely that Day 14 wasn't a scheduled activity day of the internship program. However, considering the information you provided about Day 14 focusing on project writing, here's possible scenario for that day:

Workshop and Guidance

The day could have been structured as a workshop led by the internship coordinator and other involved teachers, potentially including:

(ii) Conservation Efforts: Highlighting the importance of conservation efforts to protect endangered medicinal plant species.

- mushroom cultivation and economic Benifits: similar to Day 10, the discussion might have revisited the economic potential of mushroom cultivation. However, this session could have delved deeper into specific aspects like:

(i) mushroom varieties and market Demand:- Analyzing the different types of mushrooms in demand and the specific market considerations for each variety.

(ii) marketing strategies:- Exploring various marketing strategies for selling cultivated mushrooms, considering online platforms, local farmer's markets, or partnerships with restaurants.

(iii) sustainability practices:- Discussing sustainable practices in mushroom cultivation, such as using recycled materials for growing kits or minimizing waste production.

➢ Day 13 Report

Day 13: wrap-up discussion on Sustainable Practices (June - 25th)

The 13th and likely final day of the internship program focused on a wrap-up discussion centered around the three core themes of sustainable practices explored throughout the program:

- Rain water Harvesting: we likely revisited the various techniques for collecting, storing, and utilizing rainwater. The discussion might have addressed.

(i) Environmental benifits:- Reemphasing the the importance of rainwater harvesting in conserving water resources and mitigating drought impacts.

(ii) practical application:- Discussion of Practical application of rainwater harvesting

(ii) Drafting or revising specific sections of the reports.
(iii) Creating visuals like charts or diagrams to support our findings.

This dedicated day for independent work allowed us to make significant progress on our project reports, setting the stage for a strong finalization.

➢ Day12 Report

Day 12 : Revised - Economic and Social Impact of Horticulture (June 24th)

Day 12 of the internship program revisited the crucial topic of sustainable horticulture and its impact on society. This session likely served as a reinforcement or a chance to delve deeper into the themes explored on Day 10, which focused on module 2 :

- Horticulture and medicinal plants : We might have had another opportunity to discuss the cultivation practices for various crops with particular emphasis on medicinal plants. This session could have further explored ~~on Day 10~~ the economic significance of medicinal plants, potential focusing on :

(i) Integration with modern medicine : Discussing the potential for integration medicinal plants into modern healthcare systems and the ongoing research in this area.

(iii) Promoting sustainable Healthcare:- contributing to a more sustainable healthcare system by providing natural alternatives to conventional medicines.

- Mushroom cultivation and Economic Benifits: The discussion likely revisited the topic of mushroom cultivation, which are learned about earlier in the program. This session might focused on the economic potential of mushroom cultivation, exploring aspects like:

(i) Low Investment Business Opportunity:- Examining the relatively low investment required to start a mushroom cultivation business, making it accessible to a wider population.

(ii) Income generation and market Demand:- Highlighting the potential for income generation though mushroom farming, catering to the growing market demand for healthy and sustainable food options.

➢ Day 11 Report

Day 11 : Independent Project work (June 23rd- Sunday)

Similar to days 4 and 5, June 23rd fell on a sunday, so the internship program likely wasn't scheduled for this day. This provided us with a dedicated day to focus on our internship projects from the comfort of our homes. We likely spent this time on activities such as:

- Further Research: conducting further research on specific topics related to our chosen project theme. This could involve delving deeper into areas of particular interest or addressing any knowledge gaps.
- Data Analysis: If our projects involved collecting data during the program, this day could have been dedicated to analyzing that data and drawing meaningful conclusions.
- project Report progress: We likely continued working on our project reports, potentially:

(i) Finalizing the report structure and organization.

The program effectively blended classroom sessions with practical demonstrations and hands-on activities. The hands-on exploration of mushroom cultivation truly fascinated me, revealing the potential of this low-investment business opportunity. Witnessing a functional biogas plant at the vasa campus solidified the environmental and economic benefits of this renewable energy source.

I would like to express my sincere gratitude to all the teachers of the different departments, principle sir, and coordinator madam for their dedication and guidance throughout the summer internship program. Their expertise and support have been instrumental in making this a truely enriching learning experience.

SIGNATURE OF COURSE COORDINATOR: _____

- Hard Copy Submission: Submitting a printed and bound copy of our project reports, adhering to the formating guidelines provided earlier.
- verification and Acknowledgement: The instructors might have been available to receive our reports, answer any last-minute questions, and provide an acknowledgement receipt.

➢ CONCLUSION

my participation in the Asutosh college Summer Internship program on sustainable practices was a truly enriching experience. Over the course of fifteen days, I gained valuable knowledge and practical insights into various aspects of sustainability, including renewable energy sources like solar panels and biogas production, resource management techniques like rainwater harvesting, and sustainable forms of agriculture like medicinal plant cultivation and mushroom cultivation.

- Project Report structure: The coordinator might have provided a detailed explanation of the expected structure for the project reports. this could have included:
① Introduction ② Literature ③ methodology ④ Results and Discussion ⑤ summari conclution and Recommendations.
- Formatting and citation: This instructors might have offered guidelines on proper formatting styles and citation methods for referencing sources in our reports.
- Q and A and individual Guidance: The session likely included dedicated time for us to ask questions about specific challenges we were facing in writing our project reports. The instructors could have offered individual guidance based on our chosen project topics and approaches.

➢ Day 15 Report

Day 15: Project Report submission (June 27th)

The 15th and final day of the summer internship program marked the culmination of our hard work and learning. Project Report submission:

The primary focus of the day was the submission of our project reports. The program likely designated a specific time frame, from 11:00 Am to 5:00 pm, for us to submit our reports at the main building of Asutosh college.

This submission process could have involved:

Q1
2/6/24

- Assignment-2: Briefly mention the domestic and commercial utility of biogas plant.

Bio-gas plants have significant utility in both domestic and commercial contents;

Domestic utility:-

1) Cooking and Heating:- Bio-gas can be used as a fuel for cooking and heating, reducing reliance on traditional fuels like firewood and LPG.

2) Electricity Generation:- Small-scale biogas plants can generate electricity for household use.

3) Waste management:- Bio-gas plants help in managing household organic waste by converting in into energy and nutrient-rich slurry.

4) Fertilizer production:- The by-product, known as digestate, is an excellent organic fertilizer for home gardens.

Commercial utility:-

1) Industrial Energy production:- Bio-gas can be used to generate electricity and heat for industrial processes, reducing energy costs and carbon footprint.

2) Fuel for vehicles:- compressed biogas (CBG) can be used as a renewable fuel for vehicles.

• components of biogas plants

1) mixing tank → The feed material is collected in the mixing tank. sufficient water is added and the material is thoroughly mixed till a homogeneous slurry is formed.

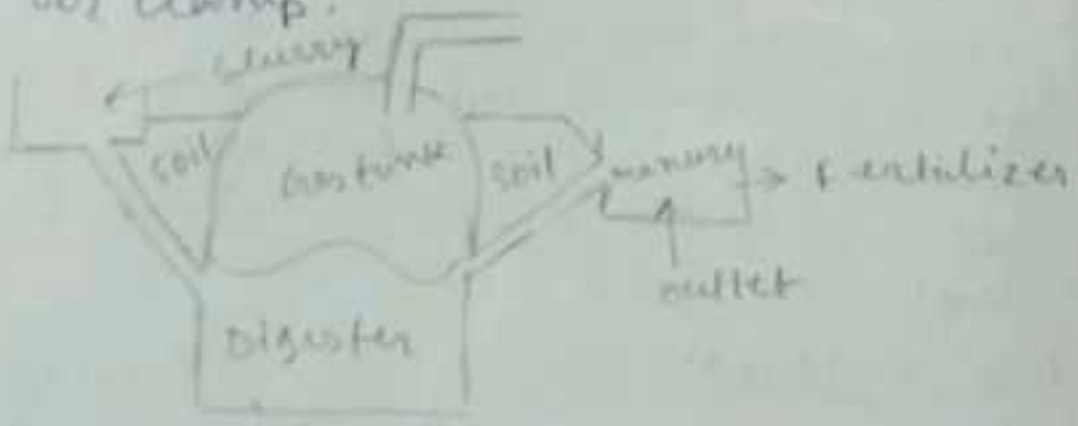
2) Inlet pipe → The substrate is discharged into the digester through the inlet pipe/tank.

3) Digester → The slurry is fermented inside the digester and bio-gas is produced through bacterial action.

4) Gas holder or gas storage dome → The bio-gas gets collected in the gas holder, which holds the gas until the time of consumption.

5) outlet pipe → The digester slurry is discharged into the outlet tank either through the outlet pipe or opening provided in the digester.

6) Gas pipeline → The Gas pipeline carries the gas to the point of utilization, such as stove or lamp.



Schematic Diagram Bio-gas Plant.

Roll No- 0107, Registration No. — 012-1211-1322-23
CU Roll No. - 232012-12-0007, Name- Sneha Dubey.

Group-A

Assignment-1: Write down the learning outcomes of Biogas plant visit at Asutosh College Second Campus at Bhasa, under the programme of MDC Summer Internship, 2024

21/6/24

Introduction:-

It mainly comprises of hydro-carbon which is combustible and can produce heat and energy when burnt. Bio-gas is produced through a bio-chemical process in which certain types of bacteria convert the biological wastes into useful bio-gas. Since the useful gas originates from biological process, it has been termed as bio-gas. Methane gas is the main consituent of bio-gas.

Biogas production process:-

The process of bio-gas production is anaerobic in nature and takes place in two stages. The two stages have been termed as acid formation stage and methane formation stage. In the acid formation stage, the bio-degradable complex organic compounds present in the waste materials are acted upon by a group of acid forming bacteria present in the dung. Since the organic acids are the main products in this stage, it is known as acid forming stage. In the second stage, group of methanogenic bacteria act upon the organic acids to produce methane gas.

Raw materials for biogas production:-

Although, cattle dung has been recognized as the chief raw material for bio-gas plants, other materials like night-soil, poultry litter and agricultural wastes can also be used.

Group - A

ASSIGNMENT: Module-I

Topic: Renewable Energy Source: Biogas Plant

Summer Internship for MDC Students (Semester-II) Academic Session 2024-25

Organised by

ASUTOSH COLLEGE

In Collaboration with Earth Star and Green Mall Nursery on "Career Oriented Sustainable Practices"

Name of the Student: Sneha Dubey.

College Roll No: 0107

University Registration No: 012-1211-1322-23

University Roll No: 232012-12-0007

Stream: B.A/B.Sc Semester-II

Group-A

ASSIGNMENT: Module-I

Topic: Conservation of Water: The Role of Rainwater Harvesting in Sustainable Water Management

Summer Internship for MDC Students (Semester-II) Academic Session 2024-25

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Name of the Student: Sneha Dubey

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University Registration No: 012-1211-1322-23

University Roll No: 232012-12-0007

Stream: B.A/B.Sc Semester-II

- **Assignment-1: Write down the learning outcomes of rainwater harvesting plant visit at Asutosh College Second Campus at Bhasa, under the programme of MDC Summer Internship,2024**

Introduction:-

Rain water harvesting is one of the most effective methods of water management and water conservation. It is a term used to indicate the collection and storage of rainwater used for humans animal and plant needs. It involves collection and storage of rainwater at surface or in sub-surface aquifer, before it is lost as surface run-off. The augmented resource can be harvested in the time of need. Artificial recharge to ground water is a process by which the ground water reservoir is augmented at a rate exceeding that of natural conditions of replenishment. The collected water is stored and pumped in a separated pipe distribution. This is a very useful method for a developing country like India in reducing the cost and the demand of treated water and also economizing the

➢ **Assignment-3: Attach field photographs of Biogas plant at Bhasa Campus with proper labelling along with a group photograph**

26/06/24

3) Waste management in commercial
bio-gas plants handle large quantities of organic waste from industries, reducing waste disposal issues and associated costs.

4) Renewable Energy Integration: Bio-gas plants can be integrated into the grid, contributing to renewable energy targets and providing a stable energy supply.

- In both settings, bio-gas plants contribute to sustainability by promoting renewable energy, reducing greenhouse gas emissions and managing waste effectively.

treatment plants operation, maintenance and distribution costs.

Necessity of the Project:-

1) To overcome the inadequacy of surface water to meet our demands within the campus and decrease dependence on ground water
2) To enhance availability of ground water and utilize rain water for sustainable development.
3) To increase infiltration of rain water into the sub soil.
4) To improve ground water quality by dilution.
5) To improve ecology of the area by increase in vegetation cover.
6) Overall, to make the campus an eco-friendly one.

DO's and Dont's :—

Harvested rainwater is used for direct usage, for recharging ~~aquifers~~ aquifers. It is most important to ensure that the rainwater caught is free from pollutants, following precautionary measures should be taken while harvesting water.

i) Roof or terraces used for harvesting should be clean, free from dust, algal plants etc.
ii) Roof should not be painted since most paints contain toxic substances and may peel off.
iii) provision of first rain separator should be made to flush off first rains.
iv) polluted water must not be used to recharge ground water.

➢ **Assignment-2: Briefly mention the domestic and commercial utility of rainwater harvesting project.**

Introduction

Rainwater harvesting is the collection of rain water for reuse. It is a viable way to supplement water supplies in both urban and rural areas. Rainwater can be collected from roofs, gutters, and other surfaces. It is then stored in tanks or cisterns for later use. Collected rainwater can be utilized in various ways, such as watering lawns, washing car, flushing toilets, and even drinking. Rainwater harvesting reduces reliances on traditional water resources and promotes water conservation. By capturing and storing rainwater, individuals and communities can mitigate the effects of droughts and contribute to the sustainability of water resources.

Need for Rainwater Harvesting:-

- **water scarcity:-** many regions, both urban and rural, face water scarcity during to increasing population, urbanization, and climate change. Rainwater harvesting provides an alternative and sustainable water source, reducing dependency on declining ground water reserves and strained surface water bodies.
- **Drought Resilience:-** Rainwater harvesting enhances resilience to drought by proving a reliable water during dry periods. Stored rainwater can be used for various purpose,

including drinking, irrigation and sanitation, there by mitigating the impacts of water scarcity on communities, agriculture and ecosystem.

Importance of rainwater Harvesting

1) water conservation:- To capture and store rainwater for future use. reducing reliance on depleting ground water and surface water sources.

2) water quality Improvement:- Rainwater is typically cleaner than surface water, reducing the need for expensive filtration and purification system.

3) Sustainable water management:- By promoting the use of rainwater, rain water harvesting promotes a shift towards sustainable water management practices.

20/6/24

- Assignment-3: **Attach field photographs of rainwater harvesting plat at Bhasa Campus with proper labeling along with a group photograph**

UNIVERSITY OF CALCUTTA

SUMMER INTERNSHIP, 2024

PROJECT REPORT

ON

SOLAR PANEL

B.Sc. MDC (3 YEARS), UNDER CCF

SEMESTER: II

UNIVERSITY ROLL NO. 232012-12-0007

REGISTRATION NO. 012-1211-1322-23

SESSION: 2023-2026

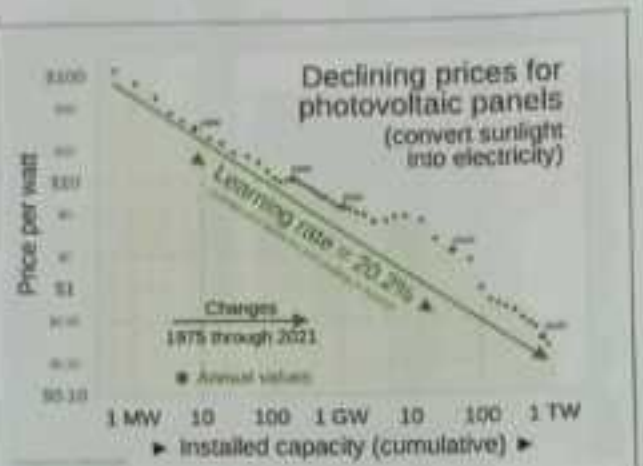
States launched Explorer 6, featuring large wing-shaped solar arrays, which became a common feature in satellites.

Space applications for solar cells require that the cells and arrays are both highly efficient and extremely lightweight. Some newer technology implemented on satellites are multi-junction photovoltaic cells, which are composed of different PN junctions with varying bandgaps in order to utilize a wider spectrum of the sun's energy.

Declining costs and exponential growth

Adjusting for inflation, it cost $96 per watt for a solar module in the mid-1970s. Process improvements and a very large boost in production have brought that figure down more than 99%, to 30¢ per watt in 2018 and as low as 20¢ per watt in 2020. **Swanson's law** is an observation similar to Moore's Law that **states that solar cell prices fall 20% for every doubling of industry capacity**. It was featured in an article in the British weekly newspaper The Economist in late 2012. Balance of system costs were then higher than those of the panels. Large commercial arrays could be built, as of 2018, at below $1.00 a watt, fully commissioned.

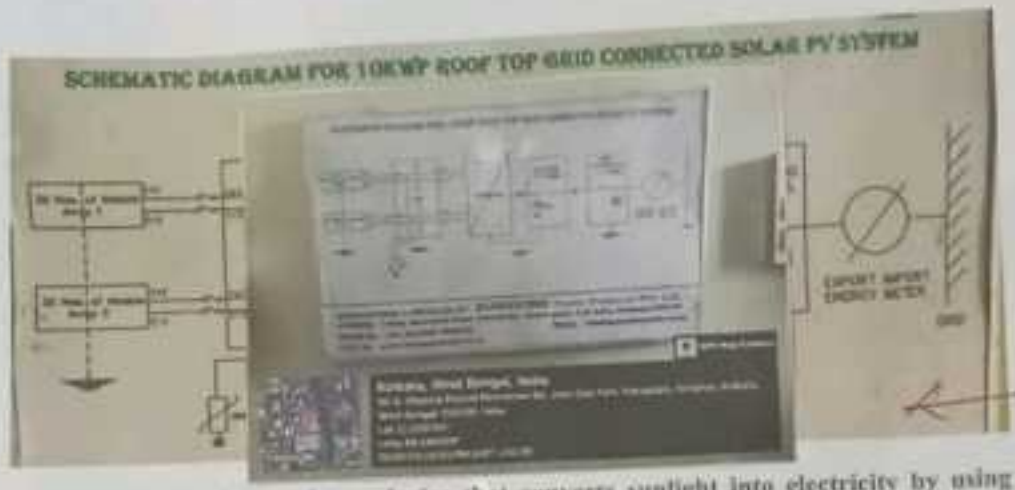
Price per watt history for conventional (c-Si) solar cells since 1977



Swanson's law–stating that solar module prices have dropped about 20% for each doubling of installed capacity—defines the "learning rate" of solar photovoltaics.

Solar PV is growing fastest in Asia, with China and Japan currently accounting for half of worldwide deployment. Global installed PV capacity reached at least 301 gigawatts in 2016, and grew to supply 1.3% of global power by 2016.

Falling costs are considered one of the biggest factors in the rapid growth of renewable energy, with the **cost of solar photovoltaic electricity falling by ~85% between 2010** (when **solar and wind made up 1.7% of global electricity generation**) and **2021** (where **they made up 8.7%**). In 2019 solar cells accounted for ~3 % of the world's electricity generation.



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Solar Panel: A solar panel is a device that converts sunlight into electricity by using photovoltaic (PV) cells.

AJB (Array Junction Box): The junction box is a connector between the solar array and the charging control device, it is an important part of the solar panel. It is a cross-domain comprehensive design combining electrical design, mechanical design, and material science. It provides users with a combination connection scheme of solar panels

Most photovoltaic junction boxes have **diodes**. The function of the diodes is to keep the power flow going in one direction, and prevent power from feeding back into the panels when there's no sunshine.

Inverter: An **Inverter** converts direct current (DC) electricity, which is what a solar panel generates, to alternating current (AC) electricity, which the electrical grid uses.

Surge Protection Device (SPD) for Solar Power System / Photovoltaic or PV /DC System. Surge Protective Devices (SPDs) provide protection against electrical surges and spikes, including those caused directly and indirectly by lightning.

Inverter LT (Low tension) Panel: It combines the output 3 phase as well as the single phase AC power of inverter placed in the solar plant system into a single box called ACDB (AC Distribution Board).

Group - A

UNIVERSITY OF CALCUTTA

SUMMER INTERNSHIP, 2024

PROJECT REPORT

ON

MEDICINAL PLANT CULTIVATION

HORTICULTURE and MUSHROOM

B.Sc. MDC (3 YEARS), UNDER CCF

SEMESTER: II

UNIVERSITY ROLL NO. 232012-12-0007

REGISTRATION NO. 012-1211-1322-23

SESSION: 2023-2026

Unit 3

Plant Propagation

Introduction

Plant propagation, in simple words, may be defined as multiplication or reproduction of plants. Commercialisation of crops leads to the development of various techniques and procedures of plant propagation. Each technique has its own merits and demerits.

Each plant responds differently to different methods of propagation. Various techniques of propagation have been developed with the objective to have uniformity in crops, early bearing, increased production, resistance against pests and diseases, and introduce certain characters in new generation. These objectives have made plant propagation interesting and challenging.

Propagation of plant is the involvement of science and art in a skillful way. Basic knowledge and skill of it can be a better source of income through commercial nurseries. It helps in maintaining the plant stock and preserving endangered (extinct) species.

Plants can be propagated by sexual and asexual means. Sexual means includes propagation by seeds,

while asexual propagation is based on the utilisation of vegetative parts of plants for raising new ones. Vegetative parts of plants like shoots, leaves, roots, stem, buds and underground parts are used in different ways for reproducing new plants. The most common asexual propagation methods include cutting, layering, grafting and budding, which need specialised skill and are done differently in different plants.

Growing of tissues in controlled conditions is an advance and recent method of vegetative propagation. It is known as 'tissue culture'. It is a highly specialised technique of propagation. By using this technique, a large number of true-to-type virus-free saplings can be produced in a short span.

What is a seed?

A seed is a ripened ovule developed after fertilisation. It consists of an 'embryo' and stored food material, both of which are enclosed in a special covering known as 'seed coat'. Plants germinate from seeds when they are provided with favourable growing conditions.

TYPES OF PROPAGATION

Sexual propagation

Propagation or multiplication of plants by seeds is known as 'sexual propagation'. Seeds are formed as a result of successful fertilisation and combination of parental gametes. It is an old and easy method and is widely used for the propagation of crops like ornamental annuals, vegetables, medicinal and fruit plants, such as papaya.

Merits of sexual propagation

- Plants propagated by seeds live longer, are vigorous and more resistant to biotic (insect-pests and diseases) and abiotic stresses (environmental conditions).
- It is an easy, simple and convenient method of plant propagation.

- Plants propagated by asexual propagation are true-to-type genetically.
- By top working (using budding and grafting), old and economically low productive fruit plants can be converted into superior ones.
- Advantages offered by rootstocks and scion can be exploited through asexual method.
- Maturity is uniform and the plant gives quality yield.
- Plants propagated by asexual method are small in size, so spraying of chemicals and harvesting are easy.
- This method enables noble plant production, e.g., different colours of flowers in a single rose plant and different types of mangoes in one mango plant can be produced through asexual method only.

Demerits of asexual propagation

- By vegetative propagation, new varieties cannot be developed.
- It requires specialised skills, so it is an expensive method of propagation.
- The life span of asexually propagated plants is short as compared to sexually propagated ones.
- These plants are more prone to biotic and abiotic stresses.

Session 1: Plant Propagation by Cutting

Cutting

Cutting is a detached vegetative part of a plant, which on separation and planting is able to regenerate the missing parts and develop itself into a new plant. It is an inexpensive and quick method of propagation. A large number of uniform plants can be produced using few parent plants. It does not involve specialised skills. The method is named after the part of plant used for cutting, e.g., stem, root and leaf.

Stem cutting

Based on the age and maturity of shoots detached for vegetative propagation, stem cuttings is of four types.


GPS Map Camera

(i) Hardwood cutting
(ii) Semi-hardwood cutting
(iii) Softwood cutting
(iv) Herbaceous cutting

Hardwood cutting

Such a cutting is taken from woody plants. Mostly, deciduous plants are propagated by this method. One-year old mature branch is cut into pieces of suitable sizes and planted in the rooting medium, e.g., rose, grapes, fig, pomegranate, bougainvillea, *tabernaemontana, lagerstroemia, jasminum,* hibiscus, etc.

Fig. 3.1: Hardwood cuttings

Procedure

- Select branches of one-year old healthy plants, having pencil thickness. Cut the branches into 10–15 cm long cuttings.
- Long cuttings are used to raise rootstocks for fruit trees. Each cutting must have at least 4–5 dormant vegetative buds. Leaves and thorns, if present, are completely removed. This checks transpiration loss.
- A slanting cut is given at the base of the cuttings just below the node and a straight upper cut is given away from the top bud.
- The cut portion will help identify the planting position. Slanting cut at the base is given so that a large area of the cuttings is in contact with the rooting medium for inducing roots.
- The secretion of hormones at the bud near the cut portion induces rooting. Straight cut at upper end reduces transpiration loss, which can be inhibited by the application of wax.
- The cuttings are planted slant-wise in a nursery bed or small poly bags for growing plants. Callus tissues form the cambium layer and rooting takes place in this region. The best season for planting the cuttings is monsoon for evergreen plants and November–February for deciduous plants. Cuttings can be planted in greenhouse or poly-house for better results.

Procedure

Softwood cuttings are prepared from tender but mature branches. The length of these cuttings varies from 10–12 cm. Tender shoots do not have sufficient food material. Hence, all leaves present on the shoots are retained for photosynthesis. The cutting material are gathered early in the morning and must be kept moist by keeping them in a wet cloth. Sandy loam medium is the best for planting softwood cuttings.

Herbaceous cutting

Such a cutting is taken from herbaceous plants. Shoots of 1 to 2-month old plants are selected for herbaceous cuttings. Examples are chrysanthemum, *iresine*, *pilea*, dahlia, petunia, carnation, marigold, etc.

Procedure

Herbaceous cuttings are made from tender succulents, especially the leafy part of the stems of herbaceous plants. Terminal, measuring 8–12 cm, of a healthy shoot is cut and the basal leaves are removed, leaving the upper leaves undisturbed. The cuttings once detached must not desiccate at the cut and are rooted well under mist. The application of auxins promotes the regeneration of adventitious roots. Sandy loam medium is the best for planting herbaceous cuttings.

Fig. 3.4: Herbaceous cuttings

Leaf cutting

Selection of cutting

Plants with thick fleshy leaves having buds are propagated by leaf cutting. Vegetative buds are present in the notches of leaf margin (*bryophyllum*) or on the vein (*begonia rex*). Leaf blade or pieces of it with bud are put on the rooting medium under favourable conditions. In case of black raspberry, the leaf blade, along with petiole and a short piece of the stem with

Fig. 3.5: Propagation through leaf (bryophyllum)

(a) Runner (chlorophytum)

(b) Sucker

(c) Rhizome (canna)

(d) Corm (gladiolus)

(e) Bulb (tuberose)

(f) Root tuber (dahlia)

Fig. 3.23 (a–f): Plant propagation by specialised organs

to produce new plants, e.g., *doob* grass, strawberry, *chlorophytum*, etc.

Sucker

It is a special shoot arising from the root or stem portion of a plant below the ground level, e.g., chrysanthemum (stem), *Clerodendron splendens* (root suckers), anthurium, etc.

Tuberous root

It refers to a swollen tuberous growth that functions as a storage organ. Examples are *satavar*, dahlia, *chlorophytum*, etc.

WHAT ARE MUSHROOMS?

- **MUSHROOM:** A macro fungus with visible fruit body that may be formed above or below the ground. The sexual spore bearing structure of mushroom is called a **fruit body**.

COMMON EDIBLE MUSHROOMS CULTIVATED IN INDIA:

1. *Pleurotus* sp. (Oyster mushroom)

Bengali: Dhingri/Jhinuk chhatu

2. *Agaricus bisporus*

(Commercial button mushroom)

3. *Volvariella volvacea*

Straw mushroom or paddy straw mushroom (Bengali: Poal Chhatu)

4. *Calocybe indica* (Milky mushroom)

COMMON TERMINOLOGIES USED IN MUSHROOM CULTIVATION

- **SPAWN:** The aggregation of mycelium of a desired mushroom species on sterile grains which are used as inoculum to inoculate substrate beds for mushroom production. (Grains are of paddy/wheat/jowar/bajra, etc. usually disease free, dirt free, healthy and intact). Shelf life of spawn: should not be more than 1 month old.
- **SPAWNING:** This is the process by which the spawn is mixed/inoculated with ready substrate/compost. It is usually conducted in a separate room to avoid infection by other fungi and insects.
- **SPAWN RUN:** In the substrate bed/compost that has been mixed with grain spawn, the mycelium spreads in the compost and this is called spawn run.
- **SUBSTRATE:** The material, usually organic, on which mushrooms grow. e.g. lignocellulosic substrates as source of Carbon: Paddy/wheat straw, wood, sawdust, bagasse, etc. Source of Nitrogen: Horse manure, farmyard manure, oat meal, corn meal, etc.
- **FLUSH** - A 'crop'/appearance of mushroom fruit bodies that develop in groups at a time followed by a brief resting period.
- **CROPPING:** The time of mushroom formation, development and harvesting.

FOOD VALUE OF MUSHROOM:

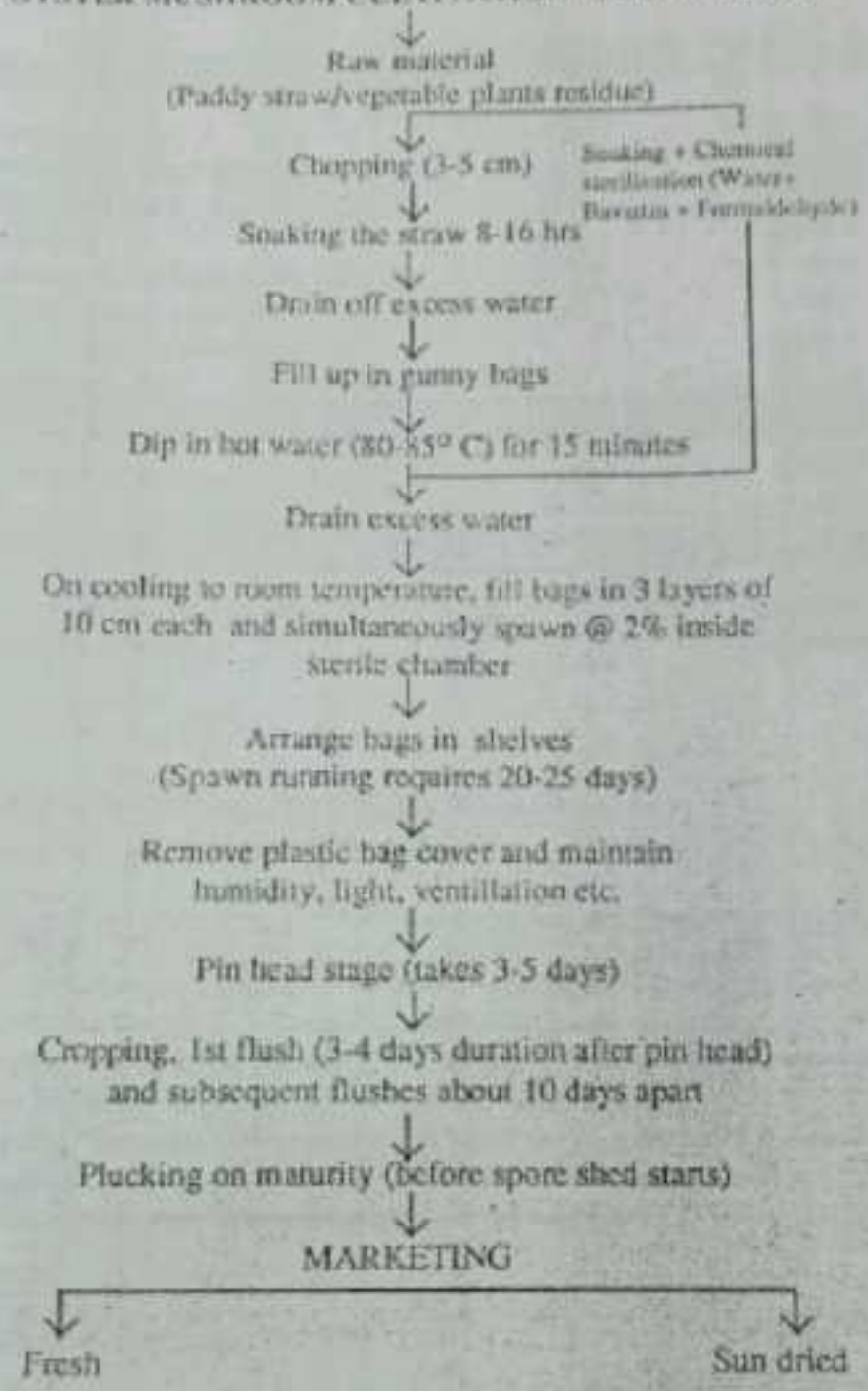
Mushrooms are popular for their delicacy and flavoured food value. It is well established fact that they are excellent sources of vitamins and minerals. They also contain appreciable amounts of vitamins like Niacin and Pantothenic acid, minerals such as calcium, phosphorus and potassium and a fair quantity of iron. Folic acid which is of vital importance for treating anaemic condition in the human body is available in large quantity. Their protein may be considered intermediate to that of animal and vegetables. Fresh mushrooms contain about 80-95% moisture, 3% protein, 0.3 - 0.4% fat and 1% minerals and vitamins. With the low carbohydrate and fat contents they constitute an ideal dish for diabetic patients.


Bhasa, West Bengal, India
Google

OYSTER MUSHROOM CULTIVATION

There are several *Pleurotus* spp., viz., *P. ostreatus*, *P. flabellatus*, *P. sajor caju*, *P. florida* etc., well known for their delicacy and flavour. These species grow wild in the forests which can be cultivated in thatched, polythene, brick or stone houses.

OYSTER MUSHROOM CULTIVATION - FLOW CHART



COST- BENEFIT ANALYSIS OF OYSTER MUSHROOM CULTIVATION:

❑ **Economic analyses of Oyster (4 crops) Mushroom cultivation on small scale polythene bags:**

		(in Rupees)
I.	**Non-recurring expenses**	
	a) Construction of high density polythene sheet growing room 300 sq.ft =	15,000=00
	b) Miscellaneous cost =	10,000=00
	Total =	25,000=00
II.	**Recurring expenses**	
	a) Rice/ Wheat straw (400 kg @ Rs.2.50) =	1,000=00
	b) Spawn 50 kg @ Rs. 50 (for 500 bags) =	2,500=00
	c) Chemicals =	1,500=00
	d) Polythene Bag (500 bags @ Rs. 1.50 each) =	750=00
	e) Electric, fuel and water charge =	1,000=00
	f) Labour Charge for Cropping =	3,000=00
	g) Miscellaneous cost =	1,000=00
	Total =	10,750=00
III.	a) Interest @ 15%/year on 'I' =	3,750=00
	b) Depreciation @ 10%/year on 'I' =	2,500=00
	Total =	6,250=00
IV.	**Recurring expenditure for 4 crops/year (Rs. 10,750 × 4)** =	43,000=00
	Total expenses (III + IV) =	49,250=00

Return:

Total production from 500 bags @ 0.750kg/bag × 4 crops/ Session	=	1500 kg
Total income for sale of mushroom @ Rs. 80/kg	=	1,20,000=00
Net Profit/year	=	70,750=00
Cost : Benefit ratio	=	1:1.44

General practice of commercial paddy straw mushrooms cultivation utilizes the same infrastructure for oyster mushroom cultivation unit. Generally, paddy straw mushroom cultivation is performed during rainy session (July-August), whereas oyster mushroom is commercially cultivated in the month of October-February. Paddy straw mushroom cultivation requires only 10-12 days for getting first flush and another two more flushes come at 7-8 days interval. Although, it is considered that non-recurring expenditure for paddy straw mushroom cultivation included here to understand the cost-benefit ratio for independent cultivation of paddy straw mushroom.

3.1.2 Preparation of compost for mushroom production:

Many formula are in use for it. IARI formula for compost preparation is following:

Formula (i)	
Ingredients	**Amount**
Horse dung	1000 kg
Wheat straw	500 kg
Chicken manure	300 kg
Urea	7 kg
Gypsum	30 kg
BHC 10%	125 gm
Formula (ii)	
Ingredients	**Amount**
Paddy straw	300 kg
Urea	9 kg
Tri-sodium phosphate (TSP)	6 kg
Muriate of potash	3 kg
Gypsum	15 kg
Lime	10 kg
Wheat bran	30 kg
Furadan (Insecticide)	250 gm
Bavistin or autistin (fungicide)	150 gm

For both formula, two methods may be used for compost preparation.

A. Longer method and

B. Shorter method

A. Longer method:

This is an outdoor procedure which takes about 28 days to complete a total of 7 turnings. A concrete slab called wharf is required. In addition, a compost turner to aerate and water the ingredients and a tractor loader to move the ingredients to the turner is needed.

In short method, it takes 20-21 days and in long method it is 28-30 days to complete the process. in short method 1st 10 days it requires to fix the temperature of 60-70°C and next 10 days it requires to fix to 50°C. So, it is somewhat difficult to maintain that temperature, and not used, so long method is used in our country. It is comparatively easy and everybody can prepare compost by this method.

Using 2nd formula, Gypsum and furadan is kept isolated separately. All other fertilizers, wheat bran, lime are mixed together and divided into 5 parts. Similarly paddy straw is also divided into 5 parts, because total compost will be of 5 layers.

First step is to wetting the paddy straw with water sprayer or hose pipe. Note that much water should not be sprayed, it will wash out the nutrients by drainage off water from the straw.

Lime is mixed with wheat bran and then all other fertilizers are added and mixed divided into 5 parts.

Now, for making straw pile select a suitable place where air flow is sufficient, shed is there and floor is of concrete. Size of pile will be of 5'×5'×5'. One part of mixed fertilizer is spread over this pile. Next another layer of straw is stacked on the 1st layer and again another part of fertilizer mixture will be spread over it. Thus all 5 layers are made by spreading of all 5 parts of fertilizers. At the top some straw will be put as covering layer. Next from 1st to 5th day examine the temperature of heap whether it is 60-70°C. Next turning of the heap is done for well aeration and rotting as following days-

6th day 1st turning

10th day 2nd turning

13th day 3rd turning

16th day 4th turning

19th day 5th turning

22nd day 6th turning

25th day 7th turning

Note that during turning the straw from side and top part will be put within the heap so that it may be rotten to compost.

On 13th day of turning 1st part of gypsum mixture is spread over the heap. On 16th day furadan is spread to kill nematode or insect. At this time if less moisture is found spray some water. At the last day test the heap whether compost is ready. It should be free of ammonia by air flow, because ammonia prevents mycelia to grow. Both chopped and uncut straw may be used, if it is chopped, then compost will be ready well and fast, 3-4 days before that if whole straw is used.

Characteristics of a good compost: It is deep brown in colour, not clumped-all parts are separated, crumbly, not bad smell, rather sweet smelled, ammonia absent, relative humidity 65-70%, pH 7.2-7.5, thermophilic and super-thermophilic bacteria are there, no insect or nematode.

B. Shorter method:

Compost prepared by this method gives the high quality products and there is very little chance of infections.

Materials required	Amount
a) Wheat straw	1000 kg
b) Chicken manure	600 kg
c) Wheat bran	60 kg
d) Urea	15 kg
e) Gypsum	15 kg

Procedure:

This method is completed in two stages: i) Outdoor and ii) Indoor composting.

i) Outdoor composting:

Wheat straw is mixed with chicken manure and sprinkled with water. The first turning starts on the 4th day and a heap of 45cm height is created. On the 7th day 2nd turning is done with wheat bran, urea and gypsum maintaining an inner temperature between 70-75°C. Third turning starts on the 8th day and on the 9th day the compost is transferred to pasteurization tunnel. It is followed by 2nd phase- indoor composting. The basic goal of pasteurization tunnel is creating and supporting necessary temperatures and gaseous air content, uniformly in the whole compost volume that has been filled in the tunnel.

ii) Indoor composting:

In this stage, pasteurization is carried out in a closed environment. Composting procedure is completed in three phases.

a) Pre-peak heating point:- After about 12-15 hours of mulch filling, the temperature of compost begins to rise and after arriving at 48-50°C it is kept at that point for 46-40 hours together with the venting system.

b) Peak heat point: Increase a heat of the compost to 57-58°C produced from the parasitic activity. If it is not achieved then steam is injected in the majority chamber and kept for 8 hours.

c) Postpeak-heat point: Temperature is lowered slowly to 48-52°C and kept there until the indication of ammonia is found in the compost.

3.1.3 Mushroom bed preparation:

1. With paddy straw:- First method:

a) Straw of aman paddy is usually good for paddy straw mushroom cultivation. Paddy straw thrashed by bullocks or motor driven machine, looses stiffness, gets


GPS Map Camera
Bhasa, West Bengal, India
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Long 88.278428°
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4.2 POST HARVEST TECHNOLOGY OF MUSHROOM:

Mushrooms have a limited shelf life ranging from one to three days due to the high water ... in them. Thus, post harvest storage and transportation are a crucial part of successful ...ation. It involves all treatments or processes that occur from time of harvesting until the ...oduct reaches the final consumer. Efficient techniques for harvesting, transportation, handling, ...orage, processing or preservation, packaging, etc are components of the post-harvest technology. ...reduces the losses, adds value to the product, generate employment in village and re-establishes ...industries in rural sector. Fresh mushrooms need to be properly stored to retard deterioration ...are consumed. To overcome post-harvest losses, suitable postharvest management practices ...be followed to retard the deterioration in quality, to increase the shelf life and marketability ...shrooms (Wakchaure, 2011a).

Storage of mushroom:

Freshly harvested mushrooms are highly perishable as it is susceptible to deterioration by the enzyme and microorganisms. So, there is a need for their proper preservation. There are two ways of preservation or storage technique-

1. Short term preservation/storage (cooling)
2. Long term preservation/storage.

4.2.1 Short term storage:

Straw mushroom can be stored for 2days at 10 - 15°C in perforated polythene bags. Other mushrooms like button, oyster and milky mushrooms are preserved at 5°C in non-perforated polythene bags. Button and milky mushroom can be stored for one week where as oyster for 3-4 days. Pre-washing leads to decline in shelf life and spoilage of mushroom by bacteria. However, some antimicrobial and reducing agents are used to extend shelf life.

A. Refrigeration:

i) After picking the temperature of button mushroom rises slowly due to respiration and atmospheric temperature. This increased heat causes deterioration in quality. To ensure high quality mushrooms in the market with greater shelf life, these must be cooled as quickly as possible after picking and kept cool throughout. Storage under low temperature is an excellent method for controlling deterioration of harvested mushrooms for a limited period of time.

ii) Low temperature delays the growth of microorganisms, reduces the rate of post-harvest metabolic activities and minimizes the moisture loss. It is effective for short-term preservation.

iii) Cold preservation is grouped in two categories: Refrigeration and freezing. Household and commercial refrigeration usually runs at 4°-7°C. Cold as chill storage uses a slightly lower temperature of -10 to -40°C, depending upon the freshness of the mushrooms to be refrigerated. Freezing is done at a temperature of below -18°C. Chill storage will preserve for days or weeks and frozen storage or deep freezing will preserve for months or even years.

iv) Refrigeration has certain advantages over freezing as it takes less energy to cool mushrooms.

v) The size and shapes of the packs is important in the selection of the cooling room system and design. Packs with more than 10 kg or with 15 cm thick layers cause problems. The choice of the cooling system depends upon the quantity to be handled. It may be a refrigerator for small grower but a cold room with all the facilities is needed for a commercial grower. Forced chilled air, ice bank or vacuum cooling systems are the other systems in use in commercial level.

vi) Vertical flow of air is more suitable for cooling. Mushroom should not be stored in the same cooler along with fruits as the gases produced by fruits causes decolouration of mushrooms.

vii) Vacuum cooling is effective for retaining quality. Blanching for a short period is essential for producing good quality frozen mushrooms. Steam blanching for one minute is before freezing helps to hold on quality.

B. Vacuum cooling:

Here, mushroom fruit bodies are cooled in low pressure, as a result moisture releases from the mushroom. Temperature of fruit bodies decreases fast and it changes the colour of mushrooms that renders it betterness. Then mushrooms are preserved for few days only. At present, an instrument - air spray moist chiller is used for vacuum cooling, here, temperature is decreased without any moisture release and preserved in 16-18°C.

4.2.2 Long term storage:

Canning, pickling and drying processes (papad) are engaged for long-term storage. These processes are not always suitable for all types of mushrooms. The quality of the finished product is not comparable with that of fresh mushroom.


GPS Map Camera
Bhasa, West Bengal, India
Lat 22.406256°
Long 88.278102°
Google

a) Canning:

Canning is the most common process for preserving mushroom. Canning is the technique by which the mushrooms can be stored for longer periods up to a year. The caning process can be divided into various unit operations namely cleaning, blanching, filling, sterilization, cooling, labelling and packaging. In this process the whole mushrooms are washed 3-4 times in cold running water to remove adhering substances. The mushrooms are blanched with a solution of 0.1% citric acid and 1% common salt for 5-6 minutes at 95-100°C to inhibit polyphenol oxidase enzymes activity, inactivate microorganisms, remove the gases from the mushroom tissue and reduce bacteria. Thereafter, blanched mushrooms are filled in tin cans in brine solution (2% salt and 0.1% citric acid) at 90°C. The cans are exhausted for 10-15mnt after lidding loosely, sealed, sterilized at 15psi for 25-30minute, cooled and labelled. Cans are sealed hermetically and kept in upside down position.

The details of canning are given below:

Mushrooms–Grading- Brining-Storage-Slicing- Labeling-Drying-WashingPackaging.

Button mushroom

↓

Cleaning and wash (in water containing 0.1% citric acid/0.3% sodium meta bi-sulphite)

↓

Cut the stalk

↓

Immerse in KMS (Potassium metabisulphite) solution (0.5%)

↓

Blanching (cooking in hot water solution or steam at about 98°C for 7-8 minutes with 1% NaCl and 0.1% citric acid) improves colour

↓

Filling in cans and weighing (200 gm/lb)

↓

Add hot brine solution (1% salt and 0.25% citric acid, Temp. 78-98°C)

↓

Exhausting (Heating at 80°C, 3-5 minutes)

↓

Sealing

↓


Cordyceps Militaris
CORDYCEPS
MILITARIS

5.6 Mushrooms Market in India and Abroad:

In India:

Fresh mushrooms have very short shelf life period and cannot be transported to long distance without refrigerated transport facility. Growers are forced to sell in localised markets near production areas.

Marketing of mushrooms in India is not yet organised. It is the simple system of producer's selling directly to retailer or even to consumer which has its own limitations. In winter about 75%

of the annual production comes in market for sale in limited duration and market area. Per capita consumption of mushrooms in India is about 50 gm as against 1 kg in various countries. There are not been any serious effort to promote the product, to strengthen and expand the market in order to increase its consumption. Mushroom is a novel food item for this country and many are not aware of its nutritive value. There is going to be growing demand of mushrooms in India in future. Marketing problems would be solved if production be increased. Co-operative societies of mushroom growers can be helpful to increase market.

There is no denial of the fact that production of mushrooms, especially of white button mushroom, in India has gone up in the last few years but it has also exacerbated its marketing problems. There have been frequent reports of gluts in north Indian states during the winter months forcing the distress sale of mushrooms. It should be borne in mind that efforts to increase the production without solving its marketing problems, would be counter of production. The marketing of fresh mushrooms would determine the future of mushroom industry in India.

Despite the changing current trends, there is not yet much market for the processed foods and mostly fresh vegetables and fruits are preferred in India. Fresh mushrooms have very short life shelf, cannot be transported to long distances without refrigerated transport facility and are sold in localised markets near and around production areas. The cultivation of white button mushrooms throughout the year under controlled condition is restricted to few commercial units and 30-40% of the production being done under the natural conditions in winter. All the problems of marketing is experienced in 3-4 winter months (Nov.-Feb.) when more than 70% of the annual production comes in markets for sale in limited duration and marketing areas.

Mushroom growers face the consequences of over-saturated market. They are forced to sell their products of mushrooms at highly unremunerative prices. Private processors get tempted to take the opportunity of the situation, rather than coming for rescue, for their own benefits.

According to current Indian estimates, mushroom production in India is about 1 lakh metric tone which is about 3% of the world production. The marketing of fresh mushroom would determine the future of mushroom industry in India. Total mushroom exports from India in 2009-10 were around 11000 tonnes and valued at Rs. 66 crore, major export destinations for Indian mushrooms are U.S, Israel and Mexico. India exports mushroom in 2 forms – fresh and processed. Button mushroom accounts for approximately 95% of total mushroom export.

In abroad:

The global mushroom market size was valued at USD 49.8 billion in 2021 and is expected to expand at a compound annual growth rate (CAGR) of 9.7% from 2022 to 2030. It is projected to reach USD 112.71 billion by 2030. Asia-Pacific is the most significant shareholder in the global mushroom market.

The high therapeutic value of edible fungus and growing public awareness are also expected to increase market growth over the next few years. Europe is the largest market for dried mushrooms in the world representing around 30% of the total world imparts. Large imparting markets are Germany, France, Italy and Poland and they offer opportunities for exporters from developing countries. In addition, market opportunities can be found on the growing markets of Latvia, Lithuania and Central & Eastern Europe. The products with rising demands are from organics and wild-collected dried mushrooms.

The marketing of fresh mushrooms all over the world is not very organised except the auction system in Netherland. For effective and efficient marketing, especially export, it is necessary to understand the global trade vis-a-vis the sources of supply, potential region of demand and consumption patterns.

The 3 major mushroom producing countries- China, USA and Netherland account for more than 60% of the world production. However, China's share is 46% which is about half of the world production.

Poland, Netherland, Canada, Ireland, China, USA, Belgium, Lithuania are the major mushroom exporting countries, while countries like UK, Germany, France, Russia, Japan import the mushrooms from the above countries. Largest importer of preserved (canned) mushrooms is Germany. China is the largest producer and consumer of mushrooms in the world. China is the largest exporter of processed mushrooms. European union and USA are the biggest markets for mushroom from India.

MEDICINAL PLANTS

According to the World Health Organization, "a medicinal plant is any plant which, in one or more of its organs/parts, contains substances that can be used for therapeutic purposes, or which are precursors for chemo-pharmaceutical semi synthesis". The ancient Indian system of medicines is predominantly plant based, making use of most of our native plants. Tyler defines herbal medicines as "crude drugs of vegetable origin utilized for the treatment of disease states, often of a chronic nature, or to attain or maintain a condition of improved health". The word "herb" has been derived from the Latin word, "herba" and an old French word "herbe". In Botany, the term "herb" is only applied to non-woody plants or plant habit. Now-a-days, herb refers to any part of the plant like fruit, seed, stem, bark, flower, leaf, stigma or a root of woody as well as a non-woody plant. The alternative medicines in the traditional systems are derived from herbs, minerals, and organic matter, while for the preparation of herbal drugs only medicinal plants are used.

History of medicinal plants

Plants have been used for medicinal purposes long before prehistoric period. The practice of medicine spread from Asia to Europe. The Greeks are known to have acquired knowledge of it over the period from 468-377 BC. In turn, the Romans learned of it from the Greeks around 100 BC. The Islamic World learned of and began to practice this science around the time the Roman Empire fell, in the 5th century. Evidence exist that Unani Hakims, Indian Vaids and European and Mediterranean cultures were using herbs for over 4000 years as medicine. By the 10th century, the Anglo-Saxon World was practicing herbal science and describing it in writings. Throughout the middle ages, most herbalism was practiced under the authority of the church, which maintained the authority to grow medicinal herbs and to introduce new herbal medicines. Indigenous cultures such as Rome, Egypt, Iran, Africa and America used herbs in their healing rituals, while others developed traditional medical systems such as Ayurveda, Unani and Chinese Medicine in which herbal therapies were used systematically.

Importance of medicinal plants

Among ancient civilisations, India is one of the earliest civilizations that have recognized the importance of herbal products for disease management, nutrition and beauty enhancement. The forest and mountains in India is the principal repository of large number of medicinal plants, which are largely collected as raw materials for manufacture of drugs. Use of plants as a source of medicine has been an ancient practice and is an important component of the health care system in India. In India, about 70 percent of rural population depends on the traditional Ayurvedic system of medicine. Most healers / practitioners of the traditional systems of medicine prepare formulations by their own recipes and dispense to the patients. In the Western countries, approximately 40 per cent of people are using the herbal medicine for the treatment of various diseases. This interest in traditional medicines is growing rapidly due to the attention being given to it by the government and different non-government agencies comprising of general public and researchers as well as the increased side effects, adverse drug reactions, and cost factor of the modern medicines.

Medicinal plants as raw materials

The primary raw material for plant based products is the biomass of the medicinal plants. Crude drugs from medicinal plants are usually obtained from whole plant or different plant parts e.g., leaf, bark, root, seed, resins, plant exudates, etc.

Biomass is the green or dried plant part(s) or whole plant obtained from plants collected from their natural habitats or harvested from cultivated plants. The biomass needed for the industry should pass the following criteria.

1. Should be from specific plant part(s) derived from a single botanically designated species and should not be mixed with biomass from other related or unrelated plant species

2. Should be free from extraneous abiotic matter like dust, stones, soil, and biotic matter such as fungus, droppings from rodents/ insects/ birds etc.

3. Should be free from damage due to insects/ diseases

4. Should contain the minimum specified or accepted concentration of the chemical (s) of commercial value

5. Should be free from chemical contaminants such as heavy metals, pesticide residues etc.

6. Should meet the specifications agreed between the supplier and the industry such as colour, admixture with other plant parts of the same plant, level and method of drying, packing etc.

Scope of medicinal plants

With the discovery of several new molecules from herbs for treating dreaded diseases like cancer and the relative safety of these products, the global demand for medicinal plant products has increased in recent years. India is sitting on a treasure of 8000 medicinal plants. In the last 50 years, Central and State Government research organizations have developed several technologies for utilizing medicinal plants. Small and medium enterprises have already been set up by many entrepreneurs and opportunities exist for new enterprises in this field.

India is the largest producer of medicinal plants. More than 1.5 million practitioners are using the traditional medicinal system for health care in India. It is estimated that more than 7800 manufacturing units are involved in the production of natural health products and traditional plant-based formulations in India, which requires more than 2000 tons of medicinal plant raw material annually. More than 1500 herbals are sold as dietary supplements or ethnic traditional medicines.

Several medicines are derived directly or indirectly from plants. While several classic plant drugs have lost much ground to synthetic competitors, others have gained a new investigational or therapeutical status in recent years. Moreover, a number of novel plant-derived components have entered into Western drug markets. Clinical plant-based research has accomplished in the important fields of anticancer (e.g. taxoids and camptothecins) and antimalarial (e.g. artemisinin compounds) therapies. Natural product research could often be guided by ethno-pharmacological knowledge and it could make substantial contributions to drug innovation by identifying the novel chemical structures or mechanisms of action. However, both plant-derived drugs and crude herbal medicines have to take the same pharmacoeconomic hurdle that has become important for new synthetic pharmaceuticals

The major drawbacks for global positioning of Indian medicinal plant products are: dearth of scientific validity of claimed medicinal properties, quality inconsistencies and high prices of the products. Other factors include adulteration, unethical means adopted by some companies, contaminants exceeding prescribed levels, not adhering to time schedules etc. Government of India is encouraging setting up of industries and is providing training, incentives etc. and is negotiating with many countries concerning export/ import regulations etc. National and State Medicinal Plants Boards are encouraging cultivation, processing, quality testing and exports of herbal plants and their value added products.

INDIGENOUS SYSTEM OF MEDICINE:

India is known for its traditional medicinal systems—(AYUSH) Ayurveda, Yoga, Unani, Siddha and Homeopathy. Medical systems are found mentioned even in the ancient Vedas and other scriptures. An indigenous system is a natural form of medicine outside the stream of Western or allopathic medicine practiced by majority of doctors all over the world today. The Ayurvedic concept appeared and developed between 2500 and 500 BC in India. The term "Ayurveda" is derived from two Sanskrit words, 'Ayur' and 'Veda' Ayur means life and Veda means knowledge or science. The literal meaning of Ayurveda is "science of life," because ancient Indian system of health care focused on views of man and his illness. "Charaka Samhita" by Charak (a physician) and "Susruta Samhita" by Sushrut (a surgeon) are the two foundational texts in Sanskrit on Ayurveda (Indian traditional medicine) written almost about 2000 years ago.

MEDICINAL PLANT GARDEN AT BHASA, 2nd CAMPUS OF ASUTOSH COLLEGE

The second campus of Asutosh College, located at Bhasa near Joka on Diamond Harbour Road, South 24 Parganas, is a "Green Campus" spread over 11 acres of land with a 2.5 acres waterbody to provide a serene, pollution-free, eco-friendly and green environment to its student. A medicinal plant garden, 'Sushrut', has been setup inside the campus named after the renowned ancient Indian medical practitioner and surgeon, Sushrut, who treated his patients with herbal medicines. The Medicinal Plant garden is situated within an area of almost 7000 sq.ft., surrounded by 'Debdaru' trees (*Polyalthia longifolia*). Medicinal plants of different families are cultivated and maintained inside the Sushrut garden. A list has been provided below along with its medicinal uses:

Common name; Scientific name; Family	Habit	Plant parts used	Medicinal uses
1. Amla *Emblica officinalis* (Euphorbiaceae)	Shrub	Fruit	Kidney and urinary tract, intestinal infections, diabetes and hepatitis.
2. KrishnaTulshi *Ocimum tenuiflorum* (Lamiaceae)	Herb	Leaf	Malaria, bronchitis, diarrhoea, antiseptic
3. Kalmegh *Andrographis paniculata* (Acanthaceae)	Herb	Shoot/leaf	Medicinal value liver problem, whooping cough, leprosy, jaundice

4. Grihakumari-*Aloe barbodensis* (Liliaceae)	Herb	Leaf (gel)	Skin soothing (astringent),moisturising and healing properties, constipation, health tonic
5. Nayantara – *Catharanthus roseus* (Apocynaceae)	Herb	Leaf	Hypertension, leukaemia, diabetes, piles
6. Aswagangha – *Withania somnifera* (Solanaceae)	Herb	Root	Ulcer, skin disease, dysentery, asthma, loss of appetite
7. Mehendi – Hena – *Lawsonia inermis* (Lythraceae)	Shrub	Leaf	Gall bladder stone, spleen ,skin treatment, small pox, liver treatment
8. Harjora – *Cissus quadrangularis* (Vitaceae)	Climber	Stem	Bone fracture, swelling, colonopathy, asthma, tumor
9. Akanda – *Calotropis gigantea* (Asclepidaceae)	Shrub	Root bark	Ulcer, leprosy, night blindness, liver disorder and worm disease,
10. Nishinda – *Vitex negundo* (Verbenaceae)	Tree	Root/leaf/fruit	Rheumatism, dyspepsia, sinus, spleen enlargement, cholera
11. Ram tulsi – *Ocimum gratissimum* (Lamiaceae)	Herb	Leaf	Headache, influenza, sunstroke.
12. Ayapana – *Eupatorium triplinerve* (Asteraceae)	Herb	Leaf	Stop hemorrhage, astringent, stimulant, digestive, purgative
13. Brahmi – *Bacopa monnieria* (Scrophulariaceae)	Herb	Shoot/leaf	Nervous disorder, epilepsy, convulsion, memory tonic, urinary problem, bronchitis
14. Anantamul –*Hemidesmus indicus* (Apocynaceae)	Herb	Root	Fever, skin disease, loss of appetite, blood purifier, laxative, conjunctivitis
15. Basak – *Justicia adhatoda* (Acanthaceae)	Shrub	Leaf	Cough, bronchitis, dysentery, chicken pox, indigestion
16. Gandal – *Paederia scandens* (Rubiaceae)	Herb	Leaf	Dysentery, loss of appetite, urinary problem, night blindness,
17. Citronella- *Cymbopogon schoenanthus* (Poaceae)	Herb grass	Leaf	Insecticidal
18. Thankuni-*Centella asiatica* (Apiaceae)	Herb	Leaf	Depression, perspiration, dysentery, liver problem, jaundice
19. Ada-*Zingiber officinale* (Zingiberaceae)	Herb	Rhizome	Nausea and vomiting associated with surgery, vertigo, anti allergic, cough and cold, rheumatism, inflammation
20. Babchi – *Psoralea corylifolia* (Fabaceae)	Herb	Seeds	Treatment of leprosy, leucoderma, psoriasis and other skin diseases.
21. Haritaki- *Terminalia chebula* (Combretaceae)	Tree	Fruit	Ease bowel movement, reduces the pile mass
22. Bohera-*Terminalia bellirica* (Combretaceae)	Tree	Fruit	Astringent and laxative, affections of the throat and chest.
23. Kurchi-*Holarrhena antidysenterica* (Apocynaceae)	Tree	Stem bark	In chronic diarrhoea, in treatment piles,skin diseases.
24. Asoka- *Saraca asoca* (Fabaceae)	Tree	Stem bark	Excessive uterine bleeding, dysmenorrheal and for depression
25. Tezpata-*Cinnamomum tamala* (Lauraceae)	Tree	Leaf	Reduction in blood glucose level, diabetes
26. Neem- *Azadirachta indica* (Meliaceae)	Tree	Leaf/fruit	Anthelmintic , antifungal, antidiabetic, antibacterial, antiviral
27. Arjun- *Terminalia arjuna* (Combretaceae)	Tree	Stem bark	Wounds, aemorrhages and ulcers,heart
28. Dalchini-*Cinnamomum zeylanicum* (Lauraceae)	Tree	Stem Bark	Aromatic, carminative, stimulant, anti microbial, anti fungal

29. Amada-*Curcuma amada (Zingiberaceae)*	Herb	Rhizome	Cough and cold, rheumatism, inflammation
30. Kemuk-*Costus speciosus (Costaceae)*	Shrub	Leaf	Fever, rash, asthma, bronchitis and intestinal worms.
31. Satamuli-*Asparagus officinalis (Liliaceae)*	Herb, climber	Root	For treatment of urinary and kindey problems, jaundice and sciatica, antioxidant to boost the immune system, reduce inflammation and maintain the health of the liver.
32. Salparni –*Desmodium gangeticum (Fabaceae)*	Herb, climber	Shoot /leaf twig	Digestive, asthma dysentery, Bronchitis.
33. Swet Tulsi-*Ocimum sanctum (Lamiaceae)*	Herb	Leaf	Leaf extracts are used in Ayurvedic remedies for common colds, headaches, stomach disorders, inflammation, heart disease.
34. Haldi -*Curcuma longa* (Zingiberaceae)	Herb	Rhizome	Anti-inflammatory, anti-cancerous, treats digestive disorders

Babchi - Psoralea corylifolia
(Fabaceae)

FIELD STUDY REPORT:
(Details of 5 different commercial and economically exploited medicinal plants from the above list)

SAMPLE NO. 1

(i) Common Name: Babchi

(ii) Scientific Name: Psoralea corylifolia (Fabaceae)

(iii) Habit: Herb

(iv) Type of vegatation: Xerophytes

(V) Soil type and condition of growth: The crops can be grown well in sub-tropical climate receiving low to medium rainfall over a variety of soils ranging from sandy medium loam to black cotton soils. Red loamy soil with good organic matters and a pH ranging from 6.5 – 7.5 are good for cultivation.

(Vi) Plant parts used: Seeds

(Vii) Harvesting and processing of plant parts used: Seeds are used in the treatment of leprosy, leucoderma, psoriasis and other skin diseases. Seed oil recommended for application over scalp to treat dandruff.

Asoke - saraca asoca
(Fabaceae)

SAMPLE NO. 2

(i) Common Name: Asoke

(ii) Scientific Name: Saraca asoca (Fabaceae)

(iii) Habit: Tree

(iv) Type of vegetation: mesophyte

(v) Type of soil and condition of growth: The soil requirements for Asoke trees are rich, well-draining, pH 5 – 7.5, slightly acidic to neutral. For growing Asholke trees, loams, sandy loams, or clay-loamy soil is ideal.

(vi) Plant-parts used: stem bark

(vii) Harvesting and processing of plant parts used: Gynecological Problems, depression, women's problems, haemorrhages, diabetes, stomach problems, and muscular spasms can all be successfully treated using Asholke tree extract. use dried stems, bark, and blooms to treat diseases and discomfort. In India, several bowls and containers are made from the tree's seeds, bark, and flowers in an effort to cure a variety of health issues. The tree is also helpful in reducing the risk of kidney stone occurrence and alleviating infections contamination, worm illness, skin consumption, hypersensitivities, blood clotting in the body, and looseness of the intestines.

Ada - zingiber officinale

SAMPLE NO. 3

(i) common Name: Ada

(ii) scientific Name: zingiber officinale

(iii) Habit: Herb

(iv) Type of soil and condition of growth: Ginger is grown as rainfed crop. It grows well in warm and humid climate. It is cultivated up to 1500 m above mean sea level. However, an optimum elevation for its successful cultivation is 300-900m. A rainfall of 1500-3000 mm, well distributed in 8-10 months is ideal. Ginger is cultivated on a wide range of soils such a sandy loams or clay loams. virgin forest soil particularly after de forestation is found ideal. The most favourite soil pH is 6.0 - 6.5.

(v) Type of vegetation: mesophyte

(vi) plant parts used: Rhizome

(vii) Harvesting and processing of plant parts used: Ginger root is used to attenuate and treat several common diseases, and such as headaches, colds, nausea, and emesis, vomiting associated with surgery, vertigo, anti-allergic,

Satamuli – Asparagus officinalis
(Liliaceae)

SAMPLE NO: 4

(i) Common Name:- Satamuli

(ii) Scientific Name:- Asparagus officinalis (Liliaceae)

(iii) Habit:- Herb, climber

(iv) Soil Type and condition of growth:- plant usually grows in a variety of soils including medium black having PH 7-8, electrical conductivity 0.15, organic carbon 0.79% and phosphorus 9.3 kg/acre. It can be easily grown in sub-tropical and sub-temperate agro-climatic regions up to 1400 m.

(v) Type of vegetation:- xerophytes

(vi) plant parts used:- root

(vii) Harvesting and processing of plant parts used:- for treatment of urinary and kidney problems, jaundice and sciatica, antioxidant to boost the immune system, reduce inflammation and maintain the health of the liver.

Haldi - curcuma Longa
(zingiberacea)

SAMPLE NO. 5

(i) common Name :- Haldi

(ii) Scientific Name :- curcuma Longa (zingiberaceae)

(iii) Habit :- Herb

(iv) Soil type and condition of growth :- Turmeric can be grown in diverse tropical conditions from sea level to 1500m above sea level, at a temperature range of 20-35°C with an annual rainfall of 1500 mm or more. under rainfed or irrigated conditions. Though it can be grown on different types of soils, it thrives best in well-drained sandy or clay loam with a pH range of 4.5-7.5 with good organic status.

(V) Type of vegetation :- mesophyte

(vi) plant parts used :- Rhizome

(vii) Harvesting and processing of plant parts used :- It might be an antioxidant, help lower blood sugar levels, hypolipidemic help alleviate inflammation, effective against microorganisms, hepatoprotective, anti-cancerous, Anti-inflammatory, treats digestive disorders.

■ Write in your own words about the outcome of the project in terms of economic aspects and application of medicinal plant i.e. the take home lesson from the project. You may use any medium (Bengali / English) while writing the conclution.

It terms of medical plans, the project highlighted the importance of personalized care and the integration of advanced data analytics. By tailoring medical plans to individual patients based on their unique health data, healthcare providers can offer more effective treatments and improve patient outcomes. The project also emphasized the role of continuous monitoring and timely adjustments to medical plans, ensuring that patients receive the most appropriate care as their conditions evolve. Overall, the take-home lesson from the project is that strategic investments in technology and personalized care approaches can lead to both economic benefits and enhanced patient care. Embracing these innovations can transform healthcare delivery, making it more efficient, cost-effective, and patient-centered.

25/6/24

ASSIGNMENT: Module-III

Topic: Aquaculture: Techniques, Sustainability and Commercial Prospects

Summer Internship for MSD Students (Semester-II) Academic Session 2024-25

Organised by
ASUTOSH COLLEGE

Name of the Student: Sneha Dubey.

College Roll No: 0107

University Registration No: 012-1211-1322-23

University Roll No: 232012-12-0007

Stream: B.A/B.Sc Semester-II

Assignment-1: Write down the Common name, scientific name and brief description about any three commercially important ornamental fish species.

1). • common name :- Betta fish
• Scientific Name :- Betta splendens
• Description :- Betta fish, also known as siamese fighting fish, are popular for their vivid colors and long, flowing fins. They are native to southeast asia and are known for their aggressive behavior, especially males who often fight each other. Bettas are labyrinth fish, meaning they can breathe atmospheric air due to a specialized labyrinth organ. They thrive in warm water and can be kept in small aquariums.

2) • common Name :- Guppy
• Scientific Name :- poecilia reticulate
• Description :- Guppies are small, vibrant fish that are highly valued in the ornamental fish trade due to their variety of colors and patterns. Originating from northeast south America, guppies are

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hardy and adaptable to various water conditions, making them ideal for beginner aquarists. They are livebearers, meaning they give birth to live young, which can lead to rapid population growth in captivity.

3) • Common Name:- Neon tetra
• Scientific Name:- Paracheirodon innesi
• Description:- Neon tetras are small, peaceful fish renowned for their striking iridescent blue and red coloration. Native to the blackwater and clearwater streams of the Amazon Basin in South America, they prefer soft, acidic water and thrive in densely planted aquariums. Their schooling behavior makes them particularly attractive in community tanks, adding vibrant color and movement.

These fish are highly sought after in the ornamental fish trade due to their beauty, diverse coloration, and adaptability to home aquariums.

Betta splendens

Poecilia reticulate

Paracheirodon innesi

Assignment-2: Write the materials and methods to construct an all glass aquarium.

Materials

1) Glass panels:-
   (i) 1 Bottom panel
   (ii) 2 side panels
   (iii) 1 Front panel
   (iv) 1 Back panel

- The thickness of the glass depends on the size of the aquarium. Common thickness range from 6mm to 12mm.

2) Silicone sealant:-
   Aquarium-safe silicone sealant (neutral cure, non-toxic to fish)

3) Masking tape:-
   High-quality masking tape for securing panels during assembly.

4) Glass cleaner:-
   non-toxic glass cleaner or rubbing alcohol for cleaning glass surface.

5) Straight Edge or Square:-
   For ensuring the panels are aligned correctly.

6) Caulking Gun:-
   For applying the silicone sealant

7) Clamps (optional):-
   TO hold panels in place if needed.

8) Razor Blade or Utility knife:-
for trimming excess silicone.

9) Paper Towels or clean Rags:-
for cleaning up excess silicone.

■ Methods:-

1) Preparation:- clean all glass panels with glass cleaner or rubbing alcohol to remove any dirt, grease, or fingerprints. This ensures better adhesion of the silicone sealant.

2) Positioning the bottom panel:- Lay the bottom panel on a flat, stable surface covered with a soft cloth or foam to prevent scratches.

3) Applying silicone to the Bottom panel:-
Apply a continuous bead of silicone along the edges of the bottom panel where the side, front, and back panels will be attached.

4) Attaching the side panels:- position one side panel vertically along the edge of the bottom panel with the silicone bead. Secure temporarily with masking tape. Repeat for the other side panel.

5) Attaching the Front and Back panels:-
Apply a bead of silicone along the edges of the side panels where they will meet the front and back panels.
Position the front panel against the side and bottom panels, ensuring it is aligned properly. Secure with masking tape. Repeat for the back panel.

8) Razor Blade or utility knife :-
for trimming excess silicone.

9) Paper Towels or clean Rags :-
for cleaning up excess silicone.

■ Methods :-

1) Preparation :- clean all glass panels with glass cleaner or rubbing alcohol to remove any dirt, grease, or fingerprints. This ensures better adhesion of the silicone sealant.

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4) Attaching the side panels :- position one side panel vertically along the edge of the bottom panel with the silicone bead. Secure temporarily with masking tape. Repeat for the other side panel.

5) Attaching the front and Back panels :-
Apply a bead of silicone along the edges of the side panels where they will meet the front and back panels.
Position the front panel against the side and bottom panels, ensuring it is aligned properly. Secure with masking tape. Repeat for the back panel.

5) Securing the panels:- Ensure all panels are aligned correctly using a straight edge or square. Adjust as necessary before the silicone cures.
use additional masking tape to secure the panels together, ensuring there are no gaps.

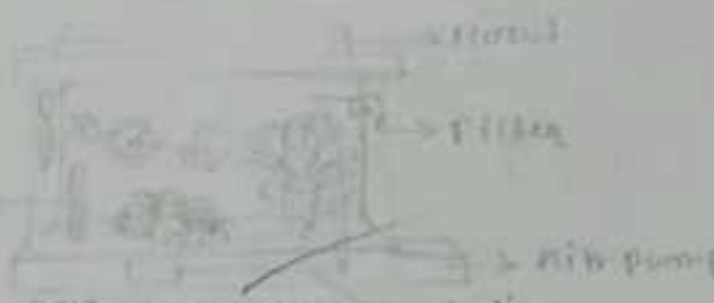
6) Applying Internal Silicone Beads:- Apply a bead of silicone along all internal seams (where the glass panels meet) to ensure a watertight seal.
Smooth the silicone with a finger or a silicone tool for a neat finish.

8) Curing Time:- Allow the silicone to cure for at least 24-28 hours, or according to the manufacturer's instructions, before handling the aquarium.

9) Trimming Excess Silicone:- After the silicone has fully cured, remove the masking tape and trim any excess silicone with a razor blade or utility knife.

10) Final cleaning:- clean the aquarium inside and out with a non-toxic glass cleaner to remove any fingerprints or smudges.

11) Leak Test:- place the aquarium on a flat surface and fill it with water to check for leaks. Let it sit for 24 hours to ensure there are no leaks.
If leaks are found, dry the aquarium thoroughly, and reapply silicone to the leaking area, allowing it to cure before retesting.



Assignment-3: Briefly describe about sustainable aquaculture practices.

1) Integrated Multi-Trophic Aquaculture (IMTA):- combining different species, such as fish, shellfish, and seaweed, to create a balanced ecosystem where waste from one species becomes food for another.

2) Recirculating Aquaculture systems (RAS):- using systems that recycle water within the farm, significantly reducing water use and preventing pollution.

3) Selective Breeding and Genetic Improvements:- Enhancing disease resistance and growth rates to reduce the need for antibiotics and increase efficiency.

4) Sustainable Feed:- using alternative feed ingredients, such as plant-based proteins and insect meal, to reduce reliance on wild fish stocks.

5) Eco-Friendly siting:- choosing locations that minimize habitat disruption and avoid areas with high ecological sensitivity.

Assignment-4: Learning outcomes and feedback

This refers to information provided to learners. Their performance or understanding it can come from various search such as teacher, peers, assignment or self-reflection. Feedback helps learners understand where they stand in relation to the learning outcome and what adjustment might be needed to achieve there outcome.

Barman
26.06.24

Group - A

21/6/24

ASSESSMENT: Module-III

Topic: Aquaculture: Techniques, Sustainability and Commercial Prospects

Summer Internship for MSD Students (Semester-II) Academic Session 2024-25

Organised by
ASUTOSH COLLEGE

Name of the Student: Sneha Dubey.

College Roll No: 0107

University Registration No: 012-1211-1322-23

University Roll No: 232012-12-0207

Stream: B.A/B.Sc Semester-II

All questions are compulsory.

1. Aquaculture involves-
   a) Cultivation of only fish
   b) Cultivation of all aquatic animals
   c) Cultivation of commercially important aquatic plants and animals
   d) Cultivation of aquatic plants

2. In Sustainable aquaculture practices –
   a) Increased aquaculture production
   b) Controlled aquaculture production
   c) Controlled aquaculture production without affecting environment
   d) Increased aquaculture production without affecting environment

3. Which is the following of an ornamental fish?
   a) Rohu
   b) Catla
   c) Tilapia
   d) Gold fish

4. Aquaculture can be done in -
   a) Cemented tank
   b) Aquarium
   c) Cages
   d) All of the above

5. Adhesive used in construction of glass aquarium
   a) Fevicol
   b) Dendrite
   c) Silicon adhesive
   d) All of the above

6. Which of the following is an essential material for home aquarium?
   a) Plant
   b) Toys
   c) Aerator
   d) Stones

7. Aquarium may be set in
   a) School
   b) Park
   c) Office
   d) All of the above

8. In ornamental fisheries involves-
   a) Breeding of ornamental fishes
   b) Construction of home aquarium
   c) Export of ornamental fishes
   d) All of the above

9. During construction of glass aquarium, the thickness of glass depends on-
   a) Fish size
   b) Size of aquarium
   c) Purpose of culture
   d) None of these

10. The beneficial impact of aquarium in human health is
   a) Stress reduction
   b) Lowering blood pressure
   c) Improve eye sight
   d) Reduce metabolism

Summer Internship (2024) under Curriculum and Credit Framework (CCF) of the

University of Calcutta

3-Year Multidisciplinary Course (BA/BSc)

Name (BLOCK LETTERS) : RAHUL DAS.

CU Roll Number : 232012-22-0173

CU Registration Number : 012 - 1112-2020-21

EXAMINED

ASUTOSH COLLEGE ESTD - 1916 AFFILIATED TO UNIVERSITY OF CALCUTTA

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by.....
Date....01/08/24.....
Asutosh College

ASUTOSH COLLEGE

92 , S.P. Mukherjee Road Kolkata-700026

01/08/24

01/08/24

Certificate of Completion

for

Summer Internship (2024) under Curriculum and Credit Framework (CCF) of the University of Calcutta

This is to certify that RAHUL DAS (student name), student of MDC (BA/ BSc), Semester II, University Roll No 232012-22-0173 (CU Roll No.) and Reg. No. 012-1112-2020-21 (CU Reg. No.), of Asutosh College, successfully completed the 15-day summer internship programme on *CAREER-ORIENTED* SUSTAINABLE PRACTICES from 13.06.2024 to 27.06.2024, at Asutosh College.

Dr. Manas Kabi
Principal
Asutosh College

PRINCIPAL
ASUTOSH COLLEGE
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KOLKATA-700 026

Issued on : 27th of June 2024.

SUMMER INTERNSHIP

13 -27 June, 2024

CAREER-ORIENTED SUSTAINABLE PRACTICES

ASUTOSH COLLEGE

MAIN BUILDING

2nd CAMPUS (BHASA)

CENTENARY BUILDING

Acknowledgements

I extend my heartfelt gratitude to the faculty members, administration and all those who made the Summer Internship Programme 2024 at our esteemed institution a resounding success.

First and foremost, I express my sincere appreciation to our Principal for visionary leadership and unwavering support, which paved the way for this enriching learning experience. I am grateful to our esteemed teachers and mentors for their invaluable guidance throughout the programme.

I would also like to thank the organizing committee for their meticulous planning and seamless execution of the various events, including the inaugration and orientation program, field trips and diverse internship assignments. These activities provided us with practical insights and hands on experience, enhancing our academic knowledge.

Lastly, I am grateful to my fellow interns for their collaborative spirit making this journey truly memorable.

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➢ COURSE CONTENT

MODULE 1

SUSTAINABILITY AND SUSTAINABLE PRACTICES: CONCEPT AND PERSPECTIVES

i. Sustainability

- Concept and need
- Dimensions of Sustainability: – Environmental, Economic and Social

ii. Sustainable Practices

- Renewable Energy Sources: Bio-Gas Plant
- Conservation of Water: The Role of Rainwater Harvesting in Sustainable Water Management
- Renewable Energy: Solar Power (Solar Panel)

MODULE 2

FUNDAMENTALS OF HORTICULTURE: CONCEPT, TECHNIQUES AND APPLICATION

Economic Importance and Classification of Horticultural Crops

- Medicinal Plants Garden, Nutrition Garden and Kitchen Garden: Socio-economic Prospects
- Mushroom Cultivation: Basic Techniques and Socio-economic Prospects

MODULE 3

AQUACULTURE TECHNIQUES AND MANAGEMENT

Aquaculture: Techniques, Sustainability and Commercial Prospects

➤ INTRODUCTION

This report delves into Key module encompassing sustainability, horticulture and aquaculture, each vital in understanding and implementing sustainable deve-lopment principle.

Module 1 : Sustainability and Sustainable Practices.

This module explores the multi-faceted dimentions of sustainability, highlighting its environmental, economic and social imperative. Key sustainable practices examined include the utilization of renewable energy sources such as bio-gas and solar panel alongside innovative approaches like rain water harvesting for efficient water management.

Module 2: Fundamentals of Horticulture

This module investigates the economic significance and classification of horticultural crops, emphasizing the socio-economic potential of medicinal plants. Additionally, it explores the basic techniques and socio-economic prospects of mushroom cultivation.

Module 3: Aquaculture Techniques and Management

This module delves into aquaculture techniques, assessing their environmental sustainability and commercial viability

Through comprehensive exploration of these modules, this report aims to underscore the signi-ficance of sustainable practices in fostering environ-mental stewardship, economic resilience and social well-being.

➢ Day1 Report

On 13th June 2024, Asutosh College hosted its Summer Internship Inaugration and Orientation Program from 12 pm to 4 pm. The event was designed to familiarize interns with the program's objective and provide a comprehensive overview of the scheduled activities.

Inaugural Speeches: The program commenced with inaugral speaches from the college principal and other faculty members. They emphasized the importance of practical learning and encouraged interns to make the most of the internship opportunities ahead.

Schedule Overview:

- 12:30pm - Online class on Medicinal Plants: The first session focused on the identification, cultivation, benefits and maintenance of Medicinal plants.
- 1:15 pm - Online Class on Aquaculture: The second session covered the fundamentals of aquaculture, including different farming techniques, species management and sustainability practies in aquatic environment.
- 2:30 pm - Online Class on Rainwater Harvesting: Interns learned about rainwater harvesting system and the environmental benifits of consenving water resource.
- 3:15 pm - Online class on Biogas Production: The final session explored biogas production processes, from organic waste decomposition to energy generation. It highligted the role of biogas in renewable energy solution and waste management.

➢ Day 2 Report

On June 14, 2024, students of Asutosh College participated in a lecture and hands-on-training session conducted by the college teacher on the topic of solar panels as renewable energy sources.

The session commenced with a comprehen-sive lecture on solar panels, focusing on their signifi-cance as a sustainable and renewable energy source. The teachers discussed how solar panels convert sun-light into electricity and their applications in residental, commercial and industrial settings. The lecture also highlighted the environmental benifits of solar energy, including reduced carbon emissions and dependence on fossil fuels.

Following the lecture, in preparation for the upcoming session, the teacher instructed us to document our experience using GPS map cameras. This involved capturing photographs that would include timestamps and geographical coordinates, ensuring accurate documentation for our college assignments. The purpose of this instruction was to maintain a chronological record of our practical training and demonstrate our engagement in the learning process.

Our teacher explaining us "How bio-gas is produced and its usage". 15th June, 2024

➢ Day 3 Report

On 15th June, students from Asutosh College embarked on an educational visit to the college's second campus, Bhasa Campus. The purpose of the visit was to gain practical knowledge and insights into various aspects of agriculture and environmental sustainability.

The journey began early in the morning as students gathered at the college premises and boarded the college bus headed towards Bhasa Campus. The atmosphere was filled with anticipation and curiosity as classmates engaged in discussions about what they expected to learn during the visit.

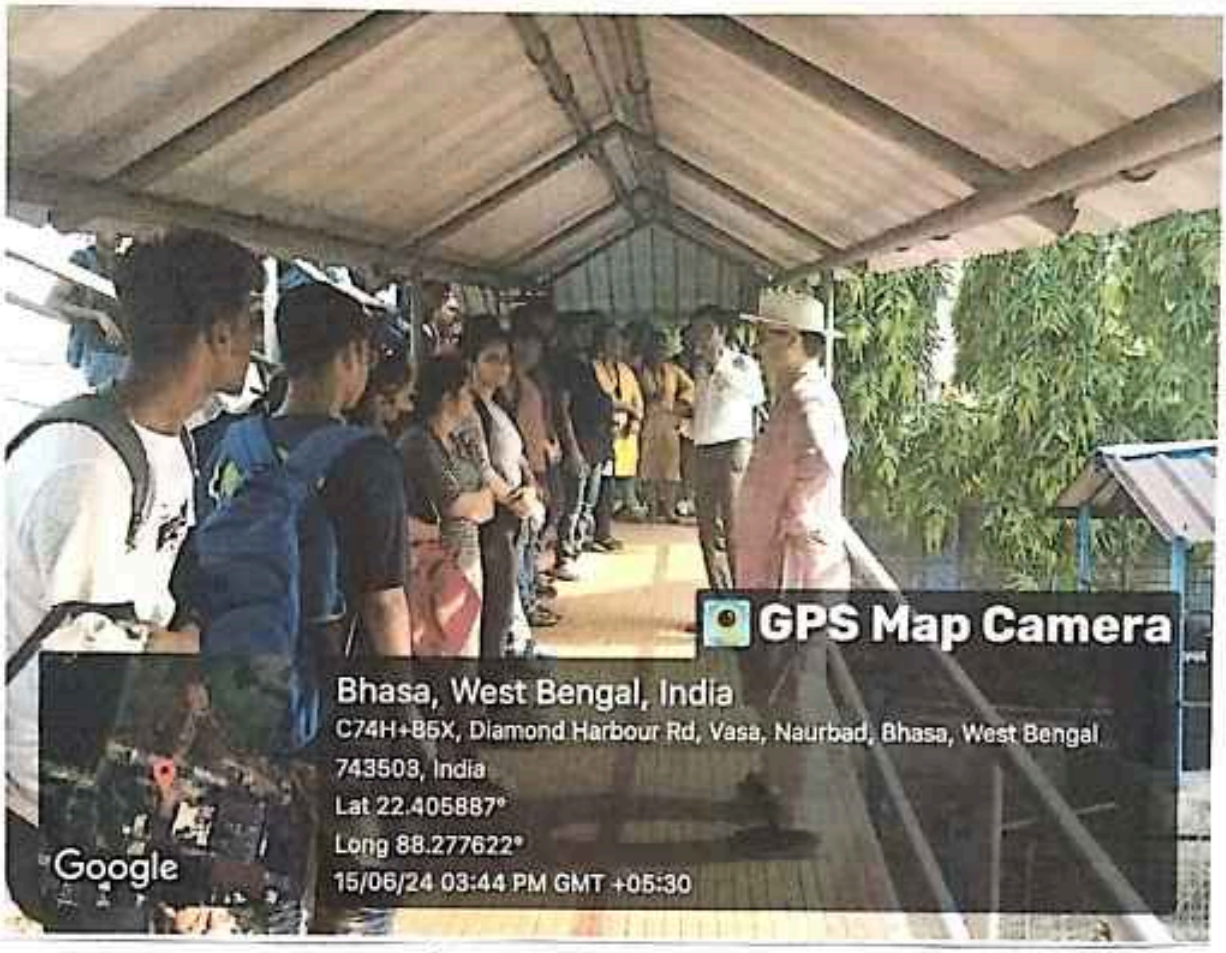
Upon arrival at Bhasa Campus, we were warmly welcomed by the faculty members who guided us through a series of information demonstrations :

1. Mushroom Cultivation : The first demonstration involved learning about mushroom cultivation techniques, including the process of preparing substrate, maintaining ideal conditions, and harvesting mushroom.

2. Horticulture : We were introduced to various horticultural practices, such as propagation methods, pest management strategies and the importance of soil health for sustainable crop production.

3. Biogas Plant : A visit to the biogas plant provided valuable insights into renewable energy sources. We learned about the process of converting organic waste into biogas, which can be used for cooking and generating electricity.

4. Rainwater Harvesting System : The campus showcased an effective rainwater harvesting system designed to conserve water. We learned about different



15th June, 2024 . Bhasa Campus
our teacher's explaination on about 'Rain water harvesting System'.

components of the system and its benefits for replenishing groundwater and reducing water scarcity.

5. Medicinal Plants: Lastly, we explored the medicinal garden where various medicinal plants were cultivated. We gained knowledge about the medicinal properties of these plants and their importance in traditional and modern healthcare practices.

Following the demonstrations, the faculty members conducted an enlightening lectur session on Mushroom cultivation, Horticulture, Aquaculture etc.

After an enriching day of learning and exploration, we boarded the college bus and returned to main campus. The journey back was filled with discussions among students, reflecting on the new knowledge gained and its potential implications for future studies and career paths.

➢ Day 4 Report

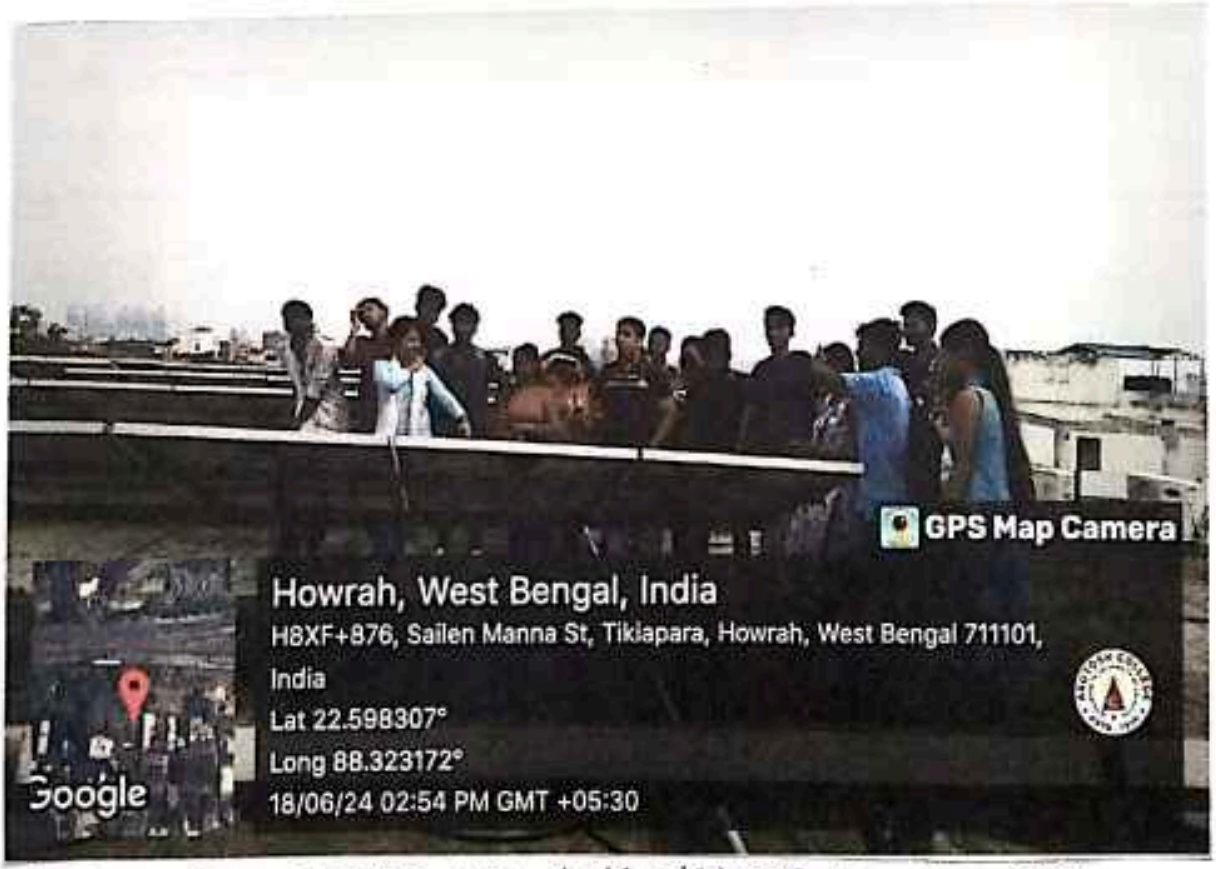
On this Sunday, June 16th 2024, our college remained closed, allowing students to focus on their internship reports. With no classes scheduled, students like us utilized this time to reflect on our learning from the past week. Throughout the week, we engaged in various online and practical sessions, including an insightful lecture on solar panels and a field trip to our college's Bhasa Campus. These activities underlined the importance of sustainability, horticulture techniques, and aquaculture management in contemporary practices. Each module provided valuable insights into renewable energy, horticultural practices and aquaculture techniques enriching our understanding of sustainable development.

➢ Day 5 Report

On 17th June 2024, our college observed a holiday, providing students with time to focus on writing their internship reports. The day was free from regular classes, following a schedule that included online classes on 13th June, a solar panel lecture on 14th June and a field trip to the Bhasa Campus on 15th June. Additionally, 16th June was a holiday being a Sunday.

Students engaged deeply with topics such as sustainability, renewable energy sources like solar power and horticulture techniques during the internship. These modules have equipped us with invaluable insights into sustainable practices and agricultural innovations.

June 18, 2024. our college's teachers led us to the college rooftop where solar panels were installed.



During the session we took pictures to document our learning experience.

➢ Day 6 Report

On June 18, 2024, our college initiated its summer internship programme with focus on sustainable practices, particularly exploring the use of renewable energy through solar panels.

Our teacher led us to the college rooftop where solar panels were installed. They elucidated on how solar panels harness sunlight to generate electricity, highlighting its role in reducing carbon footprint and promoting clean energy.

During the session, we used GPS map cameras to document our learning experience, capturing images of the solar panels along with their geographical coordinates, time and date. This exercise not only facilitated our assignment preparation but also reinforced the practical application of theoretical knowledge.

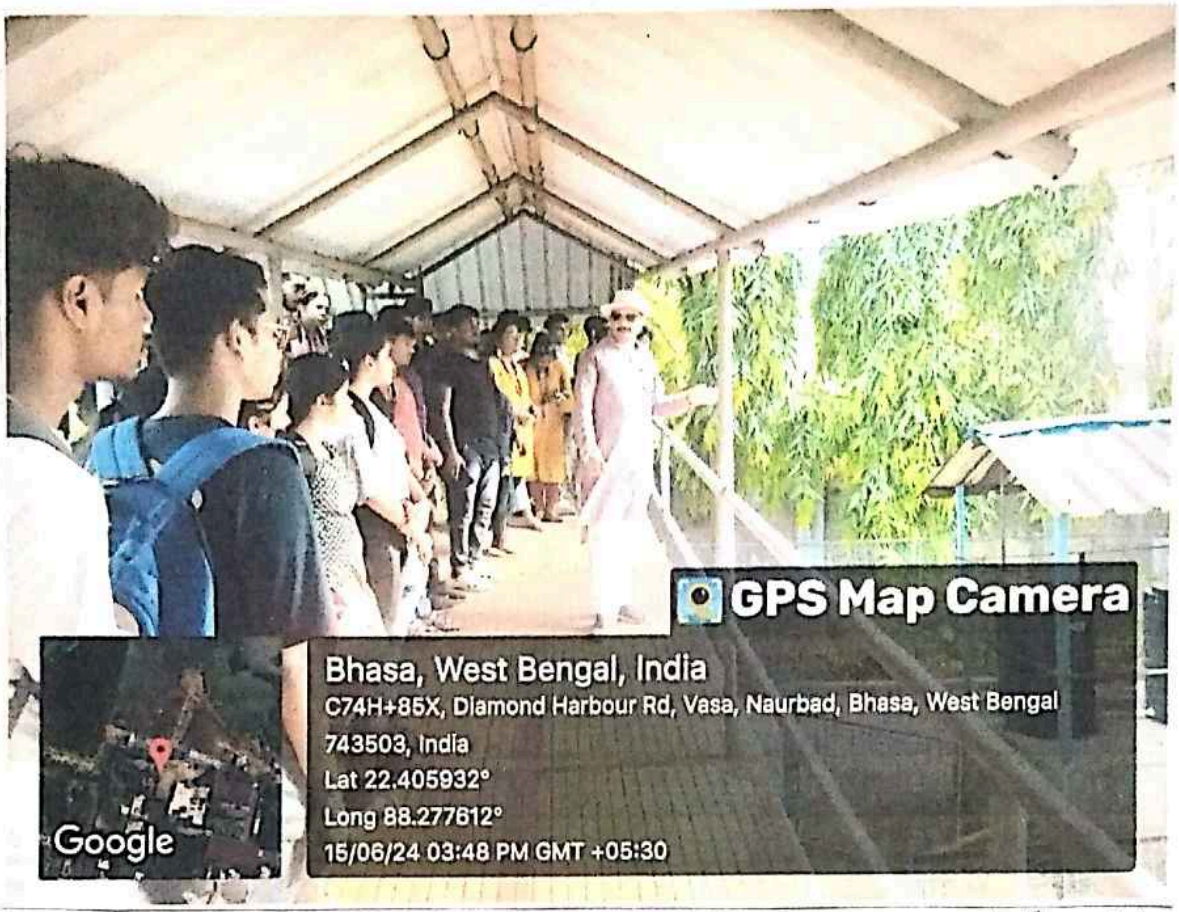
Furthermore, our teachers provided guidance on structuring our assignments, emphasizing the integration of sustainable practices discussed in Module 1.

➢ Day 7 Report

On June 19, 2024 our college initiated a summer internship programme focusing on sustainable practices, particularly highlighting the use of renewable energy sources like bio-gas. The day commenced with a comprehensive lecture by our teacher, emphasizing the importance and working of biogas.

The lecture reiterated the concept of sus-tainability, emphasizing its dimensions : environmental, economic and social. Sustainability ensures that our actions meet present needs without compromising the ability of future generations to meet their own needs. Bio gas plants exemplify sustainable practices by utilizing organic waste to produce clean energy, contributing positively to environmental and economic dimensions.

Furthermore, our teachers guided us on effectively preparing assignments related to sustainable practices. They stressed the signi-ficance of critical analysis and practical application of theoretical knowledge gained from the module.



June 15, 2024, a field trip to Bhasa Campus reinforced our learning outcomes as we were tasked to write assignment on class on 20th June.

➢ Day 8 Report

On June 20th, 2024, our college embanked on a crucial journey into understanding sustainable water management through rainwater harvesting. This topic, a core component of Module 1 on Sustainability and Sustainable Practices, provided profound insights into environmental, economic and social dimensions of sustainability.

Earlier, on June 15th, a field trip to Bhasa campus reinforced our learning outcomes. We observed firsthand how rainwater harvesting system effectively conserve water resources. This experience highlighted the practical application of sustainable practices in real-world scenarios.

In our assignment, we explored two critical aspects. Firstly, we analyzed the learning outcome from Bhasa campus visit, emphasizing how practical exposure enhances understanding of sustainable water management. Secondly, we delved into the domestic and commercial utilities of rainwater harvesting, showcasing its dual benefits of conserving water and reducing dependency on external water sources.

On 21st June we were assigned to write assignment on Bio-gas plant for which we took note explanasion on 15th June, a field trip to Bhesa Campus.

➢ Dav 9 Report

On June 21st, the summer internship progra-mme organized by our college in 2024 focused on exploring the economic and social impacts of sustainable practices, particularly concepts, from Module 1 and Module 3. The interns engaged in comprehensive discussions on sustainability concepts, emphasizing environmental, economic and social dimensions. Key topics included renewable energy sources like bio-gas plant and sustainable aquaculture

During the internship, participants undertook a multiple-choise exam on aquaculture techniques from Module 3, assessing their understanding of sustainable practices in aquatic farming. Addition-ally, interns completed assignments on two critical topics : The domestic and commercial utility of bio-gas and the learning outcomes derived from the biogas plant at Bhasa Campus.

Though interactive sessions and assignments, interns gained insights into the potential socio-economic benefits of adopting sustainable agriculture and aquaculture techniques.

➢ Day 10 Report

On June 22, 2024, our college hosted an engaging session as part of the summer internship programme focusing on Module 2: Fundamentals of Horticulture. The topic of discussion centered on the Economic and Social impacts of horticultural practices, particularly emphasizing medicinal plants.

The session commenced with a comprehen-sive lecture by our teacher, who elucidated the significance of medicinal plants in contemporary society.

Furthermore, the teachers provided detailed guidelines on how to prepare our assignments. Each intern was tasked with compiling a report on five medicinal plants, complete with photographs captured using GPS-enabled cameras at our college's Bhasa Campus. The assignment required precise documentation, including timestamps, geographical coordinates and dates of photography.

➢ Day 11 Report

On the 23rd of June 2024, our college's Summer internship programme continued with significant learning and activities. It coincided with a holiday Sunday, providing us time to compile our experiences and knowledge gained over the past week. Despite the holiday, our dedication to the internship was evident as we meticulously record our progress. Highlights from the previous week included insightful lectures on renewable energy sources like solar panels and biogas plants, as well as practical sessions on rainwater harvesting and horticulture. These modules underscored the importance of sustainability across environment, economic and social dimensions, laying a strong foundation for our internship journey.

➢ Day12 Report

On June 24th, 2024, our college organized an enriching summer internship programme focused on Module 2: 'Fundamentals of Horticulture : Concept, Techniq-ues and application."

The session began with insights into mushroom cultivation, highlighting basic techniques and its socio-economic prospects. Additionally, the teacher elucidated on plant propagation through cutting and grafting, underscoring its significance in horticultural practies.

Later, we were tasked with documentation of our learning experiences. This involved the college's Bhasa Campus, where we captured photographs using GPS-enabled cameras including precise geographical coordinates and timestamps. These images will be instrumental in illustrating our assignments on plant propagation and mushroom cultivation.

➢ Day 13 Report

On 25th June, 2024, our college's summer internship programme delved into Module 2, focucing on the economic and social impact of hoticultune. The day began with a compnehensive discussion led by our esteemed teacher, whene we explored the fundamentals of hoticultune, its techniques and practical applications.

Laten, as the teachen began singing our assignments nelated to Module 2, we neflected on the bnoaden implication of sustainable noticultunal pnactices.

➢ Day 14 Report

On June 26, 2024 The day commenced with insightful discussions on project writing, specifically addressing modules 1, 2 and 3.

Module 1 delved into the fundamentals of sustainability and sustainable practices, topics included renewable energy source such as bio-gas plants, water conservation through rainwater harvesting and the integration of solar power.

Module 2 explored the essentials of horticulture, cultivation techniques and socio-economic prospects of medicinal plants and mushroom cultivation.

Module 3 focused on sustainable practices of aquaculture.

During the programme, assignments for module 1, 2 and 3 were reviewd and signed by the teachers, marking an important milestone for the interns academic journey.

➢ Day 15 Report

27th June, 2024, Today marked the culmination of our summer internship programme at our college, where students from various disciplines engaged in insightful learning and practical application. The theme of sustainability was central throughout the internship, emphasizing its environmental, economic and social dimensions.

On this final day, we submitted our project reports reflecting our comprehensive understanding and practical experience gained during the internship. Our teachers diligently reviewed and signed off on our assignments, validating our efforts and learnings.

➢ CONCLUSION

This report has explored key modules encompassing sustainability, boticulture and aquaculture supplemented by observations from our visit to Bhasa campus and our college facilities.

In conclusion, this report hightights the importance of integrating sustainable practices across various sectors to achieve environmental resilience, economic prosperity and social well-being. By fostering these principles in education and practical implementation, we pave the way for a sustainable future grounded in innovation, efficiency and responsible stewardship of natural resources.

SIGNATURE OF COURSE COORDINATOR: _____

ASSIGNMENT: Module-I

Topic: Renewable Energy Source: Biogas Plant

Summer Internship for MDC Students (Semester-II) Academic Session 2024-25

Organised by

ASUTOSH COLLEGE

In Collaboration with Earth Star and Green Mall Nursery on "Career Oriented Sustainable Practices"

Name of the Student: RAHUL DAS

College Roll No: 0435

University Registration No: 012-1112-2020-21

University Roll No: 232012-22-0173

Stream: B.A/B.Sc Semester-II

Bio Gas

It mainly comprises of hydro-carbon which is combustible and can produce heat and energy when burnt. Bio-gas is produced through a bio-chemical process in which certain types of bacteria convert the biological wastes into useful bio-gas. Since the useful gas originates from biological process, it has been termed as bio-gas. Methane gas is the main constituent of biogas.

Biogas production process

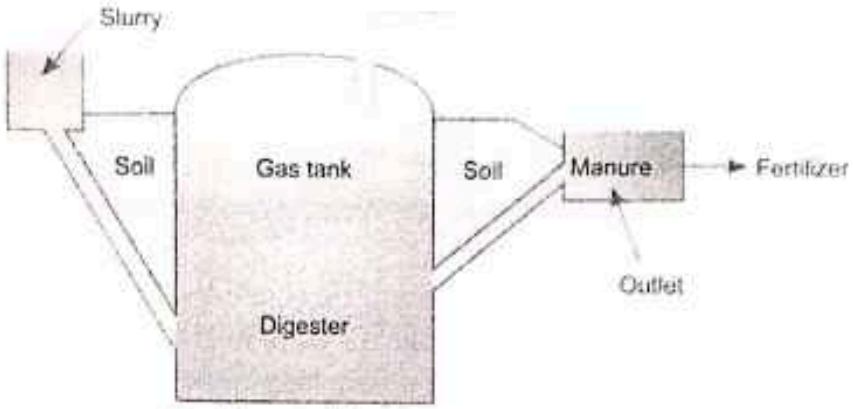
The process of bio-gas production is anaerobic in nature and takes place in two stages. The two stages have been termed as acid formation stage and methane formation stage. In the acid formation stage, the bio-degradable complex organic compounds present in the waste materials are acted upon by a group of acid forming bacteria present in the dung. Since the organic acids are the main products in this stage, it is known as acid forming stage. In the second stage, groups of methanogenic bacteria act upon the organic acids to produce methane gas.

Raw materials for biogas production

Although, cattle dung has been recognized as the chief raw material for bio-gas plants, other materials like night-soil, poultry litter and agricultural wastes can also be used.

Components of biogas plants

- **Mixing tank** - The feed material (dung) is collected in the mixing tank. Sufficient water is added and the material is thoroughly mixed till a homogeneous slurry is formed.
- **Inlet pipe** - The substrate is discharged into the digester through the inlet pipe/tank.
- **Digester** - The slurry is fermented inside the digester and biogas is produced through bacterial action.
- **Gas holder or gas storage dome** - The biogas gets collected in the gas holder, which holds the gas until the time of consumption.
- **Outlet pipe** - The digested slurry is discharged into the outlet tank either through the outlet pipe or the opening provided in the digester.
- **Gas pipeline** - The gas pipeline carries the gas to the point of utilization, such as a stove or lamp.



SCHEMATIC DIAGRAM OF BIOGAS PLANT

Availability of raw materials

The size of the biogas plant is to be decided based on availability of raw material. It is generally said that, average cattle yield is about 10 kg dung per day. For eg. the average gas production from dung may be taken as 40 lit/kg. of fresh dung. The total dung required for production of 3 m^3 biogas is 3/0.04= 75 kgs. Hence, a minimum of 4 cattle is required to generate the required quantity of cow dung.

Composition of biogas

Biogas can be produced from various wastes, including agricultural, household, cattle, and food waste. Biogas primarily contains 55-65% methane and 30-40% carbon dioxide, with small amounts of N_2, H_2, O_2, H_2S, and NH_3.

Table1: Approximate Biogas Composition in Anaerobic Digestion

Gas	Concentration %
CH_4	50-70
CO_2	25-30
N_2	0-10
H_2O	0-5
H_2S	0-3
O_2	0-3
C_xH_y	0-1
NH_3	0-0.5

Site selection

While selecting a site for a biogas plant, following aspects should be considered

- The land should be levelled and at a higher elevation than the surroundings to avoid water stagnation
- Soil should not be too loose and should have a bearing strength of 2 kg/cm^2
- It should be nearer to the intended place of gas use (eg. home or farm).
- It should also be nearer to the cattle shed/ stable for easy handling of raw materials.
- The water table should not be very high.
- Adequate supply of water should be there at the plant site. The plant should get clear sunshine during most part of the day.
- The plant site should be well ventilated.
- A minimum distance of 1.5m should be kept between the plant and any wall or foundation.
- It should be away from any tree to prevent root interference.
- It should be at least 15m away from any well used for drinking water purpose.

Advantages of biogas production

Biogas plants present a viable and promising small-scale business option, particularly in regions where agricultural activities, organic waste, and energy demands intersect. The scope of a biogas plant as a small-scale business is extensive due to its multiple benefits, sustainable approach, and the increasing demand for renewable energy solutions. Here's an exploration of the potential and advantages of setting up a small-scale biogas plant business:

Economic Viability

Initial Investment and Costs:

The initial investment for a small-scale biogas plant is relatively low compared to large-scale operations. Basic biogas digesters can be built using locally available materials, keeping costs manageable for small business owners.

Operational costs are also minimal, primarily involving the collection of feedstock, maintenance of the digester, and distribution of the biogas and by-products.

Revenue Streams:

Biogas can be sold as a clean cooking fuel, an alternative to LPG and other conventional fuels. This is particularly beneficial in rural areas where access to traditional energy sources may be limited.

By-products such as bio-slurry can be marketed as high-quality organic fertilizer, providing an additional revenue stream.

Electricity generation is another possibility, where biogas can be used to power generators, providing electricity for local communities or for sale to the grid.

Environmental Benefits:

Waste Management:

Biogas plants offer a sustainable solution for managing organic waste from households, farms, and agro-industries. This reduces the environmental pollution caused by improper waste disposal.

The process of anaerobic digestion reduces methane emissions from organic waste, a potent greenhouse gas, thereby contributing to climate change mitigation.

Sustainable Agriculture:

The bio-slurry produced as a by-product is rich in nutrients and can enhance soil fertility and crop yields, promoting sustainable agricultural practices.

Utilizing organic waste as feedstock for biogas production promotes a circular economy, where waste is converted into valuable resources.

Social and Community Impact

Job Creation:

Setting up and operating biogas plants creates employment opportunities in rural and semi-urban areas. This includes jobs in construction, operation, maintenance, and distribution.

Training programs for local communities can enhance skills and knowledge in renewable energy technologies, fostering entrepreneurship.

Energy Access:

Biogas plants can provide a reliable and consistent source of energy for cooking and lighting, improving the quality of life for rural households.

By reducing reliance on wood and other biomass for cooking, biogas plants help in reducing deforestation and indoor air pollution, promoting better health outcomes.

Market Potential

Growing Demand for Renewable Energy:

With the global shift towards renewable energy sources, there is a growing market for biogas as a clean energy solution. Governments and international organizations are increasingly supporting biogas projects through subsidies and incentives.

The rising awareness of environmental issues and the benefits of sustainable living are driving consumer demand for eco-friendly energy alternatives.

Scalability:

Small-scale biogas plants can be easily scaled up or replicated in different locations, depending on the availability of feedstock and market demand. This flexibility makes it an attractive business model for entrepreneurs looking to expand their operations over time.

Challenges and Mitigation

Technical Challenges:

Proper training and capacity building are essential to ensure the efficient operation and maintenance of biogas plants. Entrepreneurs should invest in training programs and seek technical assistance if needed.

Feedstock Supply:

Ensuring a consistent supply of feedstock is crucial for the continuous operation of a biogas plant. Entrepreneurs should establish reliable sources of organic waste, such as partnerships with local farmers and businesses.

Market Development:

Building a market for biogas and its by-products requires awareness campaigns and demonstrations of the benefits to potential customers. Collaboration with local authorities and community leaders can facilitate market acceptance.

In conclusion, small-scale biogas plants offer significant potential as a sustainable and profitable business venture. They provide multiple economic, environmental, and social benefits, making them an attractive option for entrepreneurs, particularly in rural and semi-urban areas. With proper planning, investment, and community engagement, biogas plants can contribute to the development of a green economy and the achievement of energy security.

COURSE OUTCOME

- ❑ **Technical Knowledge and Understanding**
  - ○ **Fundamentals of Biogas Production**
  - ○ **System Design and Components**
  - ○ **Operational Principles**
- ❑ **Practical Skills**
  - ○ **Construction and Installation**
  - ○ **Maintenance and Troubleshooting**
- ❑ **Environmental and Economic Impact**
  - ○ **Sustainability Assessment**
  - ○ **Economic Viability**
- ❑ **Project Management and Entrepreneurship**
  - ○ **Project Planning and Implementation**
  - ○ **Entrepreneurial Skills**
- ❑ **Community and Social Impact**
  - ○ **Community Engagement**
  - ○ **Educational Outreach**
- ❑ **Research and Innovation**
  - ○ **Research Skills**
  - ○ **Innovative Solutions**

GROUP-B

CU Reg. No: 012-1112-2020-21 NAME: RAHUL DAS

CU Roll NO: 232012-22-0173

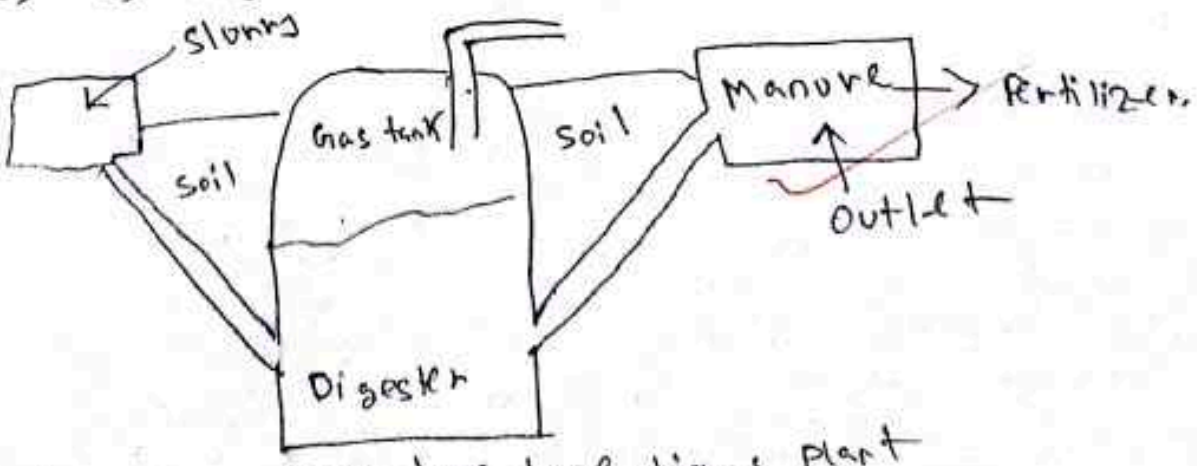
COLLEGE Roll NO: 0135

21/06/24

➢ **Assignment-1: Write down the learning outcomes of Biogas plant visit at AsutoshCollege Second Campus at Bhasa, under the programme of MDC Summer Internship, 2024**

In Bhasa campus we were able to observe three tanks used for biogas plant of which the first one was being used for mixing purposes. The feed material was being collected along with water and was mixed thoroughly until a slurry mixer is found. After that the second tank worked on the substrate was discharged into the digester through the tank to start the procedure of fermentation of the slurry mixer. Inside the digesten there was one gas holden to collect and to store the biogas until the time of consumption. And the third tank is used for digested slurry to discharge into the outlet tank.

There we got to learn that biogas could be made from various waste like agriculture, household, food waste etc. Biogas primarily consist of 50-60% of CH_4, 20-30%, CO_2 and O_2, N_2, etc.



Fixed dome type biogas plant

21/06/24

- **Assignment-2: Briefly mention the domestic and commercial utility of biogas plant.**

- A domestic biogas plant has several utility benifits:

(i.) Energy Production: It converts organic waste into methane gas which can be used for cooking and lighting purposes.

(ii) Waste management: It provides efficient way to manage organic waste.

(iii) Environmental Benifits: Biogas production reduces emission of methane from organic waste that needs to be disposed of.

(iv) Cost savings: It reduces the dependency on traditional fuel like chancol, fire wood etc.

(v) Fertilizer Production and rural development: The residue from biogas production could be used as organic fertilizer reducing the need for chemical. And it provides a sustainable energy that improves the standared of living in rural area as well as creating jobs.

- A commencial biogas plant has several utility benifits.

(i) Energy Generation: Biogas plants can produce significant amounts of methane gas. from various organic waste which can be used for producing renewable energy for commercial operation.

(ii) Energy Cost Reduction: for commencial purposes it is one of the most cost saving energy source. Biogas Plant is long-tenm investment reducing long-tenm enengy cost.

(iii) Wask Mamgemant: Biogas plant provides efficient way to manage waste and process lange quantities of organic waste. from agriculture, industnial and multiple source.

(iv) By products: Biogas plant we can get residue of various organic waste which is usefull as natural fentilizer.

- Assignment-V: Attach field photographs of Biogas plant at Bhasa Campus with proper labelling along with a group photograph

Biogas Plant at Bhasa Campus

Group photo snaph

26.06.24

RAINWATER HARVESTING

SUMMER INTERNSHIP FOR MDC STUDENTS (SEMESTER-2)

Concept

Rainwater harvesting is the collection of rainwater for reuse. It is a viable way to supplement water supplies in both urban and rural areas. Rainwater can be collected from roofs, gutters, and other surfaces. It is then stored in tanks or cisterns for later use. Collected rainwater can be utilized in various ways, such as watering lawns, washing cars, flushing toilets, and even drinking. Rainwater harvesting reduces reliance on traditional water resources and promotes water conservation. By capturing and storing rainwater, individuals and communities can mitigate the effects of droughts and contribute to the sustainability of water resources.

Need for Rainwater Harvesting

Water Scarcity: Many regions, both urban and rural, face water scarcity due to increasing population, urbanization, and climate change. Rainwater harvesting provides an alternative and sustainable water source, reducing dependency on declining groundwater reserves and strained surface water bodies.

Drought Resilience: Rainwater harvesting enhances resilience to droughts by providing a reliable water source during dry periods. Stored rainwater can be used for various purposes, including drinking, irrigation, and sanitation, thereby mitigating the impacts of water scarcity on communities, agriculture, and ecosystems.

Importance of Rainwater Harvesting

1. **Water Conservation:** To capture and store rainwater for future use, reducing reliance on depleting groundwater and surface water sources.
2. **Drought Mitigation:** To create a reserve of water during dry periods, ensuring a reliable water supply for essential needs.
3. **Flood Control:** To reduce runoff by collecting rainwater, mitigating flooding and erosion.

4. Water Quality Improvement: Rainwater is typically cleaner than surface water, reducing the need for expensive filtration and purification systems.

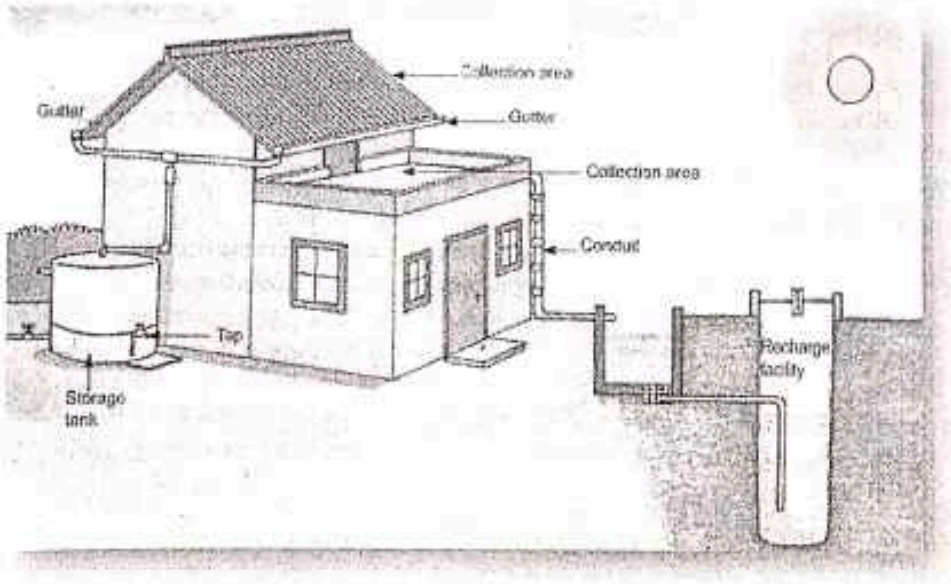
5. Aquifer Recharge: To replenish groundwater aquifers by redirecting rainwater into the ground, improving water availability and aquifer health.

6. Cost Reduction: Rainwater harvesting can reduce water bills, especially in areas with high water rates or where groundwater is scarce.

7. Sustainable Water Management: By promoting the use of rainwater, rainwater harvesting promotes a shift towards sustainable water management practices.

Components of Rainwater Harvesting

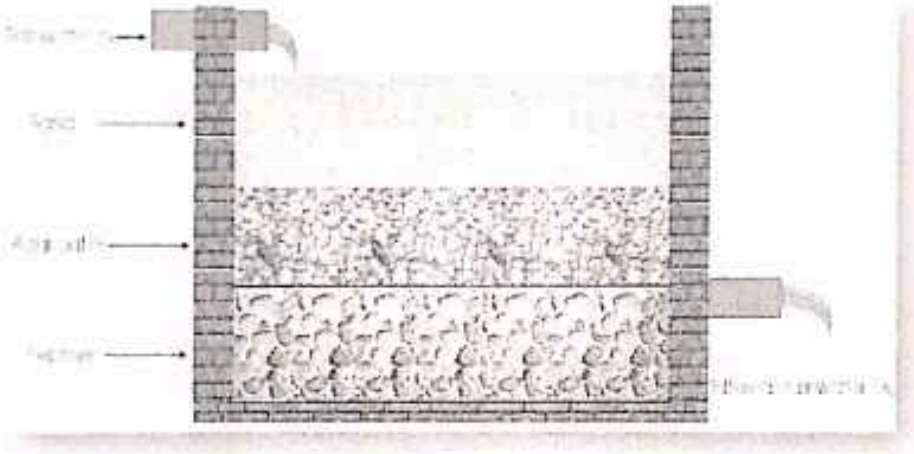
- ✓ **Collection System:** The collection system is responsible for capturing and directing rainwater into the storage system. It typically consists of roof gutters, downspouts, and pipes. Roof gutters are installed along the eaves of the roof to collect rainwater, while downspouts channel the water vertically into underground storage tanks or above-ground containers.



- ✓ **Storage System:** The storage system holds the collected rainwater until it is needed for use. There are two main types of storage systems: above-ground tanks and underground tanks. Above-ground tanks are typically made of plastic or metal and are placed near the

house or other structures. Underground tanks are buried below the surface to minimize evaporation and protect against contamination.

- ✓ **Filtration System:** The filtration system removes impurities and contaminants from the rainwater before it is used for consumption or other purposes. It typically consists of a series of filters, such as sediment filters, activated carbon filters, and disinfection units. Sediment filters remove particles, activated carbon filters remove chemicals and odors, and disinfection units kill bacteria and other microorganisms.



- ✓ **Distribution System:** The distribution system conveys the rainwater from the storage system to the points of use, such as taps, toilets, and irrigation systems. It consists of pipes, valves, and fittings that are designed to prevent leaks and contamination. The distribution system may also include pumps to pressurize the water for use in appliances and fixtures.

Advantages of Rainwater Harvesting

A. Environmental Advantages

- ❖ Reduced water consumption: Rainwater harvesting systems capture and store rainwater, reducing the need for municipal water supply and groundwater extraction.
- ❖ Improved water quality: Rainwater is naturally free of contaminants like chlorine and fluoride, making it a cleaner source of water for drinking, bathing, and irrigation.

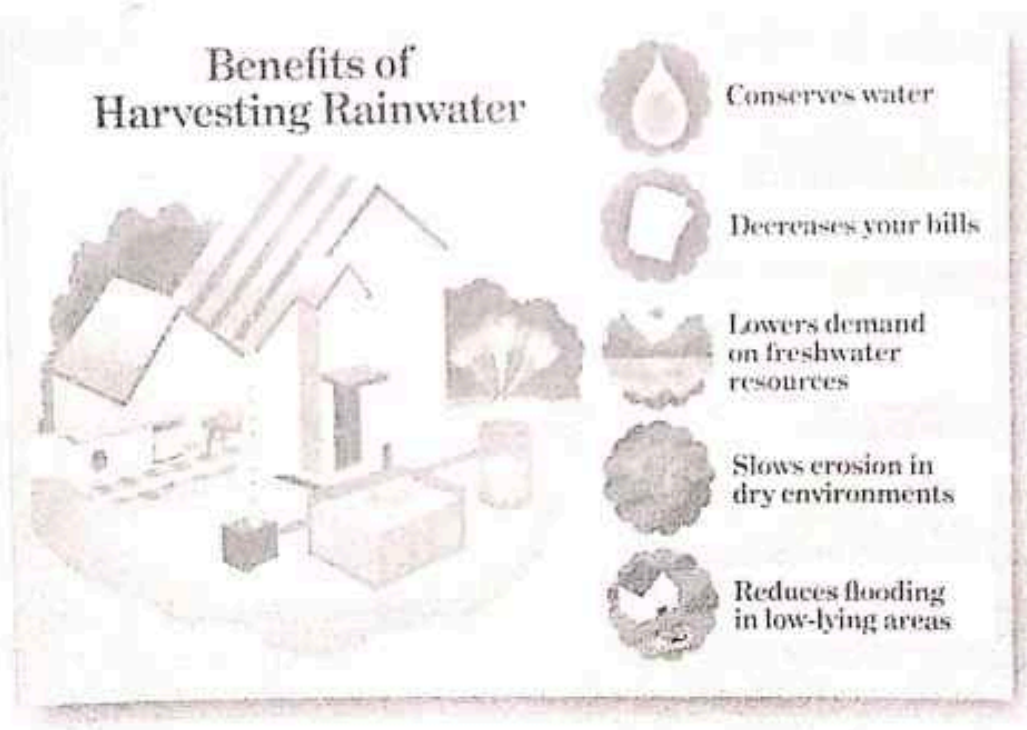
- Flood mitigation: By capturing excess rainwater, rainwater harvesting systems can help mitigate the risk of flooding during heavy rainfall events.
- Groundwater recharge: Excess harvested rainwater can be infiltrated back into the ground, replenishing groundwater resources.

B. Economic Advantages

- Reduced water bills: Harvesting rainwater can significantly lower water utility bills, especially in areas with high water rates.
- Independence from municipal water supply: Harvesting rainwater reduces reliance on costly and potentially vulnerable municipal water systems.

C. Health Advantages

- Improved drinking water quality: Rainwater is free of chemical additives and contaminants, making it a healthier alternative to tap water.
- Reduced waterborne diseases: Rainwater harvesting can help reduce the risk of waterborne diseases by providing a clean and safe source of water for consumption.



D. Other Advantages

- Low maintenance: Rainwater harvesting systems require minimal maintenance, making them a low-effort way to save water.
- Long-term investment: Rainwater harvesting systems are durable and can provide long-term savings on water expenses.

Disadvantages of Rainwater Harvesting

- **Dependence on Rainfall**: Rainwater harvesting systems rely heavily on precipitation. Regions with erratic rainfall patterns or prolonged dry seasons may struggle to collect sufficient water.
- **Initial Setup Costs**: Installing rainwater harvesting infrastructure can be expensive. This includes the cost of storage tanks, gutters, filters, pumps, and distribution systems. The initial investment may deter some individuals or communities from adopting these systems.
- **Space Requirements**: Adequate space is needed for the installation of rainwater collection infrastructure, such as large storage tanks or cisterns. This may not be feasible for properties with limited space or in densely populated urban areas.
- **Maintenance**: Regular maintenance is essential to ensure the efficient functioning of rainwater harvesting systems. This includes cleaning gutters, filters, and storage tanks to prevent debris buildup and contamination. Neglecting maintenance can lead to clogging, reduced water quality, and system failure.

Rainwater Harvesting in India

India receives an average annual rainfall of 1,180 mm according to annual data from the Meteorological Department. Only 8 % of rainwater is harvested in India. Rainwater harvesting can provide up to 70% of the water needs for a household. The Thar Desert population of Rajasthan has historically utilized rainwater collection methods. Currently, rainwater harvesting is mandatory for every new housing society to be registered in Pune, Maharashtra.

GROUP- B

ASSIGNMENT: Module-I

Topic: Conservation of Water: The Role of Rainwater Harvesting in Sustainable Water Management

Summer Internship for MDC Students (Semester-II) Academic Session 2024-25

Organised by

ASUTOSH COLLEGE

In Collaboration with Earth Star and Green Mall Nursery On "Career Oriented Sustainable Practices"

Name of the Student: RAHUL DAS

College Roll No: 0435

University Registration No: 012-1112-2020-21

University Roll No: 232012-22-0173

Stream: B.A/B.Sc Semester-II

➢ **Assignment-1: Write down the learning outcomes of rainwater harvesting plant visit at Asutosh College Second Campus at Bhasa, under the programme of MDC Summer Internship,2024**

I went and observe the rainwater harvesting plant at Asutosh College second Campus at Bhasa. To maintained the sustainibility of water rainwater harvesting is being used.

I got the opportunity to observe the harvesting of rainwater —

(i) At first, rainwater is collected in first tank through pipe which is collecting the rain water from roof

(ii) After the first tank is filled fully, the second tank gets started to be filled up.

(iii) Again the third tank is filled up by rain-water after second tank is filled.

(iv) Now, the tanks are filled up by rainwater, filtration starts. The filtered rainwater is stored in reserver.

Filtration System:

The filtration system removes impurities and contaminants from the rainwater before it is used for consumption or other purposes. It typically consists of a series of filters, such as sediment filters, activated carbon filter and disinfection units. Sediment filter (sand, pabbles) remove particles, activated carbon filters remove chemical and odors and disinfection units kill bacteria and other microorganism.

Distribution System:

The distribution system conveys the rainwater from the storage system to the point of use, such as taps, toilets, and irrigation systems. It consists of pipes, valves, and fittings that are designed to prevent leaks and contamination. The distribution system may also include pumps to pressurize the water for use in appliances and fixtures.

Water is limited. So we need to preserve the remaining water as well as need to focus on sustainibility of water like rainwater harvesting. We were fortunate to observe all of this at Asutosh College's 2nd campus. Water is life thats why water should must be used cautiously.

➢ **Assignment-2: Briefly mention the domestic and commercial utility of rainwater harvesting project.**

Concept:
Rainwater harvesting is the collection of rainwater for reuse. By capturing and storing rainwater, individuals and communities can mitigate the effect of droughts and contribute to the sustainability of water resources.

Need and Importance:
Rainwater Harvesting is needed for water scarcity and drought Resilience. It has established its importance for water conservation, flood control, cost reduction, sustainable water management etc.

India receives an annual rainfall of 1180mm of which only 8% is harvested. It could provide upto 70% of water needs for a household.

Commercial uses:
Commercial use of rainwater harvesting systems mean using the harvested water for non-potable purpose (though it could be used also for drinking water). Here are some uses of harvested rainwater in a commercial setup.

- Making up a cooling tower
- Irrigational purposes
- Laundries
- Toilet flushes
- Vehicle/fleet washes
- filling up pool etc.

Need: (i) To reduce lengthy water bill (ii) For cost savings on water usage (iii) To help for the sustainibility of water etc.
(iv) It require minimal maintenance, making them low effort way to save water.
(v) It is a long-term invesment.

Domestic use:

Rooftop rain water harvesting is used to Provide drinking water, domestic water, water for livestock, water for small irrigation and a way to replenish ground water levels.

Need: (i) Does not require a filtration system for irrigation and relatively simple, easy to install and operate.

(ii) It is an excellent source of water for landscape irrigation with no chemicals, pollution, fertillizers and other sediments.

(iii) Decrease the demand for water and promotes both water and energy conservation

(iv) less cost and reduce water bill.

Both for domestic and commercial uage water can be collected from roofs, dams, and ponds and stored in a constructed large ponds in large quantities. So that even on days when little to no rainfall occurs, enough is avaiable to irrigate crops or to produce drinking water

Currently rain water harvesting is mandatory for every new housing society to be registed in Pune, Mahanagtna.

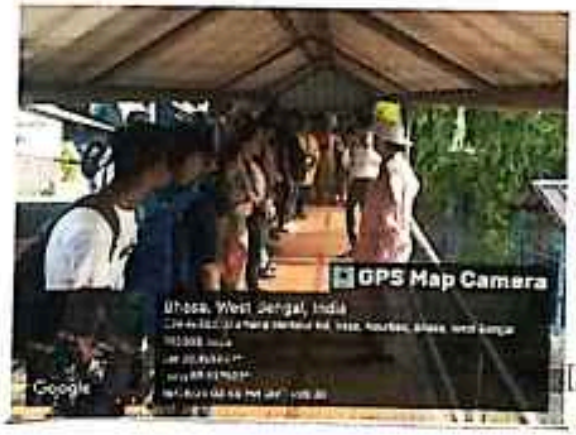
Benefits: • conserves water • Decreases your bill • Slows erosion in dry environment • Reduse flooding in low-lying areas. • lower demands on freshwater resources.

20.6

➢ **Assignment-3: Attach field photographs of rainwater harvesting plat at Bhasa Campus with proper labeling along with a group photograph**

30/10/2024

Rainwater harvesting plant at Bhasa Campus



Gnough photograph

24/9/24

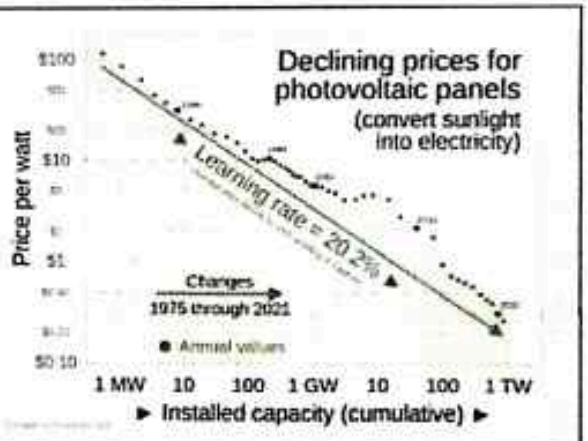
States launched Explorer 6, featuring large wing-shaped solar arrays, which became a common feature in satellites.

Space applications for solar cells require that the cells and arrays are both highly efficient and extremely lightweight. Some newer technology implemented on satellites are multi-junction photovoltaic cells, which are composed of different PN junctions with varying bandgaps in order to utilize a wider spectrum of the sun's energy.

Declining costs and exponential growth

Adjusting for inflation, it cost $96 per watt for a solar module in the mid-1970s. Process improvements and a very large boost in production have brought that figure down more than 99%, to 30¢ per watt in 2018 and as low as 20¢ per watt in 2020. **Swanson's law** is an observation similar to Moore's Law that **states that solar cell prices fall 20% for every doubling of industry capacity**. It was featured in an article in the British weekly newspaper The Economist in late 2012. Balance of system costs were then higher than those of the panels. Large commercial arrays could be built, as of 2018, at below $1.00 a watt, fully commissioned.

Price per watt history for conventional (c-Si) solar cells since 1977



Swanson's law–stating that solar module prices have dropped about 20% for each doubling of installed capacity—defines the "learning rate" of solar photovoltaics.

Solar PV is growing fastest in Asia, with China and Japan currently accounting for half of worldwide deployment. Global installed PV capacity reached at least 301 gigawatts in 2016, and grew to supply 1.3% of global power by 2016.

Falling costs are considered one of the biggest factors in the rapid growth of renewable energy, with the **cost of solar photovoltaic electricity falling by ~85% between 2010** (when **solar and wind made up 1.7% of global electricity generation**) and **2021** (where **they made up 8.7%**). In 2019 solar cells accounted for ~3 % of the world's electricity generation.

ROOF TOP GRID CONECTED SOLAR PHOTOVOLTIC SYSTEM AT ASUTOSH COLLEGE

SCHEMATIC DIAGRAM

Solar Panel: A solar panel is a device that converts sunlight into electricity by using photovoltaic (PV) cells.

AJB (Array Junction Box). The junction box is a connector between the solar array and the charging control device, it is an important part of the solar panel. It is a cross-domain comprehensive design combining electrical design, mechanical design, and material science. It provides users with a combination connection scheme of solar panels.

Most photovoltaic junction boxes have **diodes**. The function of the diodes is to keep the power flow going in one direction, and prevent power from feeding back into the panels when there's no sunshine.

Inverter. An **Inverter** converts direct current (DC) electricity, which is what a solar panel generates, to alternating current (AC) electricity, which the electrical grid uses.

Surge Protection Device (SPD) for Solar Power System / Photovoltaic or PV /DC System. Surge Protective Devices (SPDs) provide protection against electrical surges and spikes, including those caused directly and indirectly by lightning.

Inverter LT (Low tension) Panel. It combines the output 3 phase as well as the single phase AC power of inverter placed in the solar plant system into a single box called ACDB (AC Distribution Board).

Grid Interfacing I.T (Low tension) Panel: It receives the grid Power Supply either from Generator or Transformer and distributes the same to various electronic devices and distribution boards.

Export Import Energy Meter: Energy flow can be expressed as received/delivered or imported/exported depending on whether it is from a suppliers viewpoint or that of the consumer.

26/6/24

UNIVERSITY OF CALCUTTA
MODULE- II

SUMMER INTERNSHIP, 2024

PROJECT REPORT

ON

FUNDAMENTAL OF HOTICULTURAL CONCEPTS

TECHNIQUES AND APPLICATION

MUSHROOM CULTIVATION

MEDICINAL PLANT CULTIVATION

B.A. GENERAL MDC (3 YEARS), UNDER CCF

SEMESTER: II

UNIVERSITY ROLL NO. : 232012-22-0173

REGISTRATION NO. :012-1112-2020-21

SESSION: 2023-2026

Plant Propagation by means of Cutting and Grafting

- Definition of Propagation:

Plant propagation, in simple words, may be defined as multiplication or reproduction of plants. Commercialisation of crops leads to the development of various techniques and Procedures of plant propagation. Each techniq-ue has its own merits and demerit.

In simple words, Plant propagation refers to the process of creating new plants from existing ones, either by sexual or aserual means. It involves techniques such as seed germination, cutting, layering, grafting and tissue culture to reprodue plants and maintain or improve desirable traits.

- Types of Plant Propagation:

i) Cutting

ii) Grafting

iii) Layering

iv) Budding

Example of cutting and Grafting at Bhasa campus.

- Details of Cutting and Grafting in Plant Propation :

Cutting :

i) Type : Asexual propagation method.

ii) Process : Taking a portion of stem, root or leaf (cutting) from a parent plant.

iii) Propagation : Placed under favorable condition (moist soil, hormone treatment) stimulates root formation

iv) Result : Genenates a new plant genetically identical to the parent (clone)

v) Example : Commonly used for herbs, shrubs, and some trees.

Grafting :

i) Type : Asexual propagation method.

ii) Process : Joining tissues (scion from desired plant and rootstock from another) to form a single plant.

iii) Technique : Requires precise alignment and binding of vascular tissues.

iv) Purpose : Combine desirable traits (disease resistance, fruit quality) or alter growth habit.

v) Example : Widely used in fruit trees, roses, and ornamental plants for commercial and hobbyist purposes.

WHAT ARE MUSHROOMS?

- *MUSHROOM*: A macro fungus with visible fruit body that may be formed above or below the ground. The sexual spore bearing structure of mushroom is called a fruit body.

COMMON EDIBLE MUSHROOMS CULTIVATED IN INDIA:

1. Pleurotus sp. (Oyster mushroom)
Bengali: Dhingri/Jhinuk chhatu
2. Agaricus bisporus
(Commercial button mushroom)
3. Volvariella volvacea
Straw mushroom or paddy straw mushroom (Bengali: Poa Chhatu)
4. Calocybe indica (Milky mushroom)

COMMON TERMINOLOGIES USED IN MUSHROOM CULTIVATION

- **SPAWN**: The aggregation of mycelium of a desired mushroom species on sterile grains which are used as inoculum to inoculate substrate beds for mushroom production. (Grains are of paddy/ wheat/jowar/bajra, etc.
usually disease free, dirt free, healthy and intact). Shelf life of spawn: should not be more than 1 month old.
- **SPAWNING**: This is the process by which the spawn is mixed/ inoculated with ready substrate/compost. It is usually conducted in a separate room to avoid infection by other fungi and insects.
- **SPAWN RUN**: In the substrate bed/compost that has been mixed with grain spawn, the mycelium spreads in the compost and this is called spawn run.
- **SUBSTRATE**: The material, usually organic, on which mushrooms grow.
e.g. lignocellulosic substrates as source of Carbon: Paddy/wheat straw, wood, sawdust, bagasse, etc. Sourceof Nitrogen: Horse manure, farmyard manure, oat meal, corn meal, etc.
- **FLUSH** - A 'crop'/appearance of mushroom fruit bodies that develop in groups at a time followed by a brief resting period.
- **CROPPING**: The time of mushroom formation, development and harvesting.

Oyester Musthroom Cultivation.

FOOD VALUE OF MUSHROOM :

Mushrooms are popular for their delicacy and flavoured food value. It is well established fact that they are excellent source of vitamins and minerals. They also contain appreciable amounts of vitamins like Niacin and Pantothenic acid, minerals such as calcium, phosphorus and potassium and a fair quantity of iron. Folic acid which is of vital importance for treating anaemic condition in human body is available in large quantity. Their protein may be considered intermediate to that of animal and vegetables. Fresh mushrooms contain about 80-95% moisture, 3% protein, 0.3 - 0.4% fat and 1% minerals and vitamins. With the low carbohydrate and fat contents they constitute an ideal dish for diabetic patients.

OYSTER MUSHROOM CULTIVATION

There are several Oyster Mushroom well known for their delicacy and flavour. These species grow wild in the forests which can be cultivated in thatched, polythene, brick or stone houses.

OYSTER MUSHROOM CULTIVATION - FLOW CHART

↓

Raw material
(Paddy straw / vegetable plants residue)

↓

Chopping (3-5 cm)

↓

Soaking the straw 8-16 hrs

↓

Drain off excess water

↓

Fill up in gunny bags

↓

Dip in hot water (80-85°C) for 15 minutes.

Soaking + Chemical sterilisation (water + Bavistin + Formeldehyde)

↓

Drain excess water

↓

On cooling to room temperature, fill bags in 3 layers of 10 cm each and simultaneously spawn @ 2% inside sterile chamber

↓

Arrange bags in shelves
(Spawn running requires 20-25 days)

↓

Remove plastic bags cover and maintain humidity, light, ventilation etc.

↓

Pin head stage (takes 3-5 days)

↓

Cropping, 1st flush (3-4 days duration after pin head) and subsequent flushes about 10 days apart

↓

plucking on maturity (before spore shed starts)

↓

MARKETING

Fresh ← → Sun dried

COST-BENEFIT ANALYSIS OF OYSTER MUSHROOM CULTIVATION:

- Economic analyses of Oyster (4 Chops) Mushroom cultivation on small scale polythene bags:

	(in Rupees)
1. Non-recurring expenses	
a) Construction of high density polythene sheet growing room 300 sq ft	15000
b) Miscellaneous cost	10 000
Total	25,000
2. Recurring expenses	
a) Rice/Wheat Straw (400 Kg @ Rs. 2.50)	1000
b) Spawn 50 Kg @ Rs 50 (for 500 bags)	2500
c) Chemicals	150
d) Polythene Bags (500 bags @ Rs. 1.50 each)	750
e) Electric, fuel, water change	1000
f) Labour change for Cropping	3000
g) Miscellaneous cost	1000
Total	10,750
3. a) Interest @ 15% year on 'I'	3750
b) Depreciation @ 10% year on 'I'	2500
	6250

4. Recurring expenditure for 4 crops / year (Rs. 10750 x 4)	43 000
Total expenses (3+4)	49,250

Return :

Total production from 500 bags @ 0.750 ~~kg~~ kg/bag x 4 crops / session	1500 Kg
Total income for sale of mushroom @ Rs. 80/Kg	120 000
Net Profit / year	70,750
Cost : Benifit ratio	1 : 1.44.

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27/6/24

MEDICINAL PLANTS

According to the World Health Organization, "a medicinal plant is any plant which, in one or more of its organs/parts, contains substances that can be used for therapeutic purposes, or which are precursors for chemo-pharmaceutical semi synthesis". The ancient Indian system of medicines is predominantly plant based, making use of most of our native plants. Tyler defines herbal medicines as "crude drugs of vegetable origin utilized for the treatment of disease states, often of a chronic nature, or to attain or maintain a condition of improved health". The word "herb" has been derived from the Latin word, "herba" and an old French word "herbe". In Botany, the term "herb" is only applied to non-woody plants or plant habit. Now-a-days, herb refers to any part of the plant like fruit, seed, stem, bark, flower, leaf, stigma or a root of woody as well as a non-woody plant. The alternative medicines in the traditional systems are derived from herbs, minerals, and organic matter, while for the preparation of herbal drugs only medicinal plants are used.

History of medicinal plants

Plants have been used for medicinal purposes long before prehistoric period. The practice of medicine spread from Asia to Europe. The Greeks are known to have acquired knowledge of it over the period from 468-377 BC. In turn, the Romans learned of it from the Greeks around 100 BC. The Islamic World learned of and began to practice this science around the time the Roman Empire fell, in the 5th century. Evidence exist that Unani Hakims, Indian Vaids and European and Mediterranean cultures were using herbs for over 4000 years as medicine. By the 10th century, the Anglo-Saxon World was practicing herbal science and describing it in writings. Throughout the middle ages, most herbalism was practiced under the authority of the church, which maintained the authority to grow medicinal herbs and to introduce new herbal medicines. Indigenous cultures such as Rome, Egypt, Iran, Africa and America used herbs in their healing rituals, while others developed traditional medical systems such as Ayurveda, Unani and Chinese Medicine in which herbal therapies were used systematically.

Importance of medicinal plants

Among ancient civilisations, India is one of the earliest civilizations that have recognized the importance of herbal products for disease management, nutrition and beauty enhancement. The forest and mountains in India is the principal repository of large number of medicinal plants, which are largely collected as raw materials for manufacture of drugs. Use of plants as a source of medicine has been an ancient practice and is an important component of the health care system in India. In India, about 70 percent of rural population depends on the traditional Ayurvedic system of medicine. Most healers / practitioners of the traditional systems of medicine prepare formulations by their own recipes and dispense to the patients. In the Western countries, approximately 40 per cent of people are using the herbal medicine for the treatment of various diseases. This interest in traditional medicines is growing rapidly due to the attention being given to it by the government and different non-government agencies comprising of general public and researchers as well as the increased side effects, adverse drug reactions, and cost factor of the modern medicines.

Medicinal plants as raw materials

The primary raw material for plant based products is the biomass of the medicinal plants. Crude drugs from medicinal plants are usually obtained from whole plant or different plant parts e.g., leaf, bark, root, seed, resins, plant exudates, etc.

Biomass is the green or dried plant part(s) or whole plant obtained from plants collected from their natural habitats or harvested from cultivated plants. The biomass needed for the industry should pass the following criteria.

1. Should be from specific plant part(s) derived from a single botanically designated species and should not be mixed with biomass from other related or unrelated plant species

2. Should be free from extraneous abiotic matter like dust, stones, soil, and biotic matter such as fungus, droppings from rodents/ insects/ birds etc.

3. Should be free from damage due to insects/ diseases

4. Should contain the minimum specified or accepted concentration of the chemical (s) of commercial value

5. Should be free from chemical contaminants such as heavy metals, pesticide residues etc.

6. Should meet the specifications agreed between the supplier and the industry such as colour, admixture with other plant parts of the same plant, level and method of drying, packing etc.

Scope of medicinal plants

With the discovery of several new molecules from herbs for treating dreaded diseases like cancer and the relative safety of these products, the global demand for medicinal plant products has increased in recent years. India is sitting on a treasure of 8000 medicinal plants. In the last 50 years, Central and State Government research organizations have developed several technologies for utilizing medicinal plants. Small and medium enterprises have already been set up by many entrepreneurs and opportunities exist for new enterprises in this field.

India is the largest producer of medicinal plants. More than 1.5 million practitioners are using the traditional medicinal system for health care in India. It is estimated that more than 7800 manufacturing units are involved in the production of natural health products and traditional plant-based formulations in India, which requires more than 2000 tons of medicinal plant raw material annually. More than 1500 herbals are sold as dietary supplements or ethnic traditional medicines.

Several medicines are derived directly or indirectly from plants. While several classic plant drugs have lost much ground to synthetic competitors, others have gained a new investigational or therapeutical status in recent years. Moreover, a number of novel plant-derived components have entered into Western drug markets. Clinical plant-based research has accomplished in the important fields of anticancer (e.g. taxoids and camptothecins) and antimalarial (e.g. artemisinin compounds) therapies. Natural product research could often be guided by ethno-pharmacological knowledge and it could make substantial contributions to drug innovation by identifying the novel chemical structures or mechanisms of action. However, both plant-derived drugs and crude herbal medicines have to take the same pharmacoeconomic hurdle that has become important for new synthetic pharmaceuticals.

The major drawbacks for global positioning of Indian medicinal plant products are dearth of scientific validity of claimed medicinal properties, quality inconsistencies and high prices of the products. Other factors include adulteration, unethical means adopted by some companies, contaminants exceeding prescribed levels, not adhering to time schedules etc. Government of India is encouraging setting up of industries and is providing training, incentives etc. and is negotiating with many countries concerning export/ import regulations etc. National and State Medicinal Plants Boards are encouraging cultivation, processing, quality testing and exports of herbal plants and their value added products.

INDIGENOUS SYSTEM OF MEDICINE:

India is known for its traditional medicinal systems—(AYUSH) Ayurveda, Yoga, Unani, Siddha and Homeopathy. Medical systems are found mentioned even in the ancient Vedas and other scriptures. An indigenous system is a natural form of medicine outside the stream of Western or allopathic medicine practiced by majority of doctors all over the world today. The Ayurvedic concept appeared and developed between 2500 and 500 BC in India. The term "Ayurveda" is derived from two Sanskrit words, 'Ayur' and 'Veda' Ayur means life and Veda means knowledge or science. The literal meaning of Ayurveda is "science of life," because ancient Indian system of health care focused on views of man and his illness. "Charaka Samhita" by Charak (a physician) and "Susruta Samhita" by Sushrut (a surgeon) are the two foundational texts in Sanskrit on Ayurveda (Indian traditional medicine) written almost about 2000 years ago.

MEDICINAL PLANT GARDEN AT BHASA, 2nd CAMPUS OF ASUTOSH COLLEGE

The second campus of Asutosh College, located at Bhasa near Joka on Diamond Harbour Road, South 24 Parganas, is a "Green Campus" spread over 11 acres of land with a 2.5 acres waterbody to provide a serene, pollution-free, eco-friendly and green environment to its student. A medicinal plant garden, 'Sushrut', has been setup inside the campus named after the renowned ancient Indian medical practitioner and surgeon, Sushrut, who treated his patients with herbal medicines. The Medicinal Plant garden is situated within an area of almost 7000 sq.ft., surrounded by 'Debdaru' trees (*Polyalthia longifolia*). Medicinal plants of different families are cultivated and maintained inside the Sushrut garden. A list has been provided below along with its medicinal uses:

	Common name; Scientific name; Family	Habit	Plant parts used	Medicinal uses
1.	Amla – *Emblica officinalis* (Euphorbiaceae)	Shrub	Fruit	Kidney and urinary tract, intestinal infections, diabetes and hepatitis.
2.	Krishna Tulsi –*Ocimum tenuiflorum* (Lamiaceae)	Herb	Leaf	Malaria, bronchitis, diarrhoea, antiseptic
3.	Kalmegh –*Andrographis paniculata* (Acanthaceae)	Herb	Shoot/leaf	Medicinal value liver problem, whooping cough, leprosy, jaundice

4. Grithakumari-*Aloe barbadensis* (Liliaceae)	Herb	Leaf (gel)	Skin soothing (astringent),moisturising and healing properties, constipation health tonic
5. Nayantara *Catharanthus roseus* (Apocynaceae)	Herb	Leaf	Hypertension, leukaemia, diabetes, piles
6. Aswagandha – *Withania somnifera* (Solanaceae)	Herb	Root	Ulcer, skin disease, dysentery, asthma, loss of appetite
7. Mehendi – Hena – *Lawsonia inermis* (Lythraceae)	Shrub	Leaf	Gall bladder stone, spleen ,skin treatment, small pox, liver treatment
8. Harjora – *Cissus quadrangularis (Vitaceae)*	Climber	Stem	Bone fracture, swelling, colonopathy, asthma, tumor
9. Akanda – *Calotropis gigantea (Asclepidaceae)*	Shrub	Root bark	Ulcer, leprosy, night blindness, liver disorder and worm disease.
10. Nishinda – *Vitex negundo* (Verbenaceae)	Tree	Root/leaf/fruit	Rheumatism, dyspepsia, sinus, spleen enlargement, cholera.
11. Ram tulsi – *Ocimum gratissimum* (Lamiaceae)	Herb	Leaf	Headache, influenza, sunstroke.
12. Ayapana – *Eupatorium triplinerve* (Asteraceae)	Herb	Leaf	Stop hemorrhage, astringent, stimulant, digestive, purgative.
13. Brahmi –*Bacopa monnieria (Scrophulariaceae)*	Herb	Shoot/leaf	Nervous disorder, epilepsy, convulsion, memory tonic, urinary problem, bronchitis
14. Anantamul –*Hemidesmus indicus* (Apocynaceae)	Herb	Root	Fever, skin disease, loss of appetite, blood purifier, laxative, conjunctivitis
15. Basak – *Justicia adhatoda (Acanthaceae)*	Shrub	Leaf	Cough, bronchitis, dysentery, chicken pox, indigestion.
16. Gandal – *Paederia scandens* (Rubiaceae)	Herb	Leaf	Dysentery, loss of appetite, urinary problem, night blindness,
17. Citronella- *Cymbopogon schoenanthus (Poaceae)*	Herb grass	Leaf	Insecticidal
18. Thankuni-*Centella asiatica (Apiaceae)*	Herb	Leaf	Depression, perspiration, dysentery, liver problem, jaundice
19. Ada-*Zingiber officinale* (Zingiberaceae)	Herb	Rhizome	Nausea and vomiting associated with surgery, vertigo, anti allergic, cough and cold, rheumatism, inflammation
20. Babchi – *Psoralea corylifolia* (Fabaceae)	Herb	Seeds	Treatment of leprosy, leucoderma, psoriasis and other skin diseases.
21. Haritoki –*Terminalia chebula (Combretaceae)*	Tree	Fruit	Ease bowel movement, reduces the pile mass
22. Bohera-*Terminalia bellirica (Combretaceae)*	Tree	Fruit	Astringent and laxative, affections of the throat and chest.
23. Kurchi-*Holarrhena antidysenterica (Apocynaceae)*	Tree	Stem bark	In chronic diarrhoea, in treatment piles,skin diseases.
24. Asoke-*Saraca asoca (Fabaceae)*	Tree	Stem bark	Excessive uterine bleeding, dysmenorrheal and for depression
25. Tezpata-*Cinnamomum tamala* (Lauraceae)	Tree	Leaf	Reduction in blood glucose level, diabetes
26. Neem- *Azadirachta indica (Meliaceae)*	Tree	Leaf/fruit	Anthelminitic , antifungal, antidiabetic, antibacterial, antiviral
27. Arjun- *Terminalia arjuna (Combretaceae)*	Tree	Stem bark	Wounds, aemorrhages and ulcers,heart
28. Dalchini-*Cinnamomum zeylanicum* (Lauraceae)	Tree	Stem Bark	Aromatic, carminative, stimulant, anti-microbial, anti-fungal

29. Amada-*Curcuma amada (Zingiberaceae)*	Herb	Rhizome	Cough and cold, rheumatism, inflammation
30. Kemuk-*Costus speciosus (Costaceae)*	Shrub	Leaf	Fever, boils, asthma, bronchitis and intestinal worms
31. Satamuli- *Asparagus officinalis (Liliaceae)*	Herb, climber	Root	For treatment of urinary and kidney problems, jaundice and sciatica, antioxidant to boost the immune system, reduce inflammation and maintain the health of the liver
32. Salparni –*Desmodium gangeticum (Fabaceae)*	Herb, climber	Shoot /leaf twig	Digestive, asthma dysentery, Bronchitis.
33. Swet Tulsi- *Ocimum sanctum (Lamiaceae)*	Herb	Leaf	Leaf extracts are used in Ayurvedic remedies for common colds, headaches, stomach disorders, inflammation, heart disease,
34. Haldi -*Curcuma longa* (Zingiberaceae)	Herb	Rhizome	Anti-inflammatory, anti-cancerous, treats digestive disorders

27/8/24

Scientific name : Saraca asoca

Common name : Asoke

FIELD STUDY REPORT:

(Details of 5 different commercial and economically exploited medicial plants from the above list)

SAMPLE No. 1

Scientific name and common name: Saraca asoca ; Asoke

Habit : Tree

Type of vegetation: mesophyte

Soil type and condition of growth: Asoke plant thrives in tropical and subtropical environments and needs medium to deep, rich soils that are slightly acidic to neutral and well drained

Plant parts used; Stem bark

Harvesting and processing of plant parts used : The bark of Saraca asoca is harvested from mature trees and processed for medicinal use. After harvesting, it is dried and then used directly or processed further into herbal preparation for various medicinal purposes, especially for managing menstrual disorder and promoting reproductive health.

Medicinal uses :

(i) Management of Menstrual Disorder:

The bark and seeds of the Saraca asoca are traditionally used in various formulations aimed at regulating menstrual cycles and reducing discomfort associated with menstruation. In Ayurveda, it is prescribed to alleviate symptons such as dysmenorrhea (painful periods) and menorrhagia (excessive menstrual bleeding).

(ii) Potential Anti-diabetic Effects:

Preliminary studies suggest that Saraca asoca may prossess anti-diabetic properties, potentially aiding in the management of diabetes.

(iii) Support for Uterine Health:

Saraca asoca is highly regarded for its ability to support uterine health and is believed to strengthen the uterus and improve overall reproductive function in women.

(iv) Wound Healing and Antimicrobial Activity:

Topically, extracts from Saraca asoca tree bark are used for wound healing due to their antimicrobial properties, which make it effective against certain bacteria and fungi, thus aiding in the healing process of cuts and wounds.

Scientific name : Centella asiatica

common name : Thankuni

SAMPLE No. 2

Scientific name and common name: Centella asiatica; Thankuni

Habit: Herb

Type of vegetation: mesophyte

Soil type and condition of growth: Centella asiatica prefers fertile, well-drained soils with consistent moisture, partial shade and a pH of 5.0 - 7.5 for optimal growth.

Harvesting and processing of plant parts used: Centella asiatica is typically harvested for its aerial parts, including the leaves and stems, which contain active compounds benificial for health.

plant parts used: Leaf

Medicinal use:

(i) Wound Healing: Centella asiatica is widely recognized for its ability to promote wound healing. It accelerates the healing process by stimulating collagen production which helps closing wounds faster.

(ii) Anxiety and Stress Relif: Centella asiatica has adaptogenic properties that help the body adapt to stress and reduce anxiety levels. It may help in calming the mind promoting relaxation.

(iii) Cognitive Support: Centella asiatica is traditionally used to support cognitive function and enhance mental clarity.

(iv) Other: It helps against the problem like liver problem, jaundice, depression etc.

Scientific name : Vitex negundo

Common name : Nishinda

SAMPLE No. 3

Scientific name and common name: Vitex negundo ; Nishinda

Habit: Tree

Type of vegetation: mesophyle

Plant parts used: Root / leaf / fruit

Soil type and condition of growth: Vitex negundo grows well in well-drained, fertile soils, tolerating sandy, loamy or clay types. It prefers slightly acitic to neutral pH and thrives in full to partial sun condition.

Harvesting and processing of plant parts used: The leaves and tender shoots of Vitex negundo are harvested, dried in shade and processed into various herbal preparation such as extracts, powder or infusions for medicinal use.

Medicinal use:

(i) Respiratory Disorder: used to treat asthma, bronchitis and other respiratory condition due to its expectorant and bronchodilator properties.

(ii) Gynecological Disorder: used to regulate menstrual cycle, alleviate menstrual cramps and manage symptoms of menopause.

(iii) Digestive Aid: Improves digetion, relieves indigestion and treats gasthointentinal disorders such as gastritis and colic.

(iv) Wound Healing: Applied topically to wounds and skin aliments to promote healing and reduce inflamation.

Scientific name : Aloe barbadensis

Common name : Ghritha Kunari

SAMPLE No. 4

Scientific name and comonon name : Aloe barbadensis ; Grithakunari

Habit : Herb

Type of vegetation : Xerophytes

Plant parts used : Leaf (gel)

Soil type and condition of growth:

Aloe barbadensis thrives in well-drained sandy or sandy-loam soils with a slightly acidic to neutral pH. It prefers dry, arid conditions and is tolerant of drought once established.

Harvesting and processing of plant parts used :

The leaves of Aloe barbadensis (Aloe vera) are harvested by cutting close to the base. They are then filleted to extract the gel, which is processed into various cosmetic and medical products.

Medicinal use :

(i) Skin Care : Used topically to treat burns, wounds, sunburn and various skin conditions due to its moisturizing, soothing and healing properties.

(ii) Cosmetic uses : Included in various cosmetic products such as lotions, moisturizer and shampoos for its hydrating and rejuvenating effects on the skin and hair.

(iii) Digestive Health : Consumed orally to alleviate symtoms of digestive disorder such as indigestion, constipation and irritable health problem.

Scientific name : Cinnamomum tamala

Common name : Tejpata

SAMPLE No. 5

Scientific name and common name: Cinnamomum tamala; Tezpata

Habit : Tree

Type of vegetation : mesophytes

Plant part used : Leaf

Soil type and condition of growth:
Tezpata thrives in well-drained, fertile soil with good moisture retention. It prefers slightly acidic to neutral soil pH and grows best in tropical and subtropical regions with adequate rainfall.

Hervesting and processing of plant parts used :
Tezpata leaves are harvested from mature trees after the monsoon season. They are dried naturally ground into powder and stored in airtight containers for use in culinary and medicinal applications.

Medicinal use:

(i) Digestive Aid : Tezpata leaves are used to relieve digestive issues such as indigestion, bloating and gas. They have carminative properties that help in soothing the digestive tract.

(ii) Diabetes Management : It is believed that Tezpata leaves may help in managing blood sugar levels.

(iii) Respiratory Health : Tezpata is beneficial for respira-tory conditions like coughs, colds and asthma.

(iv) Anti-inflammatory : the leaves posses anti-inflammatory properties and are used to reduce inflamation, particularly in condition like joint pain.

Summary: The outcome of the project in terms of economic aspects and application of medicinal plants.

On 15th june we got the opportunity to visit at Asutosh College Second Campus at Bhasa, under the programme of MDC Summer Internship, 2024. There we were provided insights into the economical potential and practical applications of medicinal plants. We learned about their value in various industries such as pharmaceuticals, cosmetic and herbal supplements highlighting their role in generating revenue and promoting sustainable practices in healthcare and agniculture.

- Economic Potential: observed diverse medicinal plants with significant economic value due to their application in pharmaceuticals, herbal supplements and cosmetics.
- Industry Applications: Studied how these plants contribute to various sectors including healthcare, agniculture and biotechnology fostering economic growth.
- Educational Insight: Gained practical knowledge about cultivation techniques, sustainability practices. and market demand for medicinal plants.
- Future Prospects: Identified opportunities for research, entrepreneurship and community development centered around medicinal plants.
- Impact: Explored their role in local economies, emphasizing sustainable practices and biodiversity conservation.

In conclusion, our visit to the Asutosh College Second campus at Bhasa underscored the crucial intersection of economic viability and practical applications in the realm of medicinal plants. By witnessing firsthand their diverse uses across industries and understanding their economic potential, we are poised to advocate for sustainable practices and further research.

26.6.24

UNIVERSITY OF CALCUTTA

MODULE - 3

SUMMER INTERNSHIP, 2024

PROJECT REPORT

ON

SUSTAINABLE AQUACULTER PRACTICES

B.A (3YEAR) MDC, UNDER CCF

SEMESTER : II

UNIVERSITY ROLL NO : 232012-22-0173

UNIVERSITY REGISTRATION NO:
012-1111-2020-21

SESSION : 2023-2026

3 years Multidisciplinary courses (MDC)

Detailed Syllabus of Summer Internship for SEM 2 Students

Topic Name- Basics of aquarium, Management and its business

Organizing Department: By the departments of Industrial Fish & Fisheries

Syllabus: Concept of Aquarium, types, design, construction. Aquarium accessories, candidate species of aquarium, Aquarium management and Ornamental fish trade.

Study material

What is an Aquarium?

An aquarium is made up of a transparent water-filled tank that is designed to carry aquatic life (fishes and plants). It mimics a natural underwater environment and allows people to interact and observe the diversity of aquatic creatures. Aquariums provide us with a glimpse of freshwater and marine ecosystems.

A balanced aquarium habitat requires a water-containing tank, substrate, water filtration system, lights, and thermal control, system. Aquariums offer visitors a pleasant and fascinating experience, with therapeutic, educational, and aesthetic roles.

History of Aquarium

The concept of having aquariums started in ancient civilisations and in the modern world is used for variety of purposes. Here is a brief history of aquariums:

- In the past ancient civilizations (Sumerians and Egyptians) used to keep fishes in artificial ponds.
- Early fishkeeping methods included practices containing aquatic life.
- Modern concept of aquariums emerged in the 19th century in which people developed glass tanks contating water and controlled environments.
- The first public aquarium was opened in 1853 in a London Zoo, developing interest of people in marine life.
- Aquariums gained popularity among children as they served recreational, entertaining and educational purpose, presenting diverse aquatic ecosystems and and its species.
- There have been advancements in this technology that helped gaining understanding of aquatic biology leding to the growth of public and private aquariums all around the world.
- In the modern society, aquariums serve as center for education, research, and conservation of the aquatic life, offering us insights into the marine life and also promoting awareness of it.

Types of Aquarium

There are different types of aquariums and each has a different purposes and preferences. Here are the main types:

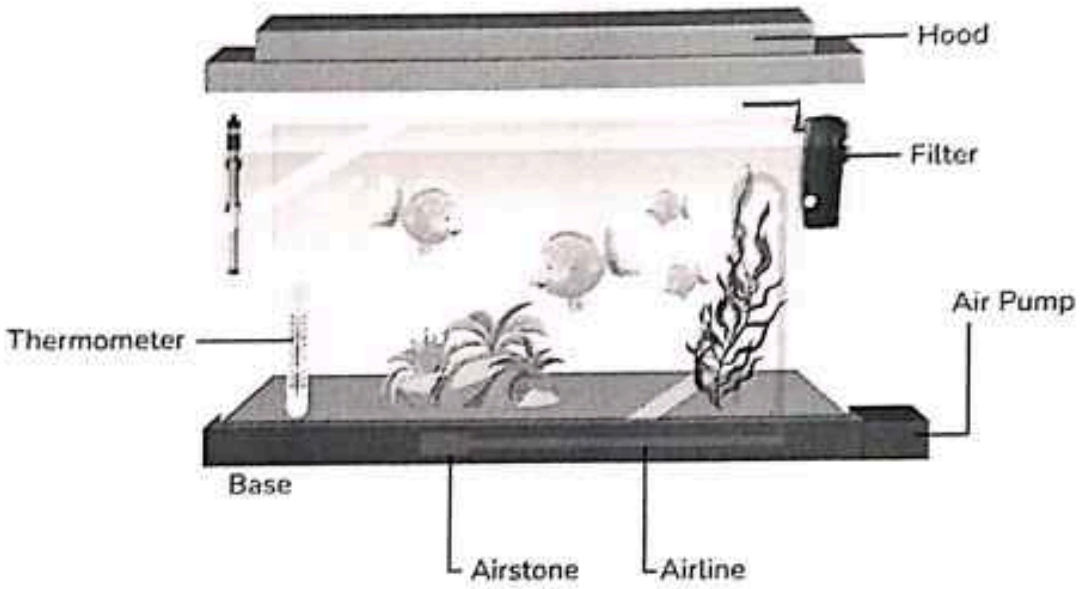
1. **Aquariums for house:** These are designed for personal interests and decorative purposes at homes, offices, or other indoor places. They can range from small bowl tanks to larger set-ups depending on space and budget. The owner can choose variety of fish, plants, and invertebrates according to the interest.
2. **Public aquariums:** These are large facilities open to the public entertainment and educational purposes. This kind of aquariums exhibit marine habitats, namely coral reefs, rivers with freshwater, and deep-sea niches. It includes displays that are interactive, guided tours, and also educational programs for visitors of all ages.
3. **Research aquariums:** These are specialized facilities which are dedicated to scientific research, conservation of aquatic life, and carry out breeding programs. They provide controlled environment for studying aquatic life under different conditions. It also contributes to the advancements in the field of marine biology, aquatic ecology, and conservation practices.
4. **Freshwater aquariums:** These typically contain freshwater marine life such as tropical fish, plants that grow in fresh water, and other aquatic invertebrates. These type of aquariums are good for beginners require relatively low maintenance when compared to the saltwater aquariums. They offer a variety of fish species for aquarists to select from.
5. **Saltwater aquariums or marine aquariums:** They mimic conditions of the ocean and include saltwater fish, corals reefs, and other marine invertebrates. These require special equipments and require higher maintenance due to delicate balance of water chemistry. They represent stunning coral reef ecosystems and also colorful marine life.
6. **Brackish aquariums:** They contain species that are adapted to the brackish water environment and provide habitat to unique species such as mollies, archerfish, and puffer fishes.

7. **The Virtual Aquarium**
   With the rise of web platforms and online technological advancements, underwater world viewership has also become a part of it. In a simple sense, a virtual aquarium is a computer program that utilizes 3D graphic technology for producing a small aquarium on a computer screen. Although the aquarium fish are swimming in real-time, the internal aquarium design remains static. In some of the programs, one can see water ripple formations and bubbles in the virtual aquarium. They are mostly used as screen savers on a computer, laptop, smartphone, tablets, etc.

Aquarium can also be classified on the basis of:

- **Content:** Aquariums can be freshwater, saltwater, or brackish, depending on the type of water and organisms they contain.
- **Size:** They range from small desktop tanks to large public aquarium exhibits.
- **Shape:** Aquariums come in various shapes, such as rectangular, bow-front, cylindrical, and hexagonal.

Aquarium



Construction of Glass tank

Factors to be considered for tank construction:

a) Size of the tank

b) Shape

c) Number of fishes

d) Location direct exposure to sunlight is not advisable

Size

Since there is no scope for changing the dimension of aquarium after construction. Some factors to be considered.

Factors

• Number of fishes to be kept- governed by surface area of the tank(L*B). Larger the area less stress to the fishes

• thumb rule – 75cm2 for 2.5cm of fish excluding tail • Nature of aquascaping • Capacity to invest money

• Space available

• Size of fish introduced • Always better to opt large tank

• In small a tanks water quality parameters will fluctuates

• The ideal ratio of length to height of aquarium tank is 3:2

The minimum reasonable size of an aquarium tank is 60cm length, 30cm height and 30cm width

Standard dimensions for rectangular tanks

Length (Cm)	Breadth (Cm)	Height (Cm)	Capacity (L)	Glass thickness (mm)
60	30	30	54	4
90	30	38	103	5
120	30	45	162	6
150	45	60	405	10
180	45	60	486	12

Accessories:

1. **Glass**

   • Glass panels of required size are cut and cleaned- 4 side panels and 1base panel

2. **Cleaning purpose**

   • Carbon tetrachloride, acetone or degreasing agents

3. **Sealing** – Silicon sealant

4. Aquarium lamps:

a) Light is a stimuli for plant growth (photosynthesis). Atleast 10-12hr of light period is needed. The most popular- fluorescent lamp and compact fluorescent lamp- gives a cool and effective illumination

b) Imported aquarium lamps (Gro-lux)- enhance the color of fishes

c) For a 48inch*18*12 inch tank, 25W fluorescent white tube is suitable, which would be placed above the water surface leaving a gap 4-6 inch

d) Lamp always fitted in the hood – so no shade falls on the viewing side

e) Necessary to give a ventilation to minimize the buildup of heat in the aquarium

5. Hood

• Improves the aesthetic beauty of the unit

• Protect the fishes and prevents insects, dust falling into the tank

• Evaporative loss is prevented

• Provides base to which light arrangements, aerator can be fitted • A window is provided in the hood to feed the fishes daily

• Plywood, bamboo ply and wood-ideal materials

6. Stand

• Must be strong enough to support the weight of full tank-gravel, water and accessories

7.Filters

• Ammonia- highly toxic to fishesaccumulates in water – through excretion of fishes, decomposition of faeces, left over feeds and organic matter.

• Filters – mainly mechanical, chemical, biological-for maintaining the water quality

• Mechanical- filter water passes through a filtration material like filter floss, foam material,

• Chemical – filter activated charcoal commonly using

• Biological filters- water passed through a filter bed, and bacteria convert toxic ammonia to less toxic nitrates

• Most commonly used – under gravel biological filters contains a corrugated or indented plastic sheet perforated with fine holes having a vertical pipe at the rear corner

• Gravel of 3-4mm size spread to height of 5cm over the plate

• By means of air pump a column of water moves up the pipe, creates a water recirculation through sand bed

• Downward movement of water through sand bed traps suspended particles

• Efficiency of biofilter can improved by using power head

• Power filter- internal filter consists of filter unit attached to powerhead, serves function of biological and mechanical filter

• Bioballs increase the surface area

8. Aerators

• Increase the oxygen content and removes excess carbon dioxide

• Vibrator type is the cheapest and most commonly used

• Aerator must be kept above the water level in order to prevent back sucking of water if the power supply fails

• Air is supplied to aquarium through PVC tubings, airline dividers, flow regulating valves and airstones

9. Heaters

• Tropical Freshwater fishes are warm water fish. These fish cannot survive in cold waters. They require an optimum water temperature of 26-280 C. Thus heating of the aquarium is required in winter.

10. Gravel

• Gravel is required in an aquarium to provide natural look, hold rooted natural aquatic plants and most importantly it acts as a substrate for proliferation of useful bacteria

11. Aquarium plants:

Aquatic plants are used to give the freshwater aquarium

• Natural appearance,

• Oxygenate the water

• Provide shelter

• Spawning

• Food

Types of aquatic plants

• Surface floating-Azolla, lemna, eichhornia, salvinia and pistia

• Emergent plants- water lilies

• Rootless submerged- ceratophyllum, nitella

• Rooted submerged- vallisneria, hydrilla, limnophila, najas, myriophyllum

12. Decoratives:

Background posters, various types of toys, rocks and caves, shells and corals drift wood etc. Are used to decorate aquariums.

Steps for fabrication of rectangular aquarium:

• Select the glass panels, cut them into required sizes, using a glasscutter and a scale.

• Clean all of the edges of glass with acetone or alcohol.

• Spread polythene or old newspaper sheet on the surface of the selected place.

• Place one of the glass panel on a plain surface.

• First, raise the back panel by applying silicon sealant; follow the same process for other side glasses too.

• Tape all the corners from outside to give extra support during setting.

• Smoothen the sealant at the joints with the finger.

• Leave the sealant to get hardened atleast for a day.

• When the tank sets remove the extra sealant, if any with a sharp knife or a blade.

• Finally check the aquarium for any leakages by filling water.

• Acetic acid is released from settings so tank should be thoroughly washed.

Setting up:

• Install the tank on a stand with thermocoal cushion

• Biological filter assembly is arranged on bottom of the tank and sand is spread over the plate

• Aquascaping

• After filling ¾ arrange with plants

• Then completely fill the tanks leaving 5cm at the top

• Keep the tanks with biofilter operation for 10-15 days

• Introduce only compatible species

• Introduce fishes after giving a quarantine period

Maintenance:

• Temp, pH, hardness, DO, C02, ammonia, nitrite, nitrate within optimum

• Weekly exchange 10-20% of water

• Siphoned the bottom water

• Slope the bottom gravel –accumulate the wastes at the lowest level

• Tap water – must be kept open for two days

• Introduce scavenger fishes like sucker cat fish e.g.- loaches, corydor

• Fed twice daily in morning and evening

GROUP - B

ASSESSMENT: Module-III

Topic: Aquaculture: Techniques, Sustainability and Commercial Prospects

Summer Internship for MSD Students (Semester-II) Academic Session 2024-25

Organised by
ASUTOSH COLLEGE

Name of the Student: RAHUL DAS

College Roll No: 0435

University Registration No: 012-1112-2020-21

University Roll No: 232012-22-0173

Stream: B.A/B.Sc Semester-II

All questions are compulsory.

1. Aquaculture involves-
   a) Cultivation of only fish
   b) Cultivation of all aquatic animals
   c) Cultivation of commercially important aquatic plants and animals
   d) Cultivation of aquatic plants

2. In Sustainable aquaculture practices –
   a) Increased aquaculture production
   b) Controlled aquaculture production
   c) Controlled aquaculture production without affecting environment
   d) Increased aquaculture production without affecting environment

3. Which is the following of an ornamental fish?
   a) Rohu
   b) Catla
   c) Tilapia
   d) Gold fish

4. Aquaculture can be done in -
   a) Cemented tank
   b) Aquarium
   c) Cages
   d) All of the above

5. Adhesive used in construction of glass aquarium
   a) Fevicol
   b) Dendrite
   c) Silicon adhesive
   d) All of the above

6. Which of the following is an essential material for home aquarium?
   a) Plant
   b) Toys
   c) Aerator
   d) Stones

7. Aquarium may be set in
   a) School
   b) Park
   c) Office
   d) All of the above

8. In ornamental fisheries involves-
   a) Breeding of ornamental fishes
   b) Construction of home aquarium
   c) Export of ornamental fishes
   d) All of the above

9. During construction of glass aquarium, the thickness of glass depends on-
   a) Fish size
   b) Size of aquarium
   c) Purpose of culture
   d) None of these

10. The beneficial impact of aquarium in human health is
   a) Stress reduction
   b) Lowering blood pressure
   c) Improve eye sight
   d) Reduce metabolism

- Common Name : Guppy
- Scientific Name : Poecilia reticulata

ASSIGNMENT: Module-III

Topic: Aquaculture: Techniques, Sustainability and Commercial Prospects

Summer Internship for MSD Students (Semester-II) Academic Session 2024-25

Organised by
ASUTOSH COLLEGE

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Stream: B.A/B.Sc Semester-II

Assignment-1: Write down the Common name, scientific name and brief description about any three commercially important ornamental fish species.

Here are three commercially important ornamental fish species, commonly found in India, along with their common names, scientific names and brief descriptions.

1. Guppy
   - Common Name : Guppy
   - Scientific Name : Poecilia reticulata
   - Description : Guppies are small, colorful freshwater fish originating from South America but widely bred in India. They are highly adaptable and come in a variety of colors and patterns, making them popular among aquarists of all levels. Guppies are known for their livebearing nature and active behavior, thriving in community tanks.

- Common Name : Gold fish
- Scientific Name : Carassius auratus

- Common Name : Angel fish
- Scientific Name : Pterophyllum Scalare

2. Goldfish :

- Common Name : Goldfish
- Scientific Name : Carassius auratus
- Description : Goldfish are one of the most popular ornamental fish species globally, including India. They are characterized by their shiny scales and prominent fins, available in various colors such as gold, orange, white and combinations thereof. Goldfish are handy and can tolerate a range of water conditions, making them suitable for beginners and experienced aquarists alike.

3. Angelfish :

- Common Name : Angelfish
- Scientific Name : Pterophyllum scalare
- Description : Angelfish are graceful freshwater fish species native to South America, including parts of Brazil and Peru. In India, they are favored for their elegant appearance, featuring triangular bodies, long fins, and striking color patterns. Angelfish are relatively easy to care for but require larger tanks due to their size and swiming behavior. They are known to be semi-aggressive and are best kept with compatible tank mates.

Making of all glass aquarium

All glass aquarium

Assignment-2: Write the materials and methods to construct an all glass aquarium.

Materials:

1) Glass panes (for side, front, back and bottom)
2) Aquarium-safe silicone sealant/adhesive
3) Glass cutter
4) Measuring tape or rular
5) Clamps or weights (optional)

Methods:

1. Design Planning:
   - Decide on the size and shape of the aquanium
   - Calculate dimensions and glass thickness based on water volume and safty nequinements.
2. Glass Cutting:
   - Measure and mank glass panes using a glass cutter.
   - Score along the manked lines and canefully break the glass along the score lines.
   - Smooth hough edges using sandpaper
3. Assembly:
   - Start with bottom pane: Apply a bead of aquanium-safe silicone along the edges.
   - Position and press side panes onto the bottom pane, ensuning they are squane and aligned.
   - Apply silicone to the seams where the side panes meet the bottom pane.
   - Repeat each for the front and back panes, sealing each seam with silicone.
4. Curing and Sealing:
   - Allow the silicone to cune for at least 24-48 houns in a well-ventilated anea.
   - Check for any leaks by filling the aquanium with water and observing for leaks oven night.
5. Final steps:
   - Trim the excess silicone off if necessany.

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- clean the inside of the aquarium thoroughly before adding water and fish.
- Decorate and set up the aquarium with substrate plants and filtration equipment as desined.

Assignment-3: Briefly describe about sustainable aquaculture practices.

i) Site Selection : Opt for locations with minimal environmental impact and suitable water quality.

ii) Water Management : Employ efficient system like recirculating aquaculture to conserve water and maintain quality parametens.

iii) Species Selection : Focus on cultivating native species that are resilient to local condition and avoid introducing invasive species.

iv) Feed Management : Develop and use feeds with sustainable protein sources to reduce environmental impact and optimise feed conversion ratio.

v) Waste Management : Implement stategies such as waste treatment and nutrient recycling to minimize pollution and support ecosystem health.

These practices aim to balance economic viability with environmental stewardship, ensuring long-tenm sustainability in aquaculture operation.

Assignment-4: Learning outcomes and feedback

we gained practical skill in aquaculture management including site selection, water quality management, species selection and sustainable practices. Feedback highlighted our grasp of essential concepts and headiness for real-world application in sustainable aquaculture. Overall, the program fostened a strong foundation in sustainable aquaculture practices and instilled a passion for environmental stewardship in aquatic ecosystems.

Banerjee
26.06.24

Summer Internship (2024) under Curriculum and Credit Framework (CCF) of the

University of Calcutta

GEOLOGY MAJOR

SEMESTER II

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GEOS MINING CONSULTANT LLP

Certificate of Completion

for

Summer Internship (2024) under Curriculum and Credit Framework (CCF) of the University of Calcutta

This is to certify that DARPAN BASAK, student of Geology Major, Semester II, University Roll No. 233012-21-0130 and Reg. No. 012-1111-0821-23 of Asutosh College, successfully completed the 15 Days summer internship programme on **Industrial training on the basics of Exploration Geology, Hydrogeology and Geotechnical Field Work** from 8th JUNE,2024 to 26th JUNE 2024 at GEOS MINING CONSULTANT LLP.

Robit Jaiswal.
GEOS MINING CONSULTANT LLP
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Kolkata-700106

Signature of authorised signatory with official seal

Issued on: 26.06.2024.

SUMMER INTERNSHIP

ON

INDUSTRIAL TRAINING ON THE BASICS OF EXPLORATION GEOLOGY, HYDROGEOLOGY AND GEOTECHNICAL FIELD WORK.

8th June to 26th June 2024

ASUTOSH COLLEGE

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The Summer Internship Project book is a result of the invaluable support from my professors : Dr. Rwiti Basu, Dr. Abhik Kundu, Dr. Dipanjan Majumdar, Dr. Ashish Kumar Das, Dr. Indrani Bhattacharya , Dr. Pampiya Choudhury and Rohit Jaiswal Sir. This book captures the experiences gathered during the 15-day internship and the enthusiasm of a first-year student. We cannot thank our teachers enough for organizing such a valuable learning opportunity for us.

I am grateful to my classmates for their help in collecting detailed photographs and information.

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COURSE CONTENT

This comprehensive course offers an in-depth exploration of the geological sciences, covering a wide range of topics and practical applications. It begins with an extensive examination of ***gemology, including the identification, classification, and valuation of precious stones, as well as industry techniques.***

Next, the course shifts its focus to ***hydrogeology***, exploring the intricate systems of groundwater, aquifer characteristics, and water quality management to understand the complexities of water resources and their sustainable use.

The course then moves on to ***mapping and geotechnical exploration***, where students gain hands-on experience in creating detailed geological maps and conducting field investigations to assess soil and rock properties, a crucial skill for land use planning and infrastructure development.

Additionally, the course covers ***drilling techniques***, examining various methods and technologies used in subsurface exploration and resource extraction, essential for understanding geological formations and mineral deposits.

Environmental geology is also explored, addressing the significant impact of geological processes on the environment, including issues related to contamination, land degradation, and resource management.

Finally, the course concludes with an in-depth study of ***mineralogy***, focusing on the properties and behaviors of minerals and their role in geological processes, providing a solid foundation for understanding the composition and formation of the Earth's crust.

By integrating these diverse topics, the course provides students with a profound understanding of geological sciences, preparing them for a wide range of careers in geology, environmental science, and related fields.

INTRODUCTION

Our internship project immersed us in the dynamic world of geology, covering diverse fields such as Gemology, Hydrogeology, Structural mapping, Drilling Techniques, Environmental Geology, and Mineral Identification. Through hands-on laboratory sessions, we explored the complexities of geological processes and their real-world applications. We gained valuable practical skills in geological mapping, groundwater assessment, and mineral and rock identification, which not only deepened our understanding of Earth sciences but also empowered us to address environmental challenges and contribute to sustainability initiatives.

Day 1 Report Date: 08.06.2024

INTRODUCTION TO GEMOLOGY

In this class, we were introduced to gemology and given a basic understanding of the classification of gemstones, lapidary, treatment, and testing techniques.

- Gemology is the branch of Geoscience that deals with the science of identifying artificial and natural gemstones and their evaluation in the market based on purity and other properties.

CLASSIFICATIONS OF GEM STONES

There are two classifications of gemstones: Precious and Semi-Precious. Precious stones are Diamond, Pearl, Sapphires, Rubies, and Emeralds. Semi-Precious stones are Amethyst, Aquamarine, Citrine, Garnet, Onyx, Opal, Peridot, Tanzanite, and Topaz. All gems, precious or semi-precious, are valuable. Their value depends on many elements including color, size, quality, and rarity.

1.**Kluge's classification of gemstones**: Kluge distinguishes five groups of precious stones, characterised by their value as gems, their hardness, optical characters, and rarity of occurrence.

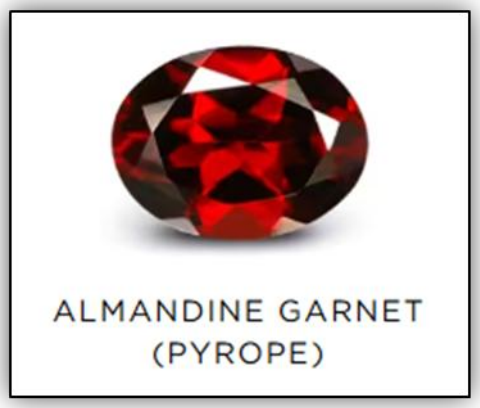
2.**Chamont's classification of gemstones:** based on the demand and supply of gemstones, they are classified under four classes.

Day 2 Report Date:10.06.2024

1. **Alexandrite:**

Alexandrite is renowned for its color-changing ability, appearing green in daylight or fluorescent light and red under incandescent light. This unique feature is highly prized, and its intensity varies among stones. With a hardness of 8.5 on the Mohs scale, alexandrite is durable enough for jewelry. Clarity ranges from slightly included to eye-clean, and it is typically cut into traditional shapes to maximize brilliance. When the rough material shows a chatoyancy effect, it might be cut into a cabochon. Alexandrite has a vitreous luster, a refractive index of 1.745 - 1.759, and a specific gravity of 3.70 - 3.78.

2. **Almandine Garnet:**



Almandine garnet displays deep red to reddish-brown hues, sometimes varying to violet-red, brownish-black, or purple. Its cubic crystal system and a hardness of 7 to 7.5 on the Mohs scale make it durable and scratch-resistant. Transparency ranges from transparent to opaque, and its luster varies from vitreous to greasy or resinous. Almandine garnet lacks cleavage, has a conchoidal to uneven fracture, and typically does not exhibit pleochroism or luminescence.

3. **Amethyst:**

Amethyst ranges from light lavender to deep purple, occasionally with red flashes. With a hardness of 7 on the Mohs scale, it is durable for jewelry use. It has a hexagonal crystal system, vitreous luster, and is transparent to translucent. Amethyst is found globally, with significant deposits in Brazil, Uruguay, and Africa.

4. **Ametrine:**

Ametrine is notable for its bi-colored zones of violet/purple (amethyst) and yellow/orange (citrine). It has a Mohs hardness of 7, a trigonal crystal structure, vitreous luster, and varies from translucent to transparent. Ametrine may exhibit pleochroism, with different colors visible in the amethyst and citrine zones.

Day 3 Report Date:11.06.2024

5. **Ammolite:**

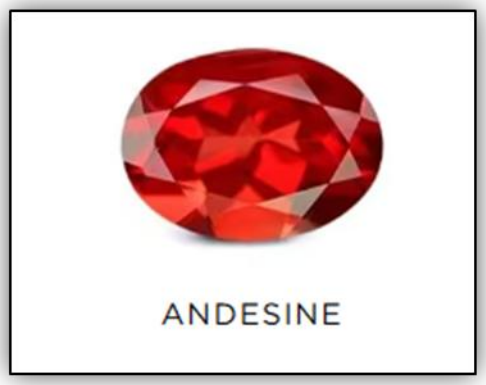
Ammolite, primarily composed of aragonite, displays iridescent colors spanning the entire visible spectrum, with red and green being most common. It has an orthorhombic crystal structure, a hardness of 3.5-4.5 on the Mohs scale, and a specific gravity of 2.60-2.85. Ammolite forms from fossilized ammonite shells and is transparent to translucent.

6. **Andalusite:**

Andalusite, an aluminum silicate, appears in various colors like brown, reddish-brown, yellow-brown, greenish, violet, and colorless. It has an orthorhombic crystal system, prismatic crystals or massive columns, a hardness of 7-7.5, and a vitreous to subvitreous luster. Andalusite is transparent to opaque and exhibits strong pleochroism.

7. **Andesine:**

Andesine has a triclinic crystal system and varies in color from white, gray, and green to yellow, red, and occasionally blue or purple. It has a hardness of 6 to 6.5, two perfect cleavages, conchoidal to uneven fracture, and a vitreous luster. It has a refractive index of 1.543 – 1.553, specific gravity of 2.65 – 2.69, and may



fluoresce under UV light. Andesine occurs in igneous, metamorphic, and sedimentary rocks.

8. **Angel Skin Coral:**

Angel Skin Coral is prized for its delicate pink color, ranging from light to vibrant orange-pink. Composed of calcium carbonate, it has a hexagonal crystal system, a hardness of 3.5-4, and a specific gravity of 2.60-2.70. With a vitreous luster and conchoidal fracture, it is translucent to opaque and requires careful handling due to its softness.

9. **Apatite Cat's Eye:**

Apatite Cat's Eye, in colors like yellow, greenish-yellow, blue, and violet, has a hardness of 5 and requires careful handling. It is usually translucent, with needle-like inclusions causing the chatoyancy effect. It has a vitreous to greasy luster and is linked to metaphysical properties like healing bones and the nervous system.

10. **Aquamarine:**

Aquamarine, a variety of beryl, ranges from pale to vibrant blue with green hues caused by iron traces. It has a hexagonal crystal system, a hardness of 7.5-8, and is transparent to translucent with a vitreous to resinous luster. Aquamarine may contain inclusions like mica and hematite, appearing as wispy veils or tiny crystals.

Day 4 Report Date:12.06.2024

- ## Technique of Polishing & Cutting Gemstone:

➢**Gemstone Cutting Faceted Cuts:** These include various types like round brilliant, oval, princess, marquise, pear, and emerald cuts. Faceted cuts have multiple flat surfaces (facets) that reflect light. Cabochon Cuts: These are smooth, rounded cuts without facets, often used for opaque or translucent stones.

➢**Gemstone Polishing Laps and Polishing Wheels:** Made from materials like tin, copper, or ceramic, used in combination with polishing powders. Polishing Compounds: Diamond powder, cerium oxide, or alumina powder are commonly used.

- ## Gem Testing Techniques:

Gemstone testing techniques are crucial for accurately identifying and evaluating gemstones, ensuring their authenticity and value. These techniques encompass a variety of methods, each designed to examine different properties and characteristics of gemstones.

➢**Spectroscopy:** This technique involves analysing the interaction of light with a gemstone to determine its chemical composition and identify any impurities present.

➢**Refractometry:** Refractometers measure the refractive index of a gemstone, which is the degree to which light is bent as it enters the gemstone.

➢**Microscopy:**Gemologists use microscopes to examine internal features of gemstones such as inclusions, growth patterns, and surface characteristics.

➢**Specific Gravity Determination:** This technique involves measuring the density of a gemstone compared to the density of water.

➢**X-ray Diffraction (XRD):** Determines the crystal structure of a gemstone, aiding in its identification and distinguishing natural gemstones from synthetics or imitations.

- ## Gem treatment for enhancing:

➢**FOILS:** The use of coloured foil or paper behind a poorly coloured or colourless stone, usually in a closed setting, was commonplace in antique jewellery.

➢**DYEING:** Another relatively simple way of improving or changing a gem's appearance is to dye or stain it.

➢**IMPREGNATION:** Some gem materials such as turquoise are legitimately impregnated with colourless paraffin wax (or plastic, which gives a more permanent result) to stabilize them and prevent attack from acidic perspiration. Less legitimate is the use of coloured impregnates to increase the value of, for instance, colourless or pale turquoise. Veins of turquoise that are too irregular or thin to be made into cabochons are often backed with a metal-loaded epoxy resin. The turquoise is then set in a closed mount which hides the resin backing.

➢**HEAT TREATMENTS:** An increasing number of gemstones are today subjected to various forms of heat treatment to improve or change their colour. Among the centuries- old heat treatments are those carried out on quartz, tourmaline, topaz, zircon and corundum.

➢**HPHT ENHANCEMENT OF DIAMOND:** In the late 1970s, researchers at the General Electric Laboratory in the USA discovered that yellow Cape series diamonds (and synthetic diamonds) could be lightened in colour by heating them under high pressure for an extended period (now called HPHT treatment).

➢**IRRADIATION METHODS:** The mechanism by which irradiation increases or modifies colour in gemstones is tied up with the production of colour centres, which can then be altered by subsequent heat treatment. Blue topaz is one of the principal gems which has its colour enhanced by means of irradiation.

➢**GAS FILLING:** Surface cavities and pits are a common feature on faceted rubies and sapphires, particularly with high value stones.

Day 5 Report Date:13.06.2024

HYDROGEOLOGY

- **Aquifer**

An aquifer is a geological formation that can store, transmit, and yield water to wells and springs.

These formations are typically composed of permeable materials such as sand, gravel, sandstone, or fractured rock that can hold and transmit water.

Aquifers are a crucial source of freshwater for agricultural, industrial, and domestic use.

- **Types of Aquifer**

1. Unconfined Aquifer: Also known as a water table aquifer, it is directly recharged by surface water infiltrating the ground. The upper surface of the saturated zone is called the water table.

2. Confined Aquifer: This type of aquifer is trapped between two impermeable layers of rock or clay. It is pressurized, and when tapped by a well, water rises above the top of the aquifer, sometimes reaching the surface without pumping.

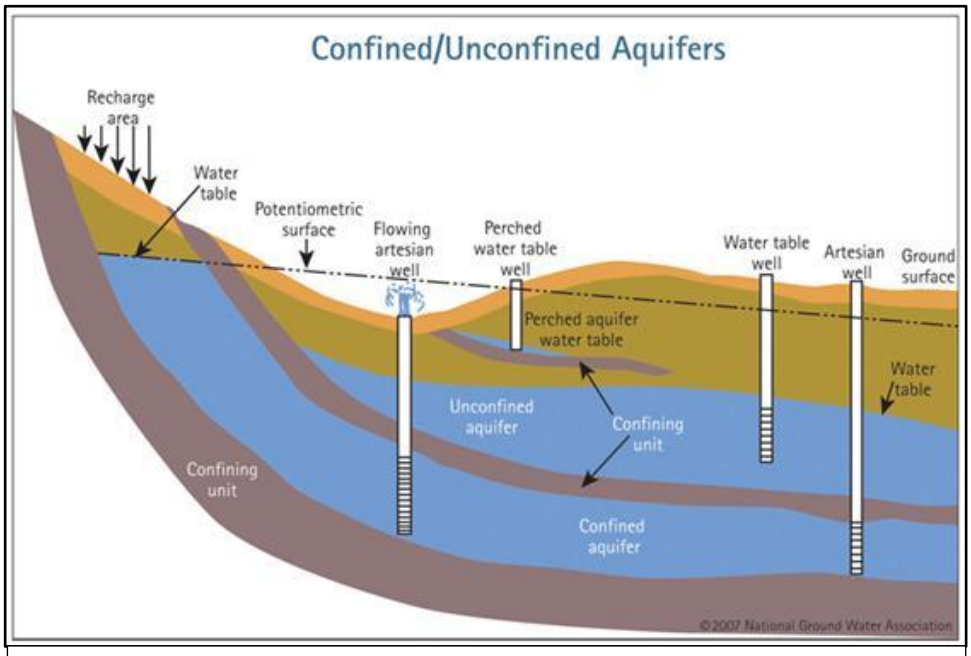


FIG.Groundwater & Aquifers

- **Water Table**

The water table is the upper surface of the saturated zone in an unconfined aquifer. It fluctuates based on seasonal variations, precipitation, and extraction of groundwater. The water table separates the saturated zone, where all pore spaces are filled with water, from the unsaturated zone above, where pore spaces contain both air and water.

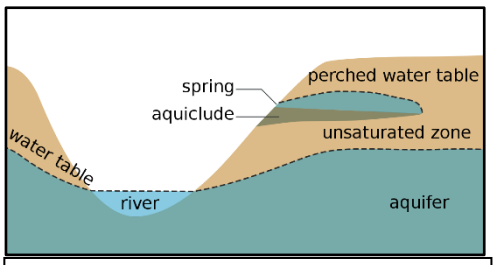


FIG. WATER TABLE

Day 6 Report Date:14.06.2024

Basic Ideas about Groundwater Mapping

Groundwater mapping involves the study and representation of the distribution and movement of groundwater within the subsurface. Key components of groundwater mapping include:

1.**Hydrogeological Surveys**: Collecting data on the geology, hydrology, and geochemistry of an area to understand the characteristics and behaviour of groundwater systems.

2.**Water Level Measurements**: Monitoring the depth to the water table or potentiometric surface in wells to determine groundwater flow direction and gradient.

3.**Geophysical Methods**: Using techniques such as electrical resistivity, seismic surveys, and ground-penetrating radar to characterize subsurface conditions without drilling.

4.**Aquifer Testing**: Conducting pump tests to determine the hydraulic properties of aquifers, including transmissivity and storativity.

5. **Remote Sensing**: Utilizing satellite imagery and aerial photography to identify surface features indicative of groundwater presence and recharge areas.

Aquifer Mapping

Aquifer mapping is the process of creating detailed maps that show the extent, thickness, and properties of aquifers. It involves:

1. **Data Collection**: Gathering geological, hydrological, and geophysical data to define the boundaries and characteristics of aquifers.

2. **Modeling**: Using computer models to simulate groundwater flow and predict the behavior of aquifers under various conditions.

3. **Mapping Tools**: Employing Geographic Information Systems (GIS) and other mapping software to create visual representations of aquifer data.

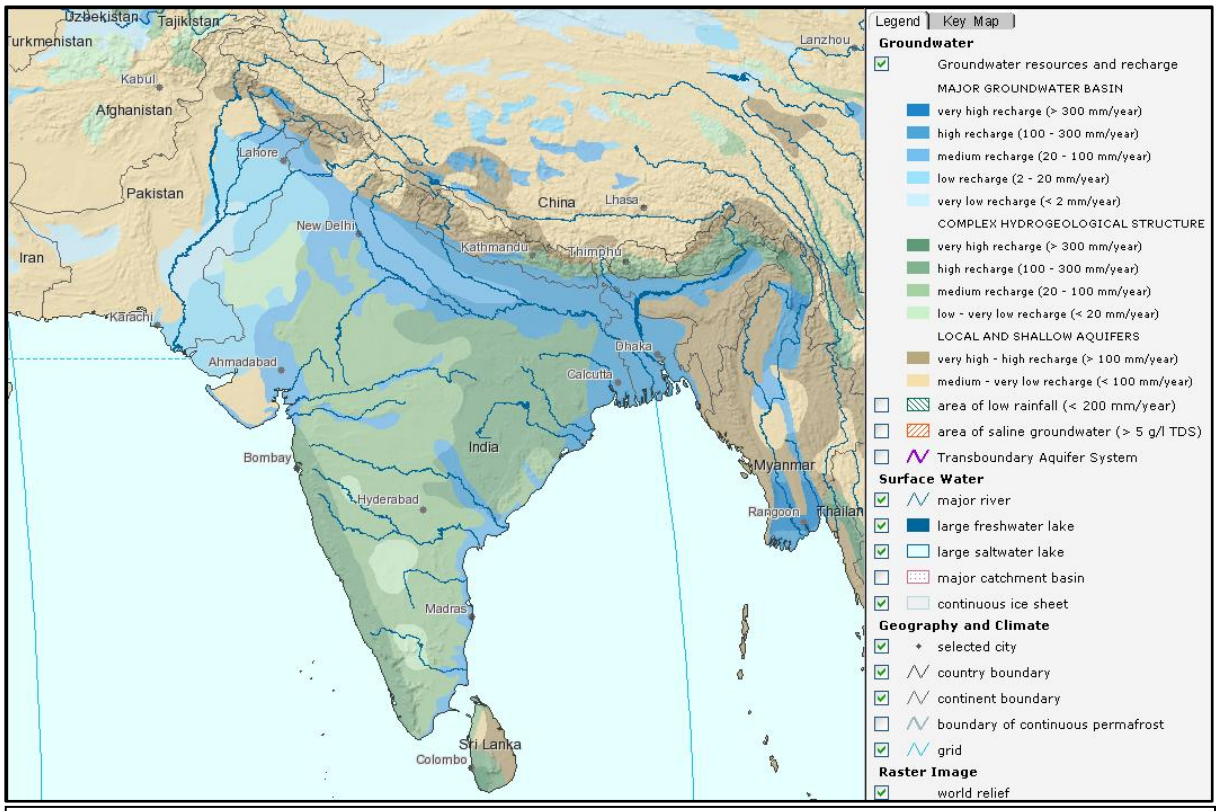


FIG. Groundwater Resources and Recharge

Advantages of Aquifer Mapping

1.**Resource Management**: Provides essential information for sustainable groundwater management, helping to prevent over-extraction and contamination.

2.**Water Supply Planning**: Assists in locating new water sources and optimizing the use of existing ones, ensuring reliable water supply for communities and industries.

3.**Environmental Protection**: Identifies areas vulnerable to contamination and guides the implementation of protective measures to safeguard water quality.

4.**Land Use Planning**: Informs decisions on land development and agricultural practices to minimize negative impacts on groundwater resources.

5.**Disaster Mitigation**: Aids in predicting and mitigating the effects of droughts, floods, and other natural disasters on groundwater supplies.

6.**Scientific Research**: Enhances understanding of hydrogeological processes and supports further studies in groundwater science..

HOW TO DO GROUND WATER MAPPING?

Data collection: Data Collection – Either from existing data bases and maps or by new field measurements.

Exploration and collection of groundwater data,Fieldinvestigations, collecting information about open and bore wells,***Geophysical investigations and characterization of groundwater reservoirs.***

Post-processing: Geographic Information System and Remote sensing for map preparation –

Existing data evaluation, Analysis of data gaps if any Filling the data gaps and preparing the database, Developing thematic layers like rainfall, slope and drainage density, Integrating different thematic layers using the Geographic Information System software

The project involves the creation of hydrogeological and water quality maps to identify recharge and discharge zones. It quantifies water present in different aquifer layers and analyzes groundwater abstraction results. Based on the study's outputs, sustainable management actions are deployed to ensure effective groundwater resource management.

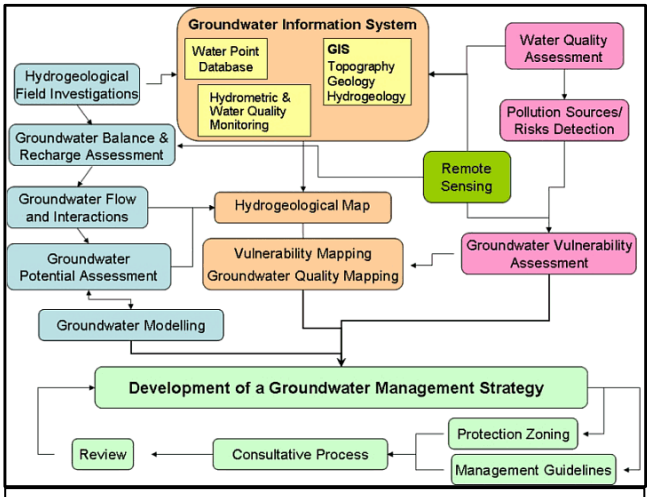


FIG. GROUNDWATER INFORMATION SYSTEM

Day 7 Report Date:15.06.2024

STRUCTURAL MAPPING AND DRILL CORE TECHNOLOGY

Structural mapping and geotechnical exploration are crucial processes in civil engineering and geology. They involve assessing the physical properties of a site to inform construction, mining, and other projects.

Structural mapping involves creating detailed maps that show the distribution, nature, and orientation of rock formations and structures such as faults, folds, and joints. This process includes:

1. Field Mapping
2. Remote Sensing
3. Geophysical Methods

Digital Elevation Map :

A Digital Elevation Map (DEM) is a representation of the Earth's surface topography in digital form. Using Geographic Information Systems (GIS), DEMs provide a 3D model of terrain elevations, capturing the height of the land at each point. DEMs are essential for various applications, including:

1. **Topographic Analysis:** Understanding the terrain features, slopes, and elevation changes.

2. **Hydrology:** Modeling water flow, watershed boundaries, and flood risk areas.

3. **Urban Planning:** Assessing land suitability, infrastructure development, and landscape visualization.

4. **Environmental Monitoring:** Analyzing erosion, land degradation, and habitat mapping.

DEMs are created from remote sensing data such as satellite imagery, aerial photography, and LIDAR. They are crucial for accurate and detailed spatial analysis in multiple fields.

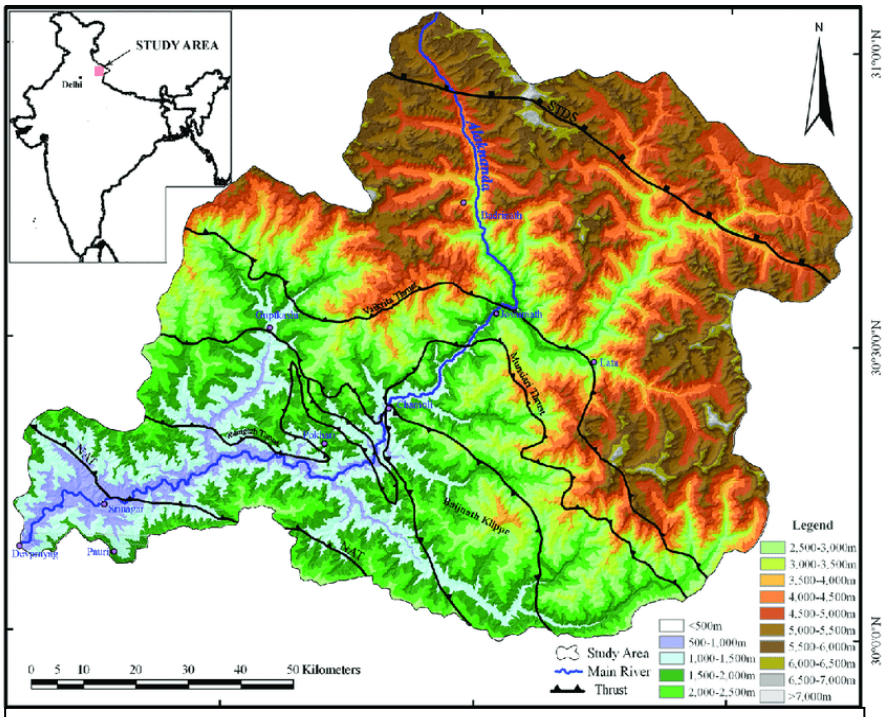


Fig.Digital elevation model (DEM) showing elevation variations for the location map of Alaknanda river basin

Day 8 Report Date:18.06.2024

Major Boundary Thrust (MBT)

The ***Major Boundary Thrust (MBT)*** is a significant geological fault line in the Himalayas. It marks the boundary between the Indian plate and the Eurasian plate, where the Indian plate is thrust beneath the Eurasian plate due to tectonic forces. This thrusting has caused the uplift of the Himalayas and is responsible for many of the region's earthquakes. The MBT separates older metamorphic rocks of the Lesser Himalayas from the younger sedimentary rocks of the Sub-Himalayas.

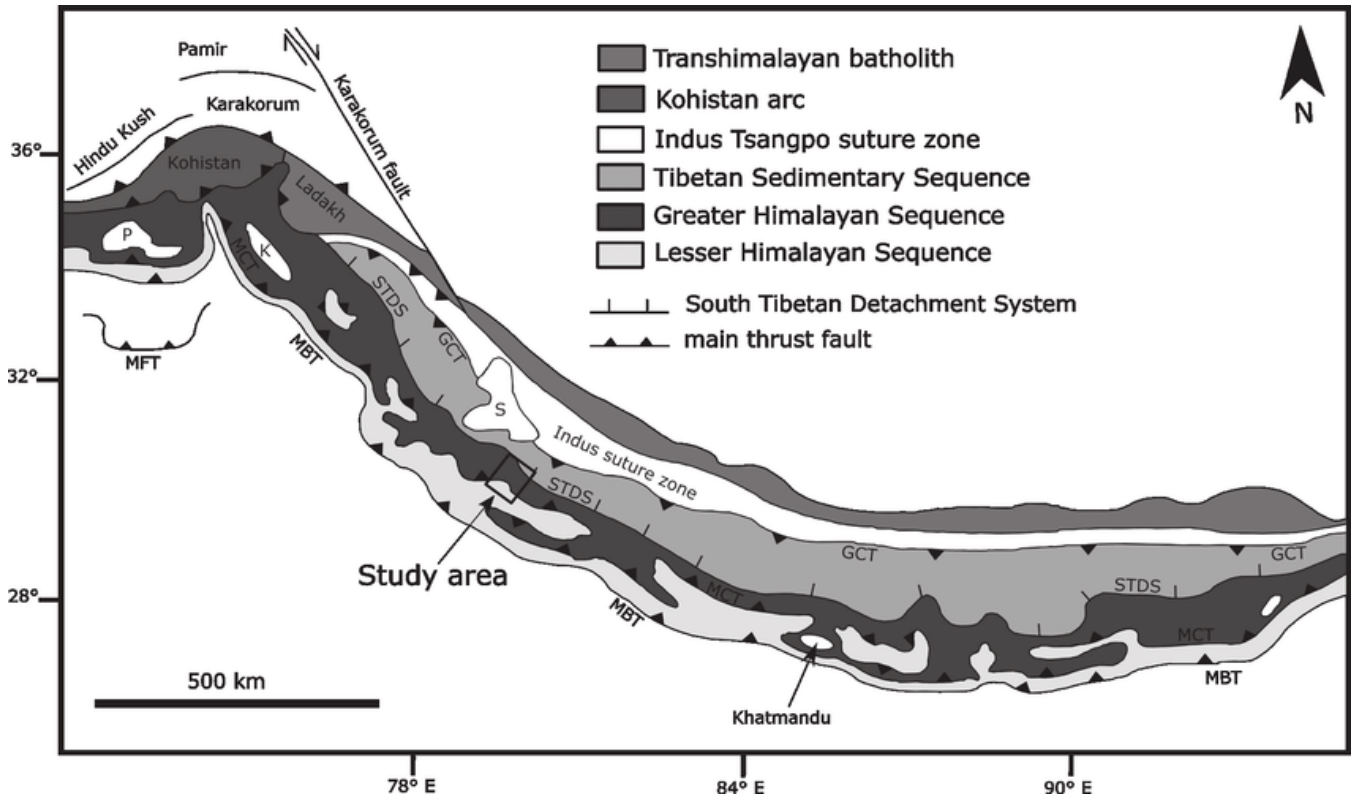


Fig.Simplified geological map of the Himalayas. MFT: Main Frontal Thrust; MBT: Main Boundary Thrust; MCT: Main Central Thrust; STDS: South Tibetan Detachment System; GCT: Great Counter Thrust

Main Central Thrust (MCT)

The ***Main Central Thrust (MCT)*** is another major geological fault in the Himalayas, located north of the MBT. It delineates the boundary between the high-grade metamorphic rocks of the Greater Himalayas and the lower-grade metamorphic rocks of the Lesser Himalayas. The MCT plays a crucial role in the geological evolution of the Himalayas, having contributed significantly to the uplift and formation of the mountain range over millions of years.

Conjugate Joint Set :

A conjugate joint set consists of two sets of fractures in a rock that form simultaneously, usually at nearly right angles to each other, due to tectonic stress. These joint sets help geologists understand the stress regime and deformation history of the rock.

Profile Plane

A profile plane is a vertical slice through a terrain or structure, showing the elevation changes along a specific line. It provides a side view of the terrain's shape.

Cross Section

A cross section is a vertical cut through a geological or structural feature, revealing the internal arrangement of rock layers, faults, and other subsurface structures along a specific line.

Day 9 Report Date:19.06.2024

Geotechnical exploration assesses the soil and rock properties to determine their suitability for construction. Key activities include:

1. Drilling and Sampling
2. In-situ Testing
3. Laboratory Testing
4. Geophysical Surveys

Importance of Geotechnical Mapping

Geotechnical mapping is a crucial part of site investigation. It involves identifying landforms, geomorphological processes, and collecting geological and structural data from various exposures. The goal is to understand the site's geological conditions, assess potential geo-hazards, and predict how soil and rock will react to proposed structures. This information is essential for designing foundations, pavements, and earthworks optimally.

- Identify geological formations, structures, and rock types
- Analyze geological processes that shaped the site
- Detect potential geo-hazards like landslides, subsidence, or earthquakes
- Determine soil and rock properties, such as stability, strength, and settlement characteristics.
- Inform the design of foundations, pavements, and earthworks to ensure stability and safety.
- Optimize construction plans to minimize risks and costs.

DRILL CORE TECHNOLOGY

Drill Core Technology involves extracting cylindrical samples of rock (cores) from the subsurface using a specialized drill. These cores provide valuable information about the geological, structural, and mineralogical characteristics of the rock layers. By analyzing drill cores, geologists and engineers can assess the composition, strength, and condition of the rock, aiding in resource exploration, geotechnical investigations, and environmental studies. This technology is essential for making informed decisions in mining, construction, and scientific research.

Core Drilling

Core drilling involves extracting cylindrical samples (cores) of rock from the subsurface using a hollow drill bit. The intact core samples provide detailed information about the rock's geological, structural, and mineralogical properties. This method is highly precise and is used for resource exploration, geotechnical investigations, and scientific research to analyze the composition and strength of subsurface materials.

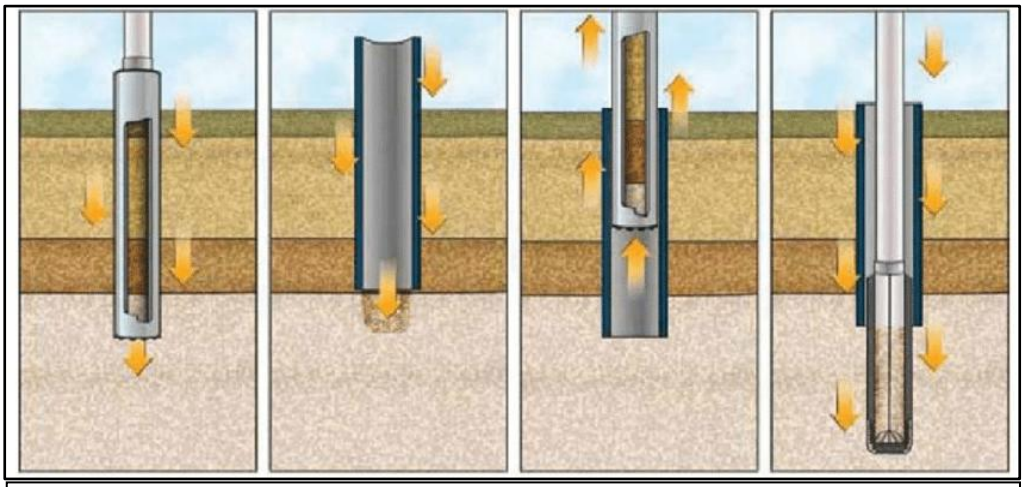


FIG. CORE DRILLING

RC Drilling

Reverse Circulation (RC) drilling uses a dual-wall drill pipe system to create a continuous flow of rock cuttings to the surface. Compressed air is injected between the drill pipes, pushing the cuttings up through the inner pipe to be collected for analysis. RC drilling is faster and less expensive than core drilling,

making it ideal for mineral exploration and large-scale geotechnical surveys where detailed core samples are not necessary.

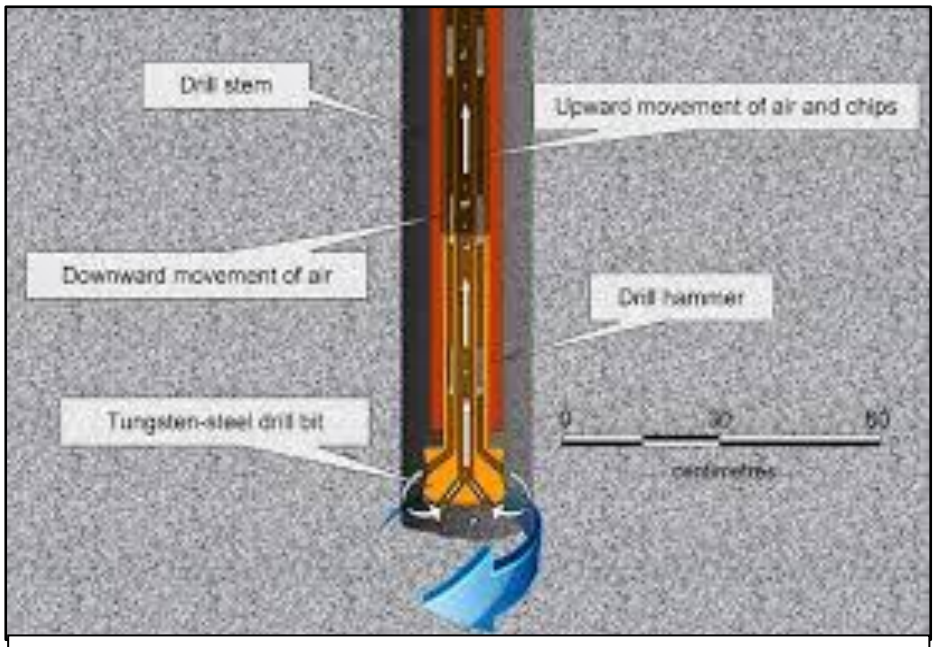


FIG. RC DRILLING

Core Drilling Advantages:

1. **Detailed Information:** Provides intact core samples that offer detailed geological, structural, and mineralogical information.

2. **High Accuracy:**Allows for precise analysis of rock properties, stratigraphy, and mineral content.

3. **Visual Inspection:** Enables direct visual inspection and physical testing of the rock core.

Drawbacks:

1. **High Cost:** More expensive due to slower drilling rates and the need for specialized equipment and personnel.

2. **Time-Consuming:** Takes longer to drill and recover cores compared to other methods.

3. **Logistical Challenges:** Requires more handling and storage space for the core samples.

Reverse Circulation (RC) Drilling Advantages:

1**. Faster and Cheaper:** Higher drilling speeds and lower operational costs compared to core drilling.

2. **Efficient Sample Recovery:** Provides continuous, uncontaminated samples quickly, which are suitable for mineral content analysis.

3. **Less Disturbance:** Causes less disturbance to the surrounding rock and reduces the risk of hole collapse.

Drawbacks:

1. **Limited Detail:** Provides less detailed geological information as it collects rock cuttings instead of intact cores.

2**. Sample Quality:** Cuttings can be less representative of the in-situ rock properties and structures.

3. **Lower Precision:** Less precise for structural and lithological analysis compared to core drilling.

Day 10 Report Date:20.06.2024

Core Logging

Core logging is the process of examining and documenting the characteristics of rock cores extracted during drilling. Geologists record details such as lithology, mineral content, grain size, color, texture, and any structural features like fractures or faults. This information helps in understanding the geological history, assessing the suitability of the rock for construction, and evaluating the potential for mineral resources. Core logging is crucial for making informed decisions in mining, construction, and environmental studies

The process of core logging involves several key steps:

1. **Core Retrieval:** Rock cores are extracted from the drill hole and transported to a logging facility.

2**. Core Inspection:** The cores are cleaned and inspected for quality. Any damaged or broken sections are noted.

3. **Core Description:** Geologists describe the core by recording its lithology, mineralogy, color, texture, and any structural features like fractures, faults, or veins.

FIG. CORE LOGGING

4. **Photographing:** High-resolution photos of the cores are often taken to document their appearance and condition.

5. **Data Recording:** Detailed notes are made on core sheets or digital logs, including measurements and observations of core intervals.

6**. Analysis:** The data is analyzed to interpret geological formations, identify resource potential, and assess rock properties.

7**. Reporting:** A comprehensive core log report is prepared, summarizing the findings and providing insights for further exploration or construction planning.

This process provides valuable information about subsurface conditions and helps guide decision-making in various geological and engineering applications.

Bore Hole

A borehole is a narrow, cylindrical hole drilled into the ground to explore subsurface conditions or extract resources. Boreholes are used for various purposes, including:

1. **Geotechnical Investigation:** To obtain soil and rock samples for assessing foundation conditions, stability, and other engineering considerations.

2. **Resource Exploration:** To locate and assess mineral, oil, and gas deposits.

3. **Water Wells:** To access groundwater for drinking, irrigation, and industrial use.

4. **Environmental Monitoring:** To sample and analyze soil and groundwater for contamination and other environmental concerns.

Boreholes are drilled using various methods, such as rotary, percussion, or auger drilling, depending on the depth, geological conditions, and intended use. They are equipped with casing to prevent collapse and contamination, and often fitted with monitoring equipment for data collection.

Day 11 Report Date:21.06.2024

RQD, or **Rock Quality Designation**, is a measure used in drilling and geology to assess the quality of rock core samples. It is defined as the percentage of intact core pieces longer than 10 centimeters (4 inches) in a core sample. The RQD value provides an indication of the degree of jointing or fracturing in a rock mass and is calculated using the following formula:

RQD% = (Sum of lengths of core pieces ≥ 10 cm/ Total length of core run) * 100

RQD Classification

0-25%: Very poor quality rock

25-50%: Poor quality rock

50-75%: Fair quality rock

75-90%: Good quality rock

90-100%: Excellent quality rock

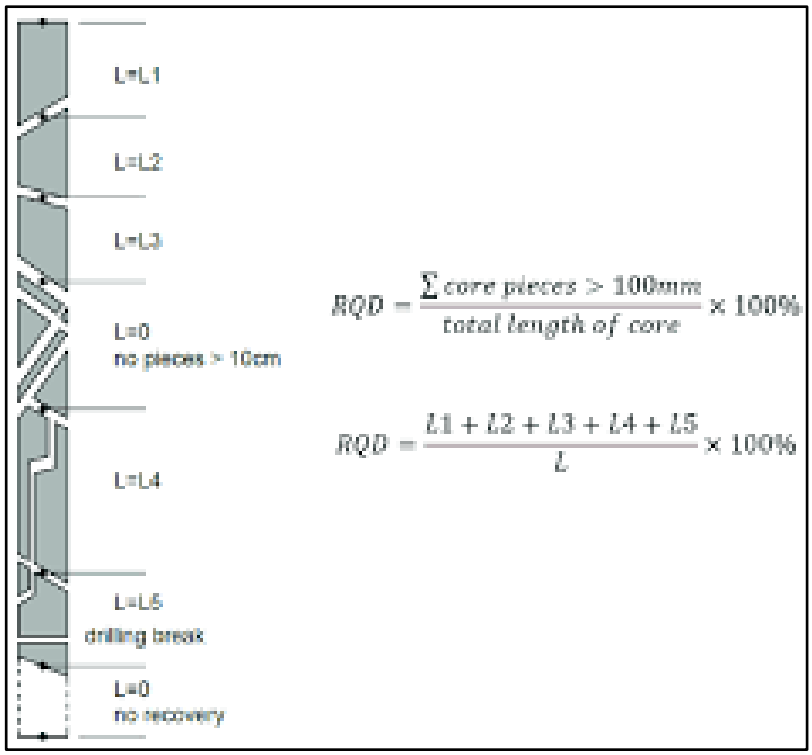


FIG. RQD

Graphical Logging:

Graphical logging, also known as geological graphic logging, lithologic logging, sedimentary logging, or stratigraphic logging, is a visual representation of rock units and sedimentary structures in a geological sequence. This tool is invaluable for geologists as it helps interpret the geological history of an area and identify potential resources.

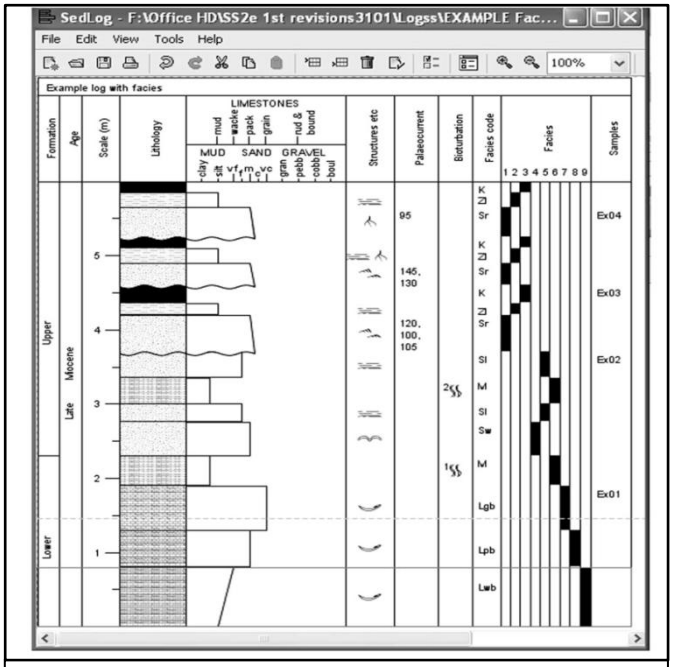


FIG. GRAPHICAL LOGGING

Day 12 Report Date:22.06.2024

ENVIRONMENTAL GEOLOGY

- **Environmental Geology –**

  The application of geology to environmental concerns.

  Environmental geology is the study of the interactions between humans and their geological environment, encompassing natural hazards, resource management, and pollution control.

- **Natural Hazards**

Natural hazards are geological processes that pose risks to humans and the environment.

Types include:

1. **Earthquakes :** Sudden ground shaking caused by the release of energy from the Earth's crust.

2. **Volcanic Eruptions:** The eruption of molten rock, ash, and gases from beneath the Earth's surface.

3. **Landslides:** The movement of rock, earth, or debris down a slope due to gravity.

4. **Floods:** Overflow of water onto normally dry land, often due to heavy rainfall or rapid snowmelt.

5. **Tsunamis:** Large sea waves triggered by underwater earthquakes or volcanic eruptions.

- **Resource Management**

Resource management involves the sustainable extraction and use of geological resources to meet current and future needs.

Types Include :-

1. **Mineral Resources:** Management of metal ores, industrial minerals, and construction materials.

2. **Energy Resources:** Sustainable use of fossil fuels (coal, oil, natural gas) and development of renewable energy sources (geothermal, hydroelectric, wind, solar).

3. **Water Resources:** Ensuring a sustainable supply of fresh water through aquifer management, desalination, and water recycling.

4. **Soil Management:** Practices to maintain soil health and fertility for agriculture and forestry.

- **Pollution Control**

Pollution control aims to reduce the impact of contaminants on the environment. Types include:

1. **Air Pollution:** Control of emissions from industries, vehicles, and other sources.

2. **Water Pollution:** Treatment of wastewater and prevention of industrial discharge into water bodies.

3. **Soil Contamination:** Remediation of polluted soils due to industrial spills, agricultural chemicals, and improper waste disposal.

4. **Waste Management:** Reduction, recycling, and proper disposal of solid and hazardous waste.

Environmental geology is crucial for mitigating natural hazards, managing resources sustainably, and controlling pollution to protect human health and the environment.

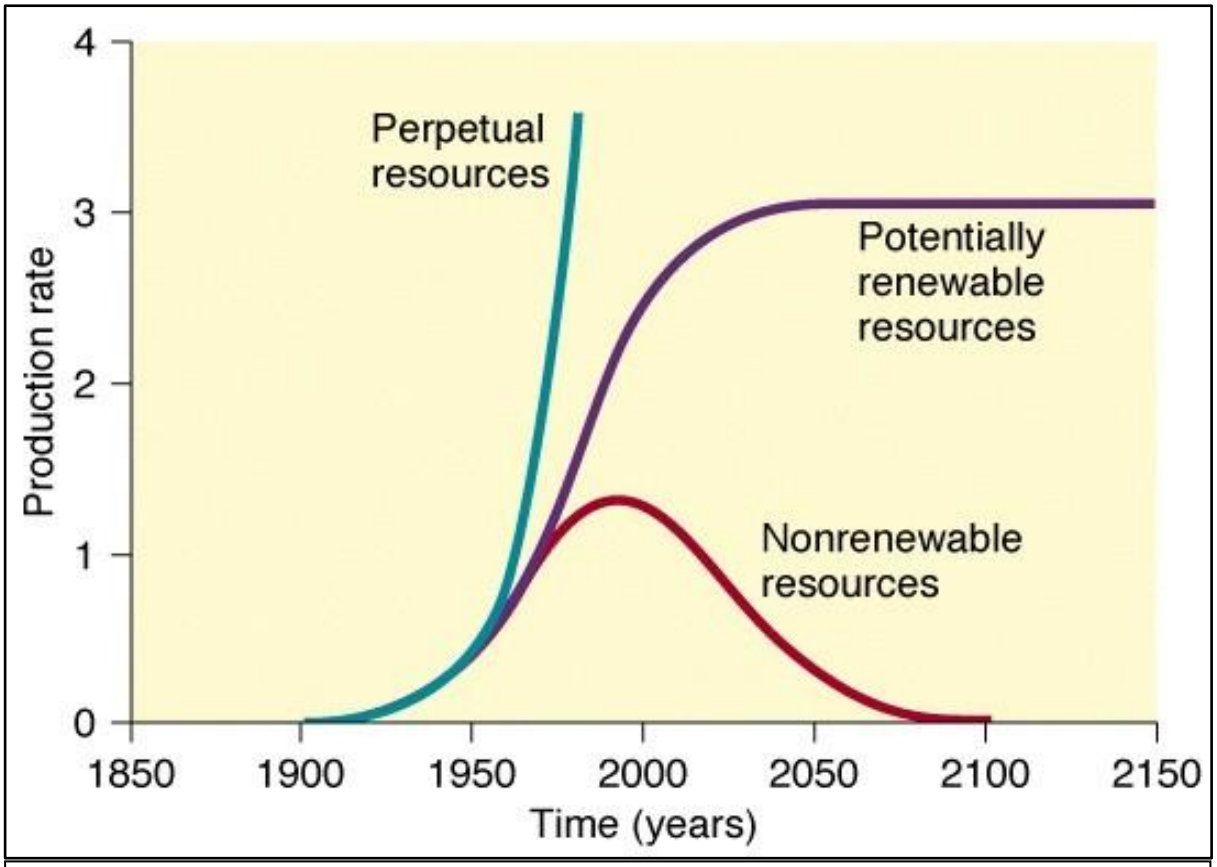


Fig.Non renewable resources are finite; renewable can sustain perpetual are unlimited.

- **<u>Concepts in Environmental Geology</u>**
    - Human activities generate waste – we do not throw anything away.
    - Human activities can alter the Earth System
        - Dam building
        - Urbanization
        - Agriculture
        - Deforestation
        - Waste
        - Natural resource extraction

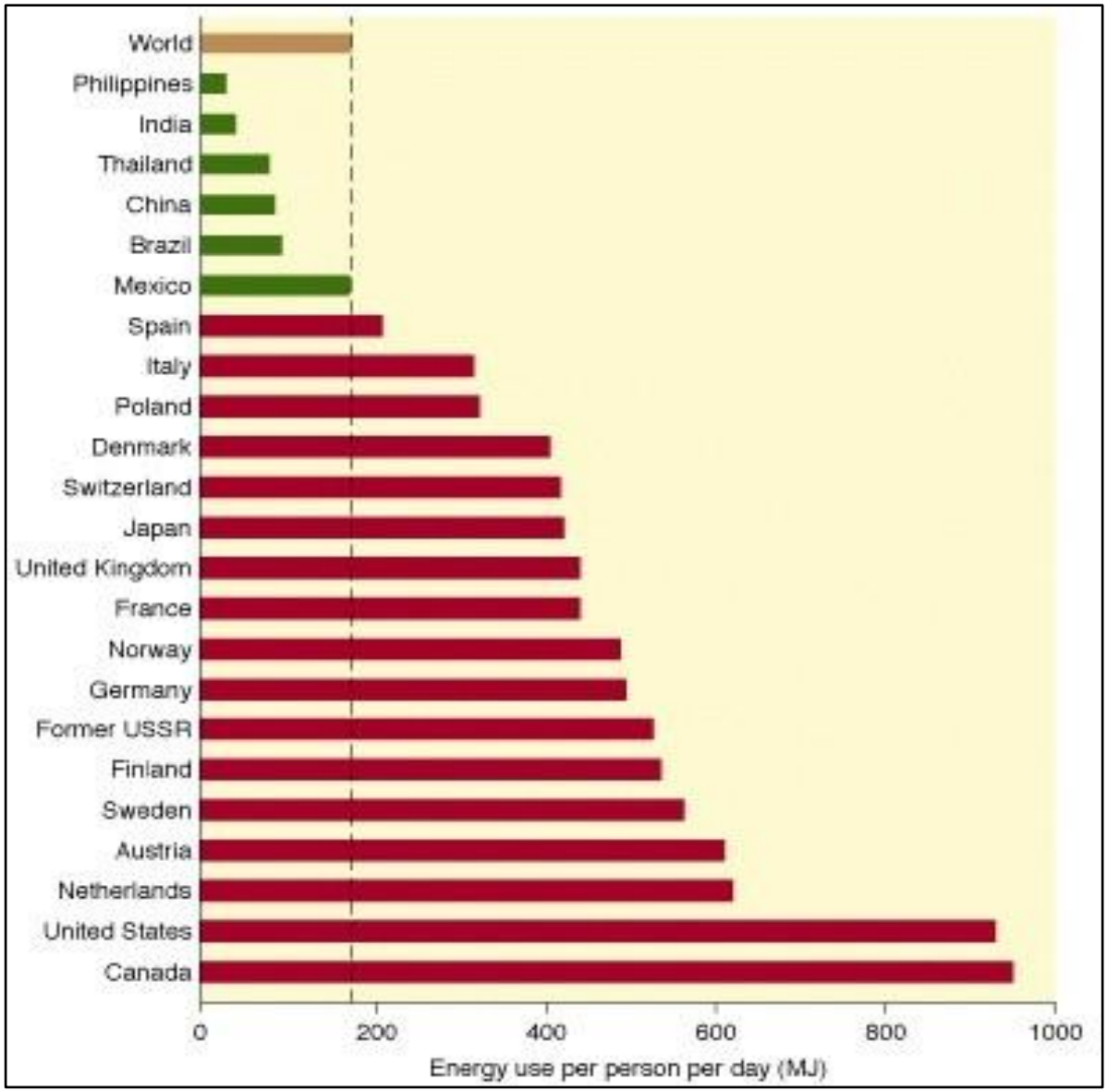


Fig. Worldwide Energy use per person per day

Day 13 Report Date:23.06.2024

Carbon sequestration refers to the capture and storage of atmospheric carbon dioxide, a crucial strategy for mitigating global climate change by reducing the concentration of CO2 in the atmosphere. The United States Geological Survey (USGS) is conducting comprehensive assessments of two primary carbon sequestration methods:

- **Carbon Sequestration Technique:**

Geological carbon sequestration involves capturing carbon dioxide (CO2) emissions from industrial sources and injecting them deep underground into rock formations for long-term storage. This technique aims to reduce the amount of CO2 released into the atmosphere, helping to mitigate climate change. Here's a brief overview of the process:

1. **Capture**: CO2 emissions are captured from industrial processes, such as power plants and factories.
2. **Transport:** The captured CO2 is transported, typically via pipelines, to the storage site.
3. **Injection:** The CO2 is injected into deep underground rock formations, such as depleted oil and gas fields or deep saline aquifers.
4. **Storage:** The CO2 is stored in these formations, where it is trapped by the surrounding rock and remains isolated from the atmosphere.

This method is considered a promising solution for reducing greenhouse gas emissions and combating global warming.

Biological Carbon Sequestration:

Biological carbon sequestration refers to the process of capturing and storing carbon dioxide (CO2) from the atmosphere through biological processes. Key mechanisms include:

1. **Photosynthesis:** Plants, algae, and phytoplankton absorb CO2 and convert it into organic carbon compounds, such as glucose and biomass.

2. **Carbon Storage in Soils:** Plants and microorganisms help build soil organic matter, which can store carbon for extended periods.

3. **Ocean Carbon Sink:** Phytoplankton and other marine organisms absorb CO2, which is then stored in ocean sediments and marine life.

While biological carbon sequestration occurs naturally, human activities can enhance it through various methods:

1.**Afforestation/Reforestation:** Planting new forests or restoring degraded ones.

2.**Sustainable Land Management:** Practices like Agroforestry, Permaculture, and regenerative agriculture.

3.**Ocean Fertilization:** Adding nutrients to stimulate phytoplankton growth.

4.**Bioenergy with Carbon Capture and Storage (BECCS):** Producing energy from biomass and capturing CO2 emissions.

Biological carbon sequestration is a vital tool for mitigating climate change, as it can remove CO2 from the atmosphere and store it in natural systems.

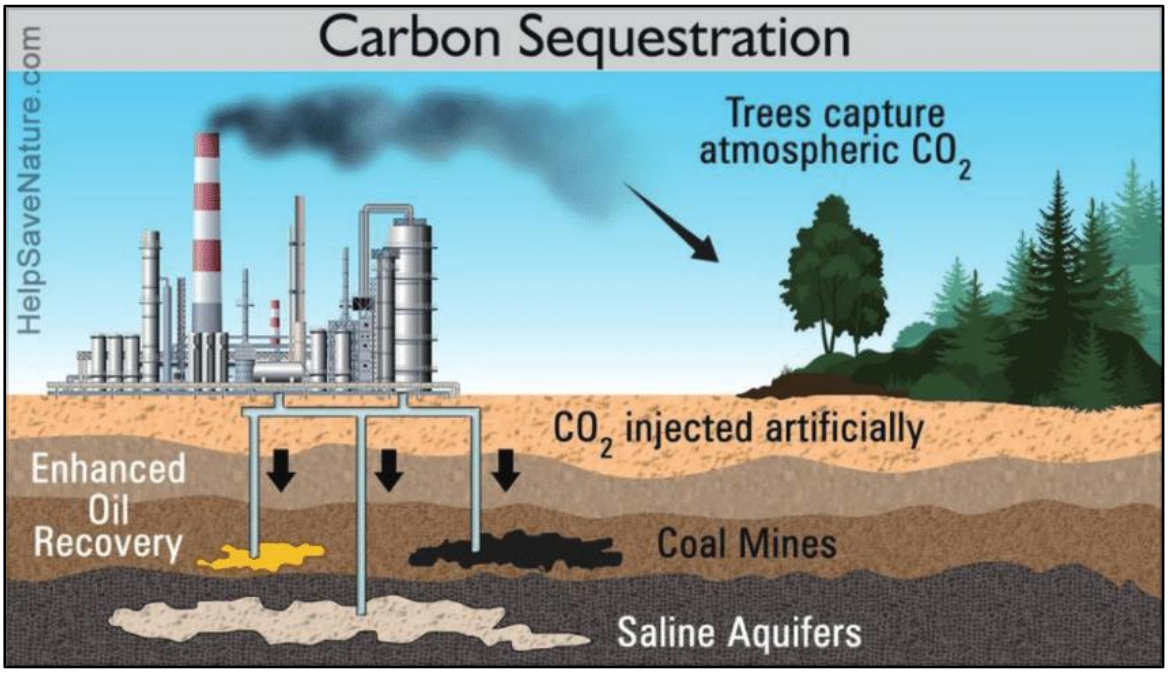


Fig. Carbon Sequestration

Day 14 Report Date:24.06.2024

Environmental Impact Assessment (EIA)

Environmental Impact Assessment (EIA) is a process used to evaluate the potential environmental effects of a proposed project or development. It aims to ensure that decision-makers consider environmental impacts before approving a project. Key steps in the EIA process include:

1.**Screening:** Determining whether a project requires an EIA.

2.**Scoping:** Identifying the key environmental issues and impacts to be assessed.

3.**Impact Analysis**: Assessing the potential positive and negative environmental effects of the project.

4.**Mitigation Measures:** Proposing actions to prevent, reduce, or offset adverse impacts.

5.**Reporting:** Preparing an Environmental Impact Statement (EIS) that documents the findings.

6.**Review and Decision:** Evaluating the EIS and making an informed decision on whether to proceed with the project.

7.**Monitoring and Compliance:** Ensuring that mitigation measures are implemented and monitoring the project's impact over time.

EIA is essential for promoting sustainable development by minimizing environmental damage and ensuring that projects are environmentally responsible.

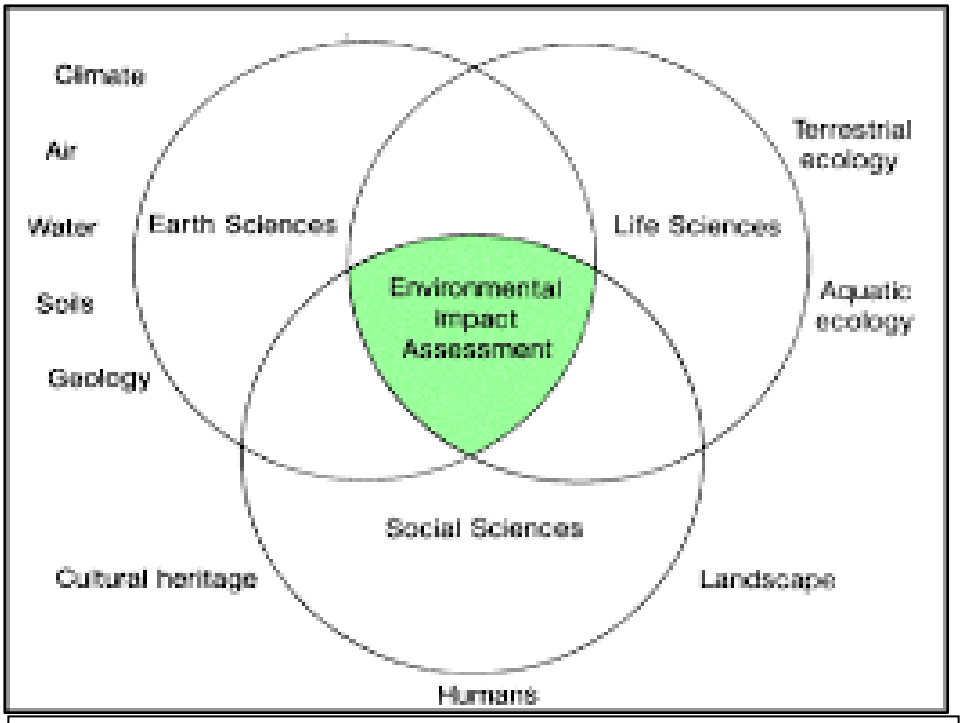


Fig. Environmental Impact Assessment (EIA)

Day 15 Report Date:26.06.2024

1.Lapis Lazuli:

Lapis lazuli is a metamorphic rock known for its intense blue color, which is mainly due to the presence of lazurite. It also contains pyrite and calcite inclusions, with a hardness ranging from 5 to 6 on the Mohs scale. Highly valued for its vibrant color and historical significance, lapis lazuli is commonly used in the production of Jewellery and ornamental objects.

FIG. LAPIS LAZULI

2.Malachite:

Malachite is a copper carbonate mineral distinguished by its characteristic banded pattern and vibrant green color. With a hardness of 3.5 to 4 on the Mohs scale, malachite is relatively soft. Its aesthetic appeal and durability make it a popular choice for Jewellery, decorative objects, and

FIG. MALACHITE

ornamental fixtures.

3.Cavansite:

FIG. CAVENSITE

Cavansite is a rare and exotic zeolite mineral characterized by its vibrant blue to green crystalline formations. It typically occurs in volcanic rocks and exhibits a hardness of 3 to 4 on the Mohs scale, indicating its moderate resistance to scratching and abrasion. Cavansite is highly prized by mineral collectors and connoisseurs due to its exceptional rarity and distinctive aesthetic appeal, making it a valuable addition to any mineral collection.

4.Thomsonite:

FIG. THOMSONITE

Thomsonite is a zeolite mineral characterized by its distinctive radiating crystal aggregates, typically exhibiting white, pink, or gray coloration. With a hardness ranging from 5 to 5.5 on the Mohs scale, thomsonite demonstrates moderate to high resistance to scratching and abrasion. This mineral is highly valued for its aesthetic appeal and rarity, making it a sought-after addition to mineral collections and a popular choice for decorative stone applications.

5.Hollandite:

FIG. HOLLANDITE

Hollandite is a rare and fascinating zeolite mineral species, distinguished by its unique crystallographic structure and typically associated with volcanic rock formations. Its distinctive properties and potential applications in geological and mineralogical research make it a subject of significant scientific interest and study. As a result, heulandite is a valuable mineral for advancing our understanding of zeolite mineralogy and its potential uses in various fields.

6.Rose Quartz

Rose quartz is a pink-colored quartz crystal, renowned for its exceptional beauty and durability. Its hardness of 7 on the Mohs scale makes it a robust mineral. The vitreous luster and hexagonal crystal structure add to its unique appeal. Beyond its aesthetic value, rose quartz is believed to possess metaphysical properties, including stress relief and emotional balance.

FIG. ROSE QUARTZ

INSTRUMENTS USED IN FIELD WORK

- **Clinometer Compass :** A clinometer can be used to measure heights of trees, poles, towers, and buildings. You can also use it to measure slopes for preliminary surveying, grade work, and site drainage. Vertical angles can be measured as well for engineering and surveying projects, satellite and microwave dish installation and more.

- **Brunton Compass**: A Brunton compass is a navigation instrument that combines a compass with a clinometer, allowing users to measure magnetic azimuths, determine slopes, and perform various navigational tasks. Users are primarily geologists, but archaeologists, environmental engineers, mining engineers and surveyors also make use of the Brunton's capabilities.

CONCLUSION

This internship offered an in-depth exploration of essential geological concepts, including gemology, hydrogeology, structural mapping, drilling techniques, environmental geology, and mineral identification. Through both fieldwork and laboratory experiences, we developed practical skills and gained a deeper understanding of geological processes.

In gemology, we learned to identify and classify gemstones by examining their physical and optical properties such as color, transparency, hardness, and crystallography.

In hydrogeology, we studied the movement and distribution of groundwater within aquifers, using various methods to evaluate its quantity, quality, and potential environmental impacts.

Structural mapping allowed us to investigate the geological forces that shape the Earth's crust, helping us interpret features like folds, faults, and fractures to understand rock deformation history.

Drilling techniques provided us with access to subsurface geological formations, enabling us to gather crucial data for resource exploration, environmental monitoring, and geological modeling.

In environmental geology, we explored the interactions between human activities and natural systems, focusing on sustainable resource management, environmental risk assessment, and mitigation strategies.

Finally, hands-on examination of mineral and rock specimens helped us refine our skills in identifying and characterizing geological materials based on their physical properties, including color, texture, mineral composition, and crystal structure.

Signature & Seal of Course Coordinator: _____

Signature & Seal of the Head of the Department: _____

Summer Internship (2024) under Curriculum and Credit Framework (CCF) of the

University of Calcutta

Mathematics MAJOR

SEMESTER II

Name (BLOCK LETTERS) **: Biplab Kanti Nath**

CU Roll Number **: 233012-21-0185**

CU Registration Number **: 012-1111-0859-23**

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SUMMER INTERNSHIP

ON

“Artificial Intelligence”

11th to 28th June 2024

ASUTOSH COLLEGE

92, S. P. MOOKERJEE ROAD

KOLKATA - 700026

Date: 01/07/2024 **Certificate No. WBACIPC202430**

TO WHOMSOVEVER IT MAY CONCERN

Certificate of Internship

This certificate is awarded to Biplab Kanti Nath, UG 1st year student of Asutosh College (CU), Kolkata (Department of Mathematics), in recognition of his outstanding contributions as a Technology Content Intern at U'vaa – the award winning sustainable social marketplace, from 11th June 2024 to 30th June 2024.

His dedication, creativity, and hard work have significantly enriched our technological content landscape. his keen eye for detail and passion for innovation have brought fresh perspectives to our projects, inspiring both colleagues and clients alike.

Throughout his internship, you have demonstrated exceptional skills in content creation using Artificial Intelligence, business acumen, technical knowledge, and collaboration. His ability to adapt to new challenges and willingness to learn have been invaluable assets to our team.

He was elected as one of the 5 leaders in the internship cohort of 36 people. His contributions have not only enhanced the quality of our technological content but have also played a vital role in advancing our mission to empower and inform our audience.

We wish him all the very best for future endeavours.

Yours sincerely,
For **U'vaa**

Abhishek Biswas
Founder – U'vaa

♦Acknowledgements♦

I am very thankful to **U'vva** for providing me with this opportunity. This internship has helped me enhance my professional skills and knowledge.

I also want to thank my **Asutosh College** for giving me this amazing opportunity to take this internship. Special thanks to our **Principle** who supported us to work on this internship. Now I am ready with academic and practical learnings to shape my career for the future.

Thank you.

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- Introduction
- Day 1 Report (date)
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- Day 12 Report (date)
- Day 13 Report (date)
- Day 14 Report (date)
- Day 15 Report (date)
- Conclusion

Course Content

Date	Content
11.06.24 (Tue)	1. Introduction to Artificial Intelligence 2. Importance of AI
12.06.24 (Wed)	1. Applications of AI 2. Introduction to AI Tools
13.06.24 (Thu)	1. Introduction to ChatGPT 2. Use of ChatGPT
14.06.24 (Fri)	**1.** MS AI CoPilot and related tools
15.06.24 (Sat)	1. Live Report Creation using AI
18.06.24 (Tue)	1. Text Content Creation (script generation) using AI
19.06.24 (Wed)	**1.** AI Video Preparation **2.** AI video editing (voice, subtitle etc) and Rendering
20.06.24 (Thu)	1. Learn MS word and Microsoft Excel with AI
21.06.24 (Fri)	**1.** Introduction to Bushiness Model
22.06.24 (Sat)	**1.** AI in Marketing
24.06.24 (Mon)	1. Introduction to Electric Vehicle 2. Work and Function
25.06.24 (Tue)	**1.** Web Development using AI
26.06.24 (Wed)	1. App design using AI
27.06.24 (Thu)	1. Business Research with web development and app development
28.06.24 (Fri)	1. Human Ideas and Artificial Intelligence 2. Future of AI

◆Introduction◆

During my internship in **U'vaa**, I delved into the dynamic intersection of artificial intelligence and multimedia content creation. Over the course of [duration], I gained hands-on experience in leveraging AI technologies to produce videos and design user interfaces. This immersive learning experience not only honed my technical skills in AI-driven video editing and UI design but also fostered collaborative skills through group projects focused on identifying and developing innovative business ideas. Additionally, I contributed to content creation by crafting scripts, thereby integrating AI into the creative process. This report encapsulates my journey of exploration and growth in harnessing AI for creative and practical applications, detailing the methodologies, challenges, and insights gained throughout the internship.

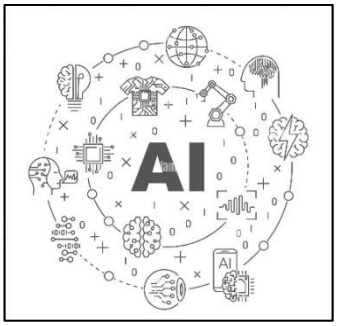
➢Day 1 report **Date: 11.06.2024**

1.Introduction to Artificial Intelligence (AI)

On the first day of our internship in Uvaa (a start-up company), our co-ordinator Abhishek Biswas introduced us to **Artificial Intelligence (AI).**

Here is the summary of the introduction

Artificial Intelligence (AI) refers to the simulation of human intelligence in machines designed to think and learn like humans. These systems use algorithms and computational models to process information, recognize patterns, make decisions, and solve problems. AI encompasses various subfields, including machine learning, where systems improve through experience, and neural networks, inspired by the human brain's structure. Its applications range from virtual assistants like Siri and Alexa to complex tasks such as medical diagnosis, autonomous vehicles, and predictive analytics. AI is transforming industries, driving innovation, and raising important ethical considerations about its impact on society.



2.Importance of AI

On the first day he also told us the importance of AI.

Here's a concise summary of the importance of AI:

1. **Innovation**: Drives new capabilities and efficiencies across industries.
2. **Efficiency**: Automates tasks, enhances decision-making, and saves costs.
3. **Problem-solving**: Analyses data for insights and improves decision-making.
4. **Personalization**: Tailors services and products to individual needs.
5. **Automation**: Powers autonomous systems for safer and more efficient operations.
6. **Economic Growth**: Creates jobs, enhances competitiveness, and fosters new markets.
7. **Ethical Considerations**: Ensures responsible development and equitable benefits.

These aspects underline AI's role in advancing technology, business practices, and societal impact.

➢Day 2 report Date:12.06.2024

1.Applications of AI

On the second day of our internship, we learnt about the Applications of AI.

Here are concise examples of AI applications:

1. **Healthcare**:
    - **Medical Imaging Analysis**: AI aids in diagnosing medical images like MRIs.
    - **Drug Discovery**: AI predicts and tests potential drug candidates.
    - **Personalized Medicine**: AI recommends personalized treatment plans.
2. **Finance**:
    - **Fraud Detection**: AI detects patterns indicating fraudulent transactions.
    - **Algorithmic Trading**: AI makes rapid trading decisions based on market data.
    - **Credit Scoring**: AI assesses credit risk using financial and behavioural data.
3. **Retail**:
    - **Recommendation Systems**: AI suggests products based on customer preferences.
    - **Inventory Management**: AI optimizes inventory levels to minimize costs.
    - **Customer Service**: AI-powered chatbots handle customer inquiries and issues.
4. **Transportation**:
    - **Autonomous Vehicles**: AI enables self-driving cars by processing sensory data.
    - **Route Optimization**: AI optimizes transportation routes for efficiency.
    - **Traffic Management**: AI adjusts signals based on real-time traffic data.
5. **Education**:
    - **Personalized Learning**: AI adapts educational content to student needs.
    - **Student Assessment**: AI analyses performance and provides feedback.
    - **Administrative Support**: AI automates tasks like scheduling and grading.
6. **Marketing and Advertising**:
    - **Targeted Advertising**: AI delivers personalized ads based on user data.
    - **Customer Segmentation**: AI identifies customer groups for targeted campaigns.
    - **Content Generation**: AI creates and optimizes marketing content based on engagement data.

2. Introduction to AI tools

On this day our co-ordinator introduced us to various AI tools like ChatGPT, Veed, Invideo, Uizard, Galileo etc and told us their uses and how to use them. AI tools and frameworks play a vital role in enabling developers and researchers to build sophisticated AI applications and models

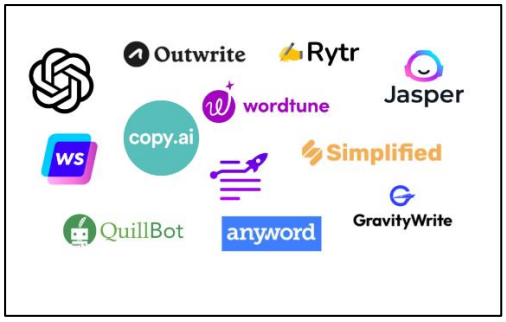


Fig. AI tools

➢Day 3 report Date:13.06.202

1. Introduction to ChatGPT

On the third day we learnt about ChatGPT and its uses.

Here's a concise introduction to ChatGPT:

ChatGPT is an advanced AI language model developed by OpenAI. It uses the Generative Pre-trained Transformer (GPT) architecture, specifically GPT-3.5, to understand and generate human-like text based on the input it receives. ChatGPT can engage in conversations, answer questions, provide information, and assist with various tasks by leveraging its vast knowledge base and natural language processing capabilities. It is trained on a diverse range of internet text, allowing it to adapt to different contexts and provide nuanced responses. ChatGPT represents a significant advancement in AI technology, making it a powerful tool for communication, learning, and information retrieval.

Fig. ChatGPT

2. Uses of ChatGPT

Here are some of the key uses of ChatGPT:

1. **Conversational AI**: ChatGPT can engage in natural and meaningful conversations with users, providing information, answering questions, and simulating human-like interactions.
2. **Customer Support**: It can handle customer inquiries and support tickets, providing instant responses and assisting with common queries, thereby improving customer service efficiency.
3. **Personal Assistants**: ChatGPT can act as a virtual assistant, helping users with tasks such as scheduling appointments, setting reminders, and providing relevant information based on user preferences.
4. **Education**: It serves as a learning companion by explaining concepts, answering academic questions, and providing educational resources tailored to individual needs.
5. **Content Generation**: ChatGPT can generate text for various purposes, including writing articles, summaries, product descriptions, and creative storytelling.
6. **Creative Writing and Ideation**: It helps in brainstorming ideas, generating creative content, and assisting writers with drafting texts such as scripts, poetry, and marketing copy.

And there are many more uses of ChatGPT. These applications demonstrate how ChatGPT can be leveraged across different domains to enhance productivity, communication, and creativity through its advanced language understanding and generation capabilities.

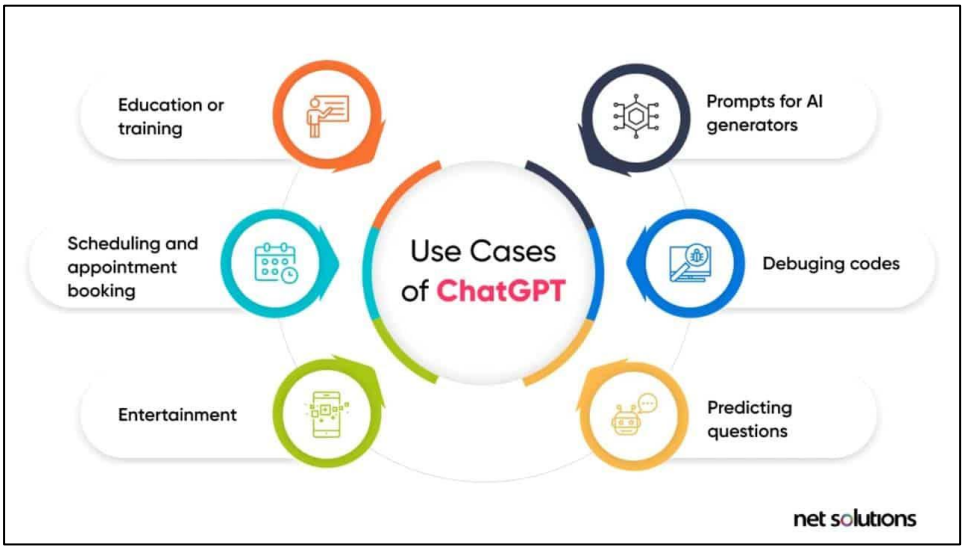


Fig. Uses of ChatGPT

➢Day 4 report **Date:14.06.2024**

☼MS AI Co-pilot and related tools

Microsoft AI Co-pilot, also known as Co-pilot for short, is an advanced AI tool developed by Microsoft that enhances productivity and collaboration in various tasks across Microsoft 365 applications. Here are some key points about MS AI Co-pilot and related tools:

1. **Integration**: MS AI Co-pilot is integrated into Microsoft Office applications such as Word, Excel, and PowerPoint, as well as Teams and other collaboration tools. It uses AI to assist users with tasks like drafting documents, analysing data, creating presentations, and facilitating teamwork.
2. **Natural Language Processing**: It leverages natural language processing (NLP) capabilities to understand and respond to user queries and commands in a conversational manner. This makes it easier for users to interact with complex data and tasks.
3. **Automation and Suggestions**: AI Co-pilot automates routine tasks and provides intelligent suggestions to streamline workflows. For example, it can automate formatting in documents, suggest insights from data analysis, or recommend content for presentations based on user input.
4. **Collaborative Features**: It promotes collaboration by enabling real-time co-authoring, sharing insights across teams, and facilitating seamless communication through integrated tools like Microsoft Teams.
5. **Security and Privacy**: Microsoft emphasizes security and privacy in the use of AI Co-pilot, ensuring that data handling and processing adhere to stringent privacy standards and organizational policies.
6. **Customization and Integration**: Users can customize AI Co-pilot to suit specific organizational needs and integrate it with other Microsoft services and third-party applications through APIs and connectors.

By these tools we can reduce the time duration and complete our tasks before time. Overall, Microsoft AI Co-pilot enhances efficiency and productivity by harnessing AI to assist users in creating, analysing, and sharing content within the Microsoft ecosystem.

➢Day 5 report **Date:15.06.2024**

☼Live report creation using AI

Live Report Creation using AI involves using artificial intelligence to generate reports in real-time, often from complex datasets or streams of data.

Report can be created automatically by AI tools. Automated reporting is the process of generating regular reports with minimal manual effort. ChatGPT, developed by OpenAI, can play a crucial role in creating automated reports and streamlining data communication.

How to use ChatGPT to Automate report creating:

- **Identify the data of the report.**
- **Choose the format in which we want to generate the report.**
- **Write a prompt for ChatGPT that includes the data.**
- **Submit the prompt to ChatGPT.**
- **ChatGPT will generate a report based on the prompt.**

Also there are several other report creating AI is available in the internet like

Here are some AI tools for creating live reports:

1. **Piktochart AI**: Converts data into visually appealing reports quickly, supporting formats like PDF and DOCX (Piktochart).
2. **ClickUp AI**: Includes ClickUp Brain for generating reports, summarizing articles, and managing tasks (ClickUp).
3. **Venngage DesignAI**: Automates the design of presentations and reports with various templates and customization options (Venngage).
4. **SlideModel.AI**: Suggests content structure and generates initial content for presentations and reports, exportable to PowerPoint or Google Slides (Venngage).
5. **Synthesia**: Offers AI voice generation for creating audio-visual reports in multiple languages and accents (TechRadar).

Overall, Live Report Creation using AI empowers organizations to leverage data-driven insights swiftly and efficiently, enabling informed decision-making and enhancing operational agility in dynamic business environments

➢Day 6 report **Date:18.06.2024**

☼ Text Content Creation (script generation) using AI

On the 6th day of our internship, we learnt about another application of AI i.e. Script generation using AI.

We know that AI is making waves in the content marketing space. From AI writing tools to AI art. ChatGPT has immense use in many different areas, but for content creators, it can be an indispensable asset.

The steps to make script using ChatGPT are:

Step 1: Open ChatGPT and sign up with your email-id.

Step 2: Write the specific prompt in which topic you want the script.

Step 3: Then send it to ChatGPT and wait until ChatGPT gives you the complete script.

Here are the scripts that I made for You tube shorts of 1 min on the topic **Cubes and Cube Roots**

Basic Concept Script:

Imagine a perfect cube, with each side perfectly equal in length. This shape is not only visually appealing, but it also holds a special mathematical significance.

In mathematics, a cube is a three-dimensional shape with six equal square faces. When we talk about the cube of a number, we are referring to raising that number to the power of 3. For example, the cube of 2 is 2 x 2 x 2, which equals 8.

But what about cube roots? The cube root of a number is the value that, when multiplied by itself three times, gives you the original number. For example, the cube root of 8 is 2, because 2 x 2 x 2 equals 8.

Cubes and cube roots are not just abstract concepts in mathematics. They have practical applications in real life, such as in engineering, architecture, and even in nature.

So next time you see a cube, whether it's a building block or a piece of art, remember the beauty and significance of cubes and cube roots in the world of mathematics.

Problem Script

"Hello and welcome to today's maths problem session! Today, we will be exploring the topic of cubes and cube roots.

Let's start with a simple problem: What is the cube of 5? To find the cube of a number, we simply multiply the number by itself three times. So, the cube of 5 is 5 x 5 x 5, which equals 125.

Now, let's move on to cube roots. What is the cube root of 64? The cube root of a number is the number that, when multiplied by itself three times, equals the original number. So, the cube root of 64 is the number that, when multiplied by itself three times, equals 64. In this case, the cube root of 64 is 4, because 4 x 4 x 4 equals 64.

Now, let's try a more challenging problem: What is the cube root of 729? Take a moment to think about it. The cube root of 729 is the number that, when multiplied by itself three times, equals 729. In this case, the cube root of 729 is 9, because 9 x 9 x 9 equals 729.

I hope you enjoyed today's maths problem session on cubes and cube roots. Remember, practice makes perfect, so keep practicing and exploring the world of mathematics. Thank you for joining us today, and we'll see you next time!"

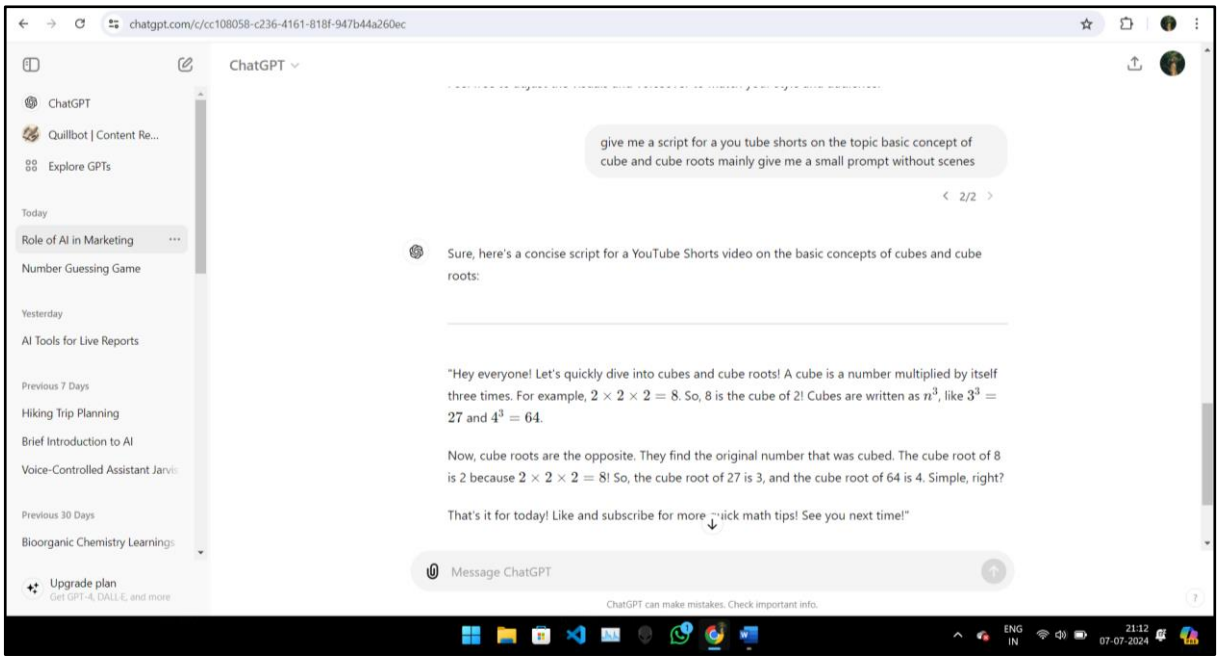


Fig: Script generation using ChatGPT

➢Day 7 report **Date:19.06.2024**

1.AI video preparation

AI is also capable of producing videos quickly and easily. First, we must prepare the text or script for the necessary video. The text content will come from either self-generated content, Google, ChatGPT, or other generative AI. Next, using video generative AI technologies such as VideoGPT by VEED / VEED.io, invideo.io or other tools, we have to enter the text as a prompt.

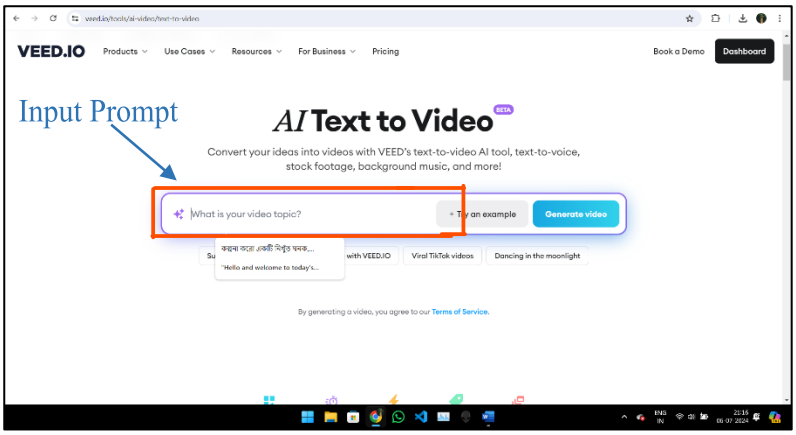


Fig. VEED AI

2. AI video editing (voice, subtitle etc) and Rendering

We can also edit the generated video. We can edit the images, voice, subtitles, music etc. We just have to signup with our email-id to edit and after that we can export the video. After rendering we can download the video.

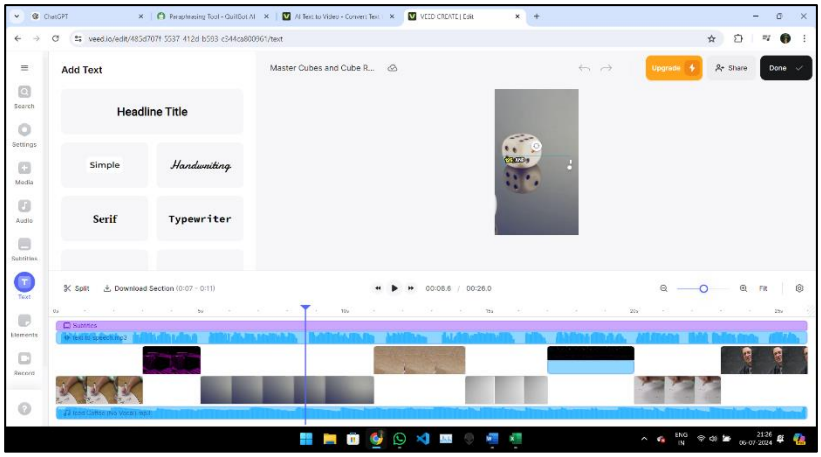


Fig. Video editing in VEED AI

After creating these scripts, we created videos using Veed AI. The video links are given below:

Basic Concept:

https://drive.google.com/file/d/1xI80hJ4S19uI36XFO0FMq316y2pm9q7/view?usp=drivesdk

Problem-Script:

https://drive.google.com/file/d/127zMzSWyEFJR5ItNeMgqJjyhoRVhXQum/view?usp=drivesdk

➢Day 8 report **Date:20.06.2024**

☼ Learn MS word and Microsoft Excel with AI

♦**Microsoft Word and Microsoft Excel using GPT:** Excel can now perform tasks that were previously thought to be impossible thanks to AI. With MS Excel or Google Sheets, GPT can be used to assist with formula development, chart exploration, and various other tasks. And with MS word or Google Docs, GPT can translate paragraphs, change styles etc very easily.

Steps to Integrate Excel and ChatGPT:

♦Navigate to the 'Home' table

♦Click on 'Get Add-Ins' in the Add-ins section

♦Type 'GPT for Excel Word' in the search bar available on top Side of the newly opened dialogue box

♦Choose the appropriate add-in according for you to operate in Excel and Word.

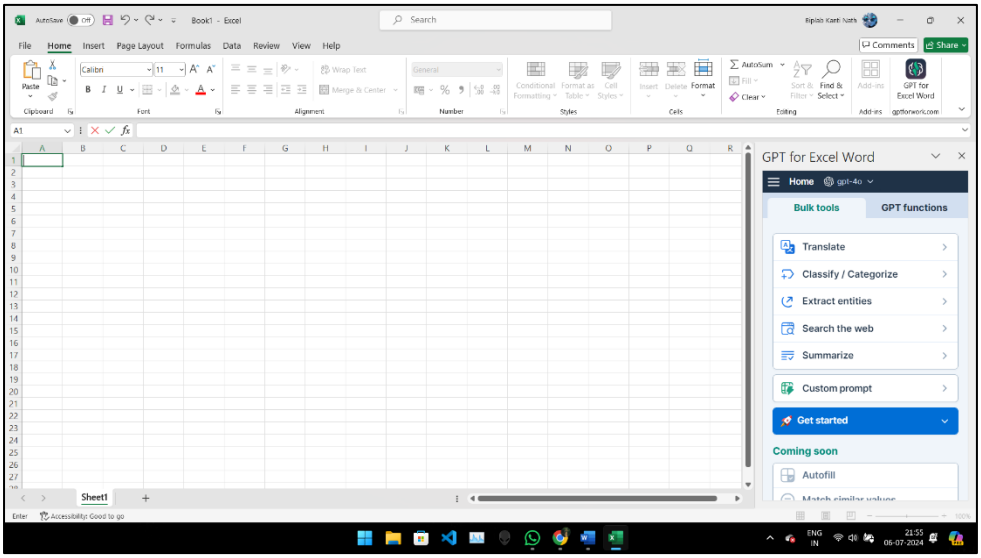


Fig. GPT in MS Excel

➢Day 9 report **Date:21.06.2024**

☼Introduction to Business Model

We also created some business models as our group task. We are separated in groups each consists of four members. Together we created a business model on a social problem which can be solved by an mobile application.

We made a business model to connect the social workers and NGOs with the needy peoples.

Problem that needs to be solved: Social workers and NGOs play a vital role in advancing public and social welfare in society. Addressing global issues like hunger, environmental conservation, healthcare, and education requires cooperation between government entities, non-governmental organizations, social workers, and volunteers. However, a lack of information, knowledge, andconnections often hinders NGOs and social workers from promptly reaching those in need, particularly in large countries such as India. Some social workersface challenges in finding empty land for tree planting initiatives, while certainNGOs provide free medical services but struggle due to limited awareness and support, leading to impoverished individuals tragically passing away without essential treatment. highlighting the importance of easy public access to NGOsand social workers.

We are introducing our social media platform

Business Model

1. Platform Concept:

- Create a social media platform where individuals can post about social and environmental problems they encounter, categorizing them by type (e.g., hunger, medical issues).

- Users can pinpoint the location of these issues, adding specificity to the posts.

2. Audience and Users:

- General Public: People who want to report issues or seek help for others in their community.

- NGOs and Social Workers: Organizations and individuals who can provide aid and support to those in need. Social workers/NGOs/ volunteer’s public social media platform

- Volunteers: Individuals looking to contribute their time and effort towards social causes.

3. Monetization Strategy:

- Advertising Revenue: Partner with companies that sell environmentally friendly products or products related to social welfare. These companies can advertise their products on your platform.

- Sponsorships: Seek sponsorships from organizations aligned with your platform's mission, such as corporate social responsibility (CSR) initiatives.

- Premium Features: Offer premium features to NGOs and social workers for enhanced visibility or access to advanced tools.

4. Key Features:

- Issue Reporting: Easy-to-use interface for users to report problems and specify their location.

- NGO and Volunteer Matching: Algorithms or filters to match NGOs and volunteers with relevant issues based on location and type.

- Verification and Validation: Implement systems to verify and validate the authenticity of posts to maintain credibility.

- Community Engagement: Tools for users, NGOs, and volunteers to interact and coordinate efforts.

5. **Revenue Streams:**

- Pay-per-Click (PPC) Ads: Charge advertisers based on the number of clicks their ads receive.

- Display Ads: Sell ad space on your platform for a fixed period or impression basis.

- Commission on Sales: Negotiate commissions with advertisers for sales generated through your platform (e.g., affiliate marketing with product links).

- Premium Membership bought by NGOs and social workers

6. Market Strategy:

- Target Audience: Initially focus on communities where social and environmental issues are prevalent and where NGOs and volunteers are actively involved.

- Partnerships: Collaborate with NGOs, local governments, and community organizations to increase platform adoption and credibility.

- User Acquisition: Use digital marketing, social media campaigns, and community outreach to attract users and build a strong user base.

7. Impact Measurement:

- Metrics: Track metrics such as number of issues reported, number of successful interventions, and user engagement to measure platform effectiveness.

- Feedback Loop: Implement feedback mechanisms to continuously improve the platform based on user and stakeholder input.

By effectively addressing social and environmental challenges through technology and community collaboration, your platform can potentially create significant positive impact while also generating sustainable revenue through strategic partnerships and advertising.

➢Day 10 report **Date:22.06.2024**

☼AI in Marketing

AI plays a significant role in marketing by enhancing efficiency, personalization, and data-driven decision-making. Here are some key areas where AI is impacting marketing:

1. **Personalization**: AI algorithms analyse customer data to create personalized experiences. This can include product recommendations, tailored content, and personalized email campaigns, enhancing customer engagement and satisfaction.
2. **Customer Insights**: AI analyses large volumes of data to identify patterns and trends. This helps marketers understand customer behaviour, preferences, and needs, enabling more effective targeting and segmentation.
3. **Automation**: AI-powered tools automate repetitive marketing tasks such as email marketing, social media posting, and ad placement. This increases efficiency, reduces human error, and allows marketers to focus on strategy and creativity.
4. **Predictive Analytics**: AI uses historical data to predict future customer behaviour, such as purchasing patterns or churn risk. This helps in optimizing marketing strategies and improving ROI.
5. **Content Creation**: AI can generate content, such as social media posts, product descriptions, and even news articles. This speeds up the content creation process and ensures consistency in brand messaging.
6. **Customer Service**: AI-powered chatbots and virtual assistants provide instant customer support, answering queries, and resolving issues. This improves customer satisfaction and reduces the workload on human agents.
7. **Ad Optimization**: AI optimizes digital ad campaigns by adjusting bids, targeting, and creatives in real-time based on performance data. This maximizes the effectiveness of ad spend and improves conversion rates.
8. **Sentiment Analysis**: AI analyses social media and online reviews to gauge customer sentiment towards a brand or product. This helps marketers respond quickly to negative feedback and capitalize on positive trends.
9. **Sales Forecasting**: AI models predict future sales based on various factors like market trends, historical sales data, and economic indicators. This helps businesses in planning inventory, budgeting, and setting sales targets.

Overall, AI in marketing leads to more informed decisions, improved customer experiences, and greater efficiency, ultimately driving business growth.

➢Day 11 report **Date:24.06.2024**

1.Introduction to Electric Vehicles

Electric Vehicle (EV) refers to those automobiles which are powered by electric motors instead of an internal combustion engine. They are powered by energy stored in rechargeable batteries, which can be recharged using common household outlets or specialized charging stations. Unlike internal combustion engine vehicles which emit pollutants and greenhouse gas, electric cars are tailpipe emissions free. They are also energy efficient and often cost less to operate than traditional gasoline-powered vehicles. As technology has improved and the environmental movement gained traction, EVs have increasingly appealed to consumers who view them as part of a larger shift towards sustainable transport.

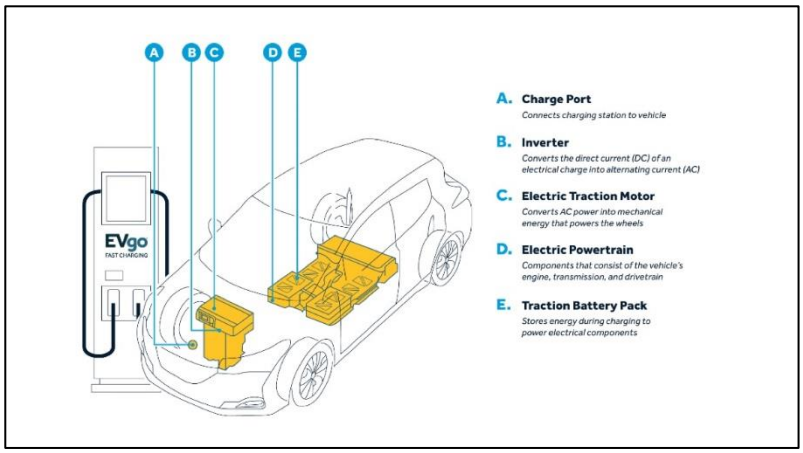


Fig: Working function of an Electric Car

2. Work and Function

Here are some Work and Function of an Electric Car

1. **Charging Port**: Connects to external power sources for recharging the battery.
2. **Inverter**: Converts DC power from the battery into AC power for the electric motor.
3. **Electric Motor**: Drives the vehicle using electrical energy, providing instant torque and smooth acceleration.
4. **Electric Powertrain**: Transfers energy from the motor to the wheels efficiently.
5. **Traction Battery Pack**: Stores electrical energy for powering the vehicle, typically using lithium-ion cells.

These components enable electric vehicles to operate with zero tailpipe emissions, lower operating costs, and reduced environmental impact compared to traditional gasoline-powered vehicles.

➢Day 12 report **Date:25.06.2024**

☼Web Development using AI

To design webpages using AI, you can follow these steps and utilize these AI tools:

1. **Layout and Design Generation**: AI tools like Adobe Sensei, Sketch, or Canva's Design Tools offer features for generating initial design layouts based on user preferences, trends, and best practices.
2. **Content Creation and Optimization**: Use AI-powered tools such as Copy.ai or Write sonic to generate compelling copy, headlines, and SEO-optimized content for your webpages.
3. **Personalization**: Implement AI-driven personalization tools like Dynamic Yield or Preconise to customize content and user experiences based on visitor behaviour, demographics, and preferences.
4. **Testing and Optimization**: AI tools such as Optimizely or Google Optimize use machine learning to conduct A/B testing and optimize webpage elements like layout, colours, and call-to-action buttons for better conversion rates.
5. **Analytics and Insights**: Utilize AI-powered analytics platforms like Google Analytics or Mix panel, which use machine learning algorithms to provide insights into user behaviour, traffic patterns, and engagement metrics to optimize your webpage design and content strategy.

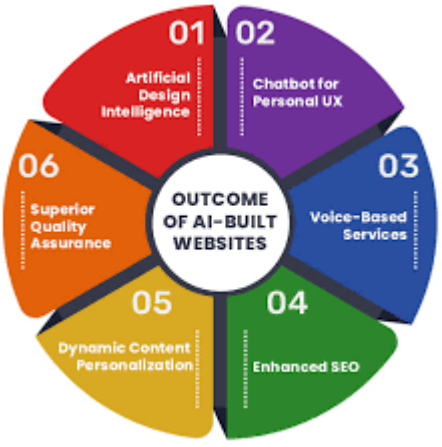


Fig: Benefits of using AI in Web Development

By integrating these AI tools into your web development process, you can automate design tasks, improve user engagement, and optimize webpage performance effectively.

➢Day 13 report **Date:26.06.2024**

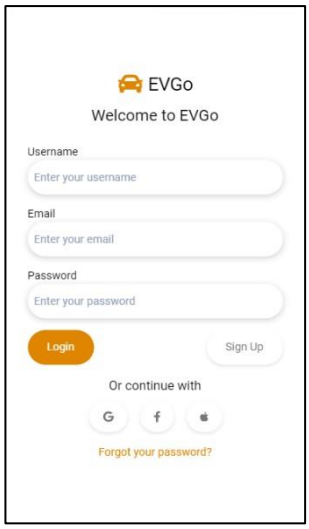
☼ App design using AI

App UI design is now easier than the normal method by using AI. AI, which analyses user behaviour to develop personalised adaptive interfaces can exceptionally contribute in designing improved app UI. layout generation and component suggestions, making the design process much faster with high efficiency. By generating heatmaps and predictive analysis, AI-driven tools give designers insights about usability to make the user experience better. It also provides sophisticated interaction like voice and gesture recognition that makes your UI accessible or engaging for users. Using AI as a medium, designers can produce interface systems which are beautiful and at the same time responsive to user behaviour and needs while staying versatile enough for every individual preference. This leads to an unprecedented level of satisfaction from users in general due higher levels of engagement with dynamic usability preferences.

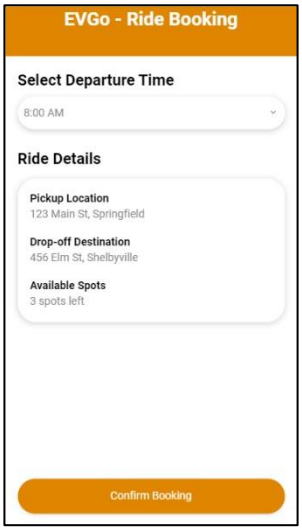
Some well-known AI used for app UI design are: uizard.io, usegalileo.ai, visily.ai

During our internship we created an Ev ride booking app UI design using these tools. Using these tools are very easy, you just have to input the specification you want in your app or upload the screenshots of your designs, and AI will make your app design within a minute, and you can also customize the designs according to your need.

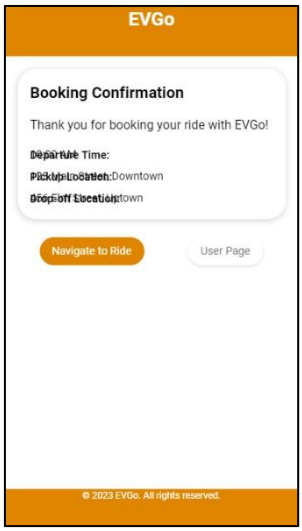
0These are the designs that I made using uizard.io :



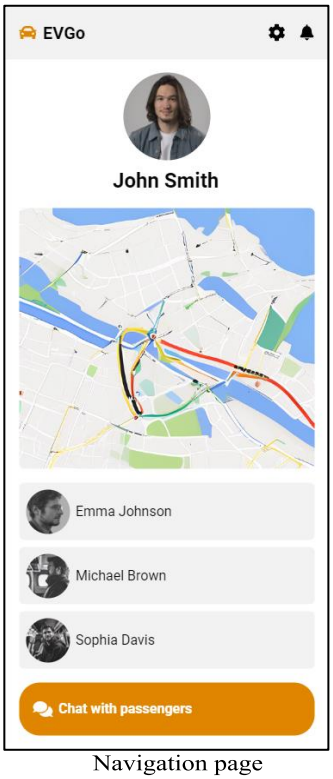
Sign up/login page



Ride booking



Booking confirmation



Navigation page

➢Day 14 report **Date:27.06.2024**

☼ Business Research with web development and app development

1. Identify Your Target Audience:

- Define the demographics and psychographics of your potential users.
- Conduct surveys, focus groups, and interviews to understand their needs and preferences.

2. Analyse Competitors:

- Identify existing apps similar to your idea.
- Analyse their strengths, weaknesses, user reviews, and ratings.
- Determine their market positioning and pricing strategies.

3. User Experience (UX) Research:

- Conduct usability testing and gather feedback on prototypes.
- Use tools like wireframes and mockups to visualize the app's interface and features.

4. Development Cost Estimation:

- Estimate the cost of development, including design, development, testing, and maintenance.
- Obtain quotes from app development companies or freelance developers.

5. Revenue Models:

- Decide on a revenue model (e.g., freemium, subscription, ads, in-app purchases).
- Estimate potential revenue based on market size and pricing strategy.

6. Funding and Budgeting:

- Determine the funding required for development, marketing, and operations.
- Explore funding options like bootstrapping, venture capital, or crowdfunding.

7. Intellectual Property:

- Protect your app idea with trademarks, copyrights, or patents if necessary.

8. User Feedback:

- Continuously collect user feedback and reviews.
- Implement updates and improvements based on user input.

9. Performance Metrics:

- Monitor key performance indicators (KPIs) such as user engagement, retention rate, and revenue.
- Use data analytics to make informed decisions and optimize the app.

➢Day 15 report **Date:28.06.2024**

1. Human ideas and Artificial Intelligence

Over the next decade, as artificial intelligence (AI) becomes increasingly pervasive, most people believe that it would give way to humans leading better lives; however, a lot of them are anxious about how AI will influence what it means to be human. When do we want it on our team and when does more AI mean less control, choice or freedom for us? They talked about it in terms of the unlimited potential - that computers might soon be more powerful and intelligent than human beings at things like making complex decisions, reasoning, learning and analytics/pattern recognition across a range disparate data type including fine grain details with larger pattern matches from exceptional signal to noise ratios; visual acuity (contextual reality), speech input/transcription/output/translation.

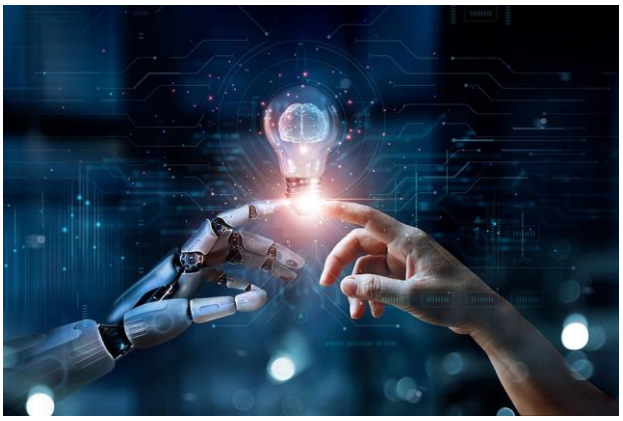


Fig: Human ideas with Artificial Intelligence

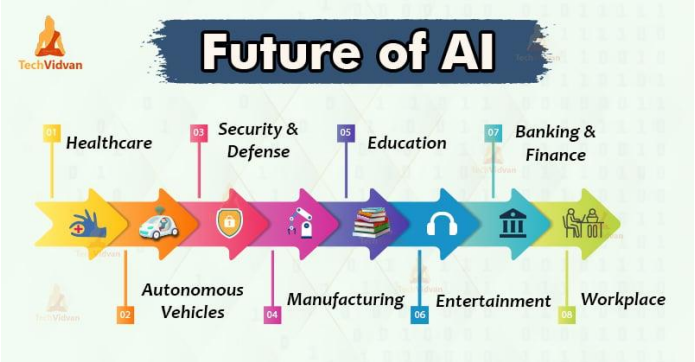


Fig: Future of AI

2.Future of AI

AI is the way of future prospects in all the fields. Key areas of impact include:

Healthcare: Better diagnostics powered by apps, personalized medicine & robotic surgeries.

Mobility: Autonomous cars and traffic regulation.

Finance: Advanced fraud detection and personalized financial advice.

Use-Case: Education, it includes personalized learning and automates the administrative tasks.

Customer Service: AI-driven Chat Bots and Virtual Assistant

Environment: Climate modelling, sustainable resource management.

So, AI will persist to enhance gradually and bring innovation and efficiency across various verticals as well, reminding us (obviously) it also requests for ethical concerns.

➢CONCLUSION

This internship at U'vaa has been a wonderful and fulfilling experience. I can say that working at U'vaa has taught me a lot of valuable lessons. It goes without saying that my work has certain technical flaws and might be rectified given adequate time. as a person with no prior AI experience. Whatever the case, I think the time I invested in learning about it and conducting research was worthwhile because it helped me identify a workable approach for creating a real-time program that works flawlessly. I've discovered the value of having good time management abilities, being self-motivated, and having the capacity to pick up new talents.

SIGNATURE & SEAL OF COURSE COORDINATOR: _____

SIGNATURE & SEAL OF THE HEAD OF THE DEPARTMENT: _____

Summer Internship (2024) under Curriculum and Credit Framework (CCF) of the

University of Calcutta

ELECTRONICS MAJOR

SEMESTER II

Name (BLOCK LETTERS) : **SUMAN DAS**

CU Roll Number : **233012-21-0121**

CU Registration Number : **012-1112-0796-23**

ASUTOSH COLLEGE

92, S.P. Mukerjee Road

Kolkata-700026

Certificate of Completion

for

Summer Internship (2024) under Curriculum and Credit Framework (CCF) of the University of Calcutta

This is to certify that SUMAN DAS, student of Dept. Of ELECTRONICS Major, Semester II, University Roll No 233012-21-0121 and Reg. No 012-1112-0796-23, of Asutosh College, successfully completed the 15 days/120 hours summer internship programme on DIGITAL MARKETING from 4th June to 27th June,2024 at Digital4Doc.

DIGITAL 4 DOC
Shubhra Mukherjee.
PARTNER

Signature of authorised signatory with official seal

Issued on: 28/06/2024.

SUMMER INTERNSHIP

ON

DIGITAL MARKETING

4th June to 27th June 2024

ASUTOSH COLLEGE

92, S. P. MUKERJEE ROAD

KOLKATA - 700026

Acknowledgements

I would like to express my sincere gratitude to Mr. Hrishav Mukherjee, our course coordinator, for his invaluable guidance and support throughout the Digital Marketing internship program. I am also deeply thankful to Digital4Doc for providing me with this excellent learning opportunity. Additionally, I extend my heartfelt thanks to Dr. Kunal Sinha and my department for facilitating this opportunity, and to my university for incorporating this valuable internship into the curriculum.

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➢ COURSE OUTLINE

The course was divided into four main modules, each focusing on different aspects of digital marketing:

1. **Module I: Canva Post Design (Content & Festive Post Design)**

   - Focus: Designing content and festive posts using Canva.

2. **Module II: Mobile Reels making using Canva**

3. **Module III: Facebook Page Creation & Optimization & Facebook Ads (Social Media Ads)**

   - Focus: Creating and optimizing Facebook pages and running Facebook ads.

4. **Module IV: Google Optimization**

   - Focus: Optimizing content and pages for Google search.

5. **Module V: Medical Blog Content Writing**

   - Focus: Writing and optimizing content for medical blogs.

➢ INTRODUCTION

This report outlines the details of my Digital Marketing internship program undertaken at Digital4Doc. The internship, titled "Digital Marketing," was a comprehensive 15-day program designed to equip participants with practical skills and knowledge in various aspects of digital marketing. The program was conducted from June 4, 2024, to June 27, 2024, and included both training sessions and hands-on practical work.

The primary objective of this internship was to develop a deep understanding of various digital marketing domains, including search engine optimization (SEO), social media marketing, content marketing, email marketing, and pay-per-click (PPC) advertising. The program was meticulously structured to cover these areas through a series of training sessions led by industry experts, followed by practical assignments that allowed for hands-on application of the concepts learned.

From the outset, the internship was characterized by a dynamic and engaging learning environment. The initial days were dedicated to intensive training sessions, where we delved into the fundamental principles of digital marketing. These sessions covered a wide range of topics, from the basics of SEO and keyword research to the intricacies of creating and managing social media campaigns. The instructors, who brought a wealth of real-world experience to the table, provided invaluable insights and practical tips that went beyond textbook knowledge.

One of the highlights of the training was the focus on the latest trends and innovations in digital marketing. We explored the impact of artificial intelligence and machine learning on marketing strategies, the growing importance of video content, and the role of data analytics in driving marketing decisions. These discussions not only broadened our understanding but also inspired us to think creatively about how to leverage these trends in our future careers.

Following the training sessions, the internship transitioned into the practical phase, where we were tasked with applying our newly acquired knowledge to real-world projects. This hands-on experience was instrumental in reinforcing the concepts learned during the training. Working on live projects for Digital4Doc's clients provided a valuable opportunity to navigate the challenges and complexities of digital marketing in a professional setting. We were involved in tasks such as conducting SEO audits, developing content strategies, managing social media accounts, and creating PPC campaigns.

Throughout the internship, we received continuous feedback and guidance from our mentors, which was crucial for our learning and development. The collaborative environment at Digital4Doc fostered a culture of sharing ideas and learning from each other's experiences. This not only enhanced our technical skills but also helped us develop important soft skills such as teamwork, communication, and problem-solving.

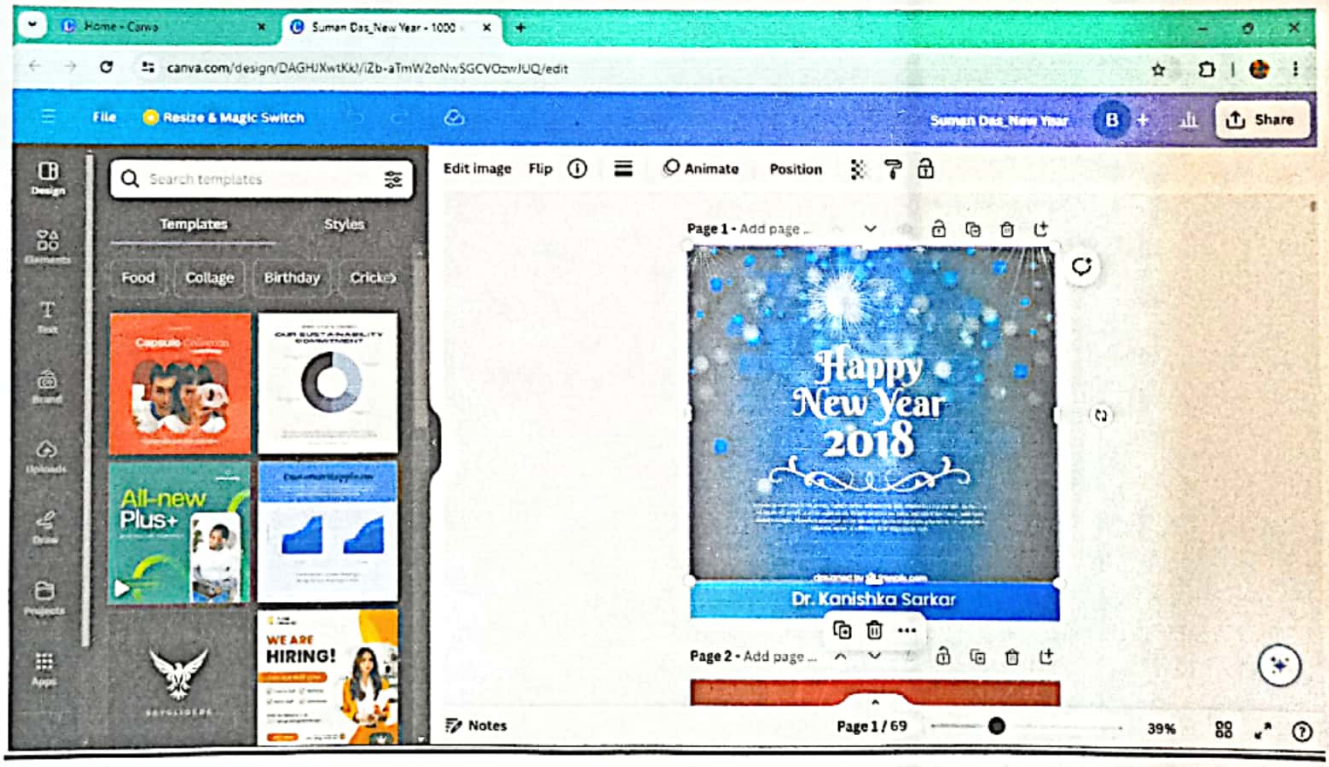
In conclusion, the Digital Marketing internship at Digital4Doc was an enriching experience that provided a holistic understanding of digital marketing. The blend of theoretical training and practical application equipped me with the skills and confidence to pursue a career in this dynamic field. This report delves into the specifics of the internship, detailing the training modules, practical projects, and key learnings that marked this transformative journey.

➢ **Day1 Report** **Date: 04/06/2024**

Module I: Canva Post Design (Content & Festive Post Design)

Activity: Training

Description: On the first day, we were introduced to Canva, a powerful graphic design tool. We learned about its basic tools and features, such as templates, text addition, image insertion, and element customization. We practiced creating simple content and festive posts, focusing on layout, color schemes, and typography. This session was highly interactive, allowing us to get hands-on experience with Canva and understand the basics of design principles.



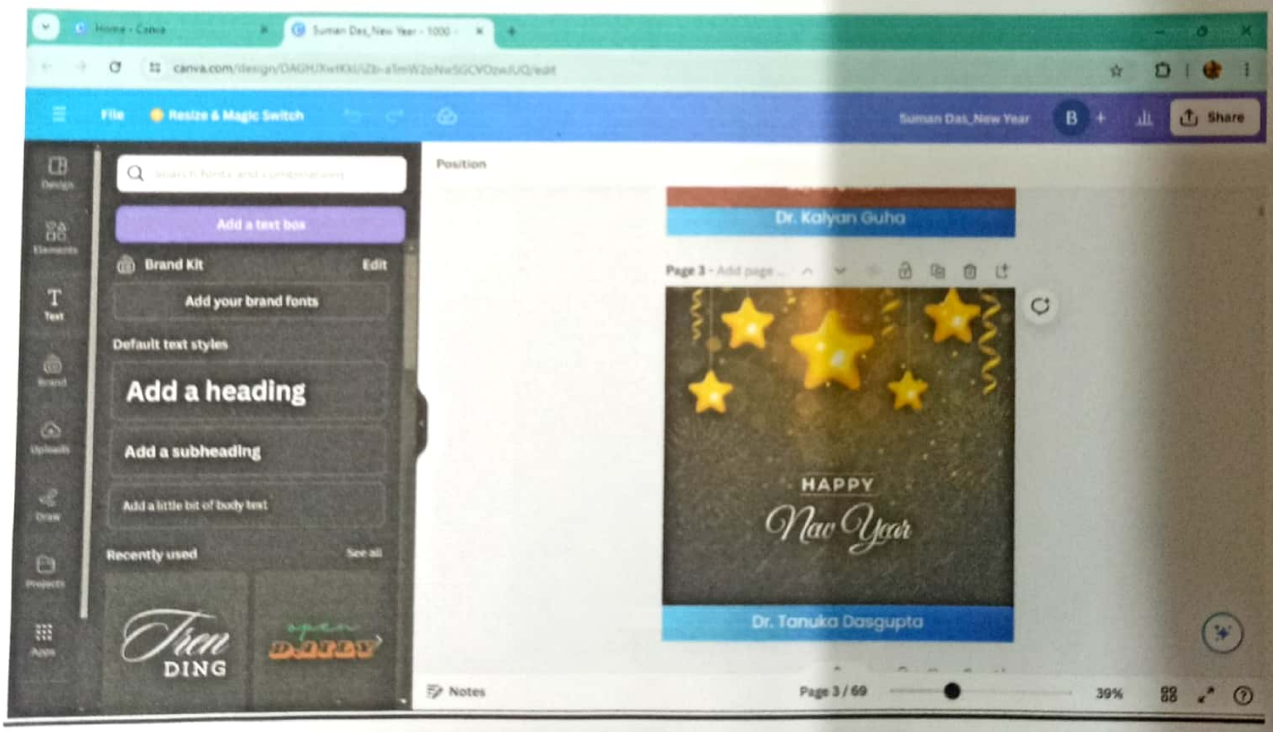
➢ Day 2 Report

Date: 05/06/2024

Module I: Canva Post Design (Content & Festive Post Design)

Activity: Training

Description: The second day was an extension of our Canva training, where we explored advanced design techniques. We learned how to use layers, adjust transparency, and apply filters to enhance our designs. The trainer provided valuable tips on creating visually appealing and engaging content. We also practiced creating more complex festive posts, experimenting with different elements and effects. This session significantly improved our design skills and creativity.

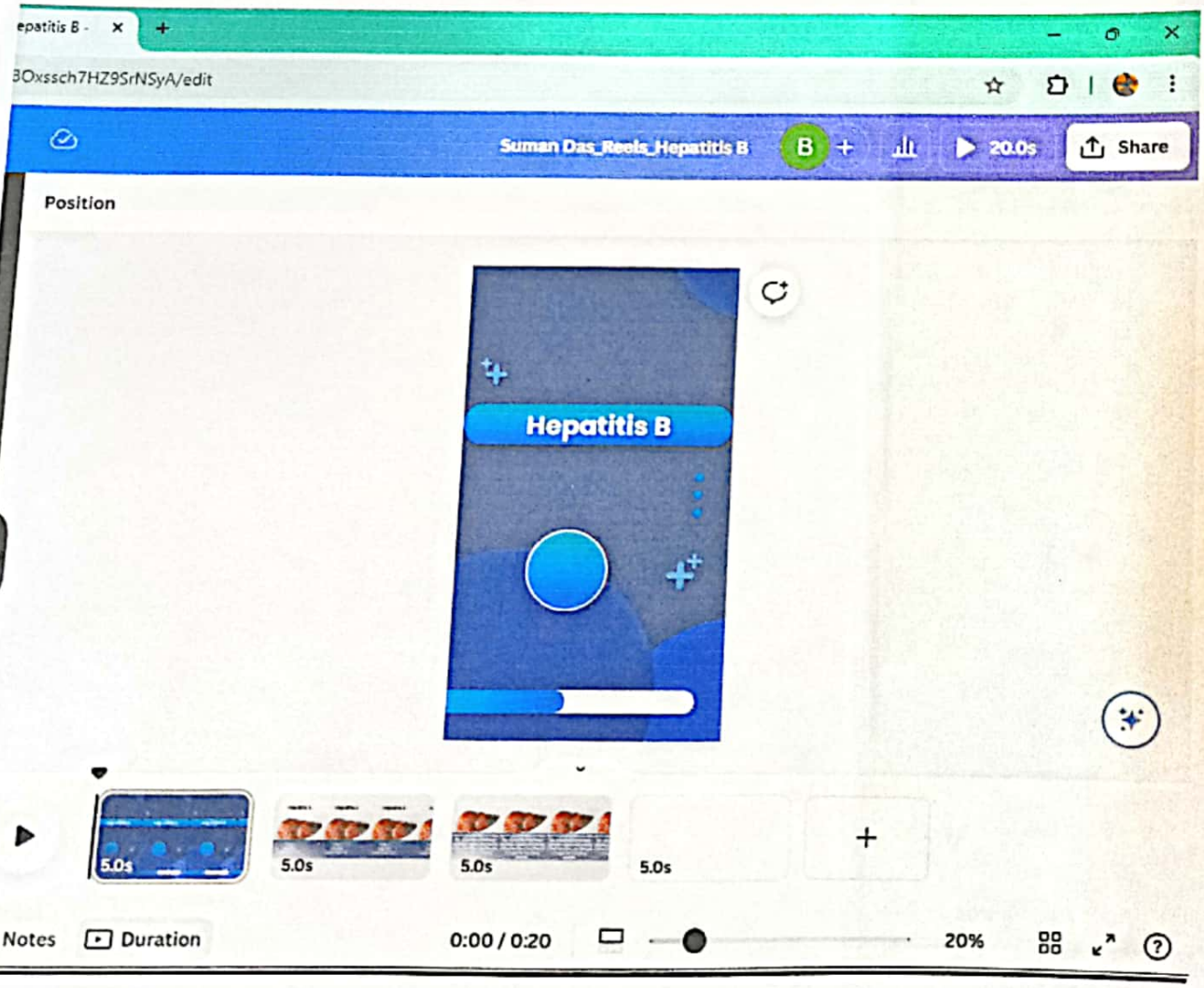


➢ **Day3 Report** **Date: 06/06/2024**

Module II: Mobile Reels making using Canva

Activity: Training

Description: I attended third day Canva mobile reel making training by Digital4Doc. The session covered basics like template selection and customization, and advanced techniques such as animation, transitions, and audio integration. We had hands-on practice, created reels from scratch, and participated in a group activity to apply our skills. The training concluded with a Q&A session and digital certificates. This training enhanced my ability to create engaging, high-quality reels for digital marketing. I highly recommend it for improving digital content creation skills.

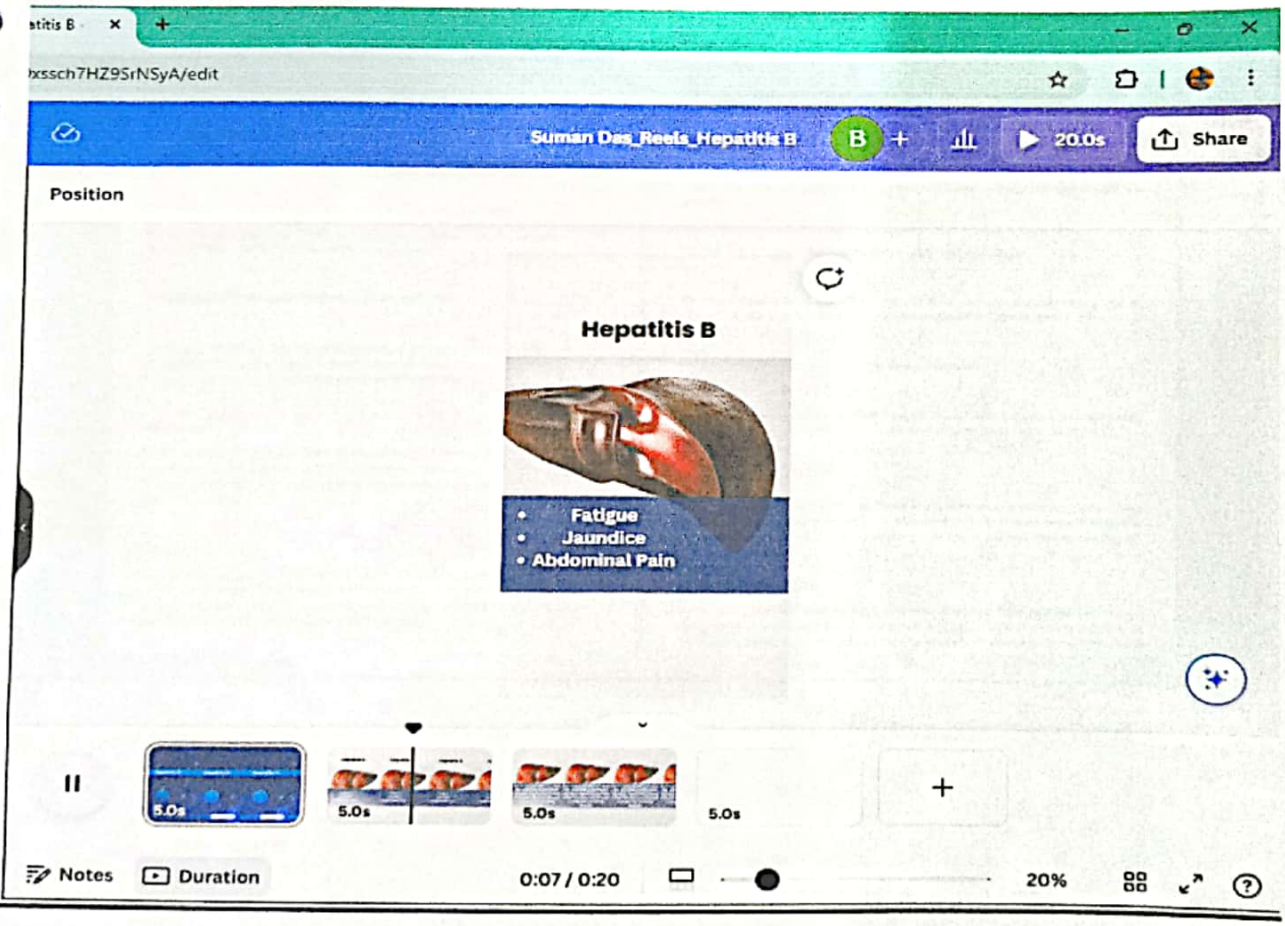


➢ **Day 4 Report** **Date: 13/06/2024**

Module II: Mobile Reels making using Canva

Activity: Practical

Description: I attended fourth day practical work session on Canva mobile reel making organized by Digital4Doc. The training covered both basic and advanced techniques, including template selection, customization, animation effects, transitions, and audio integration. We engaged in hands-on exercises, created reels from scratch, and participated in a group activity for a hypothetical campaign. The session concluded with a Q&A and digital certificates. This practical experience significantly improved my ability to create high-quality, engaging reels for digital marketing. Highly recommended for enhancing digital content creation skills.



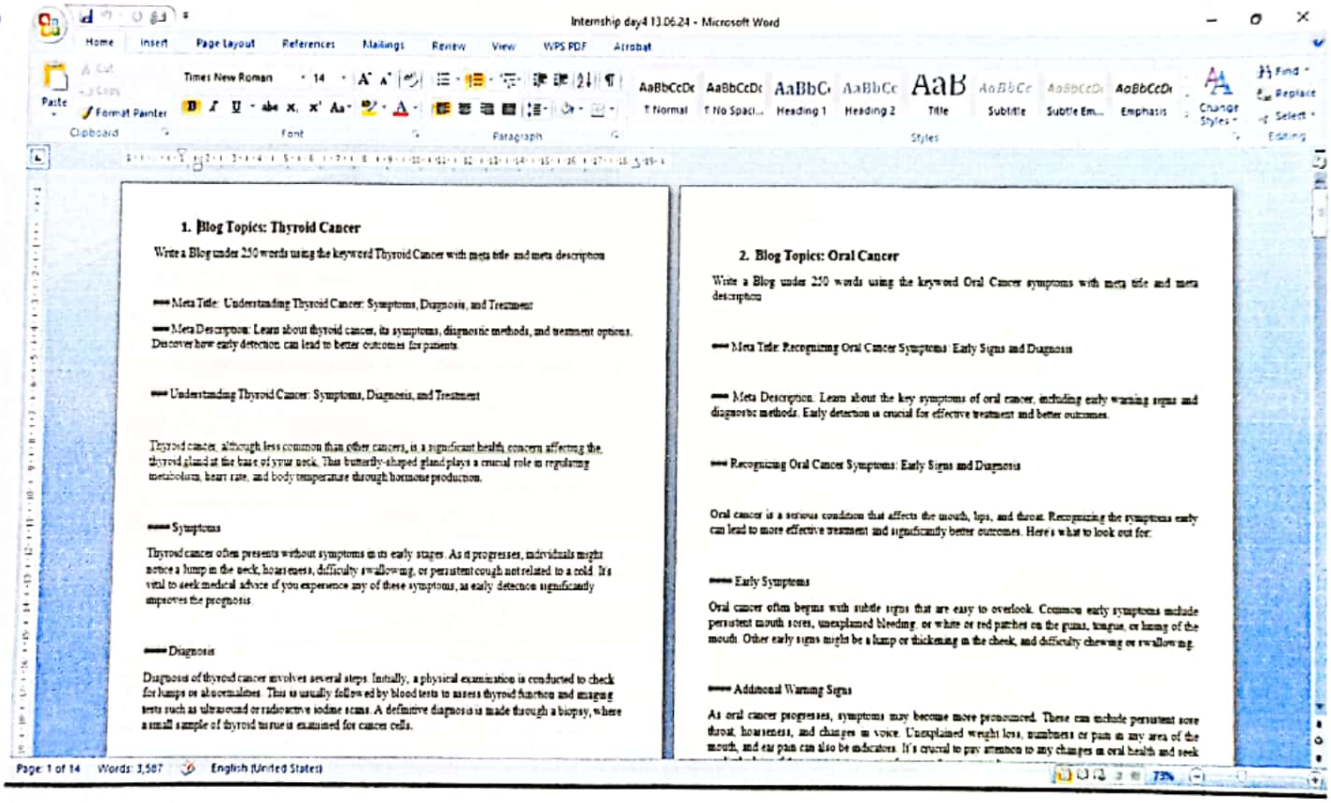
➢ Day 5 Report

Date: 14/06/2024

Module II: Medical Blog Content Writing

Activity: Training

Description: The fifth day focused on medical blog content writing. We learned about the fundamentals of blog writing, including structure, tone, and style. The session emphasized understanding the target audience, particularly in the medical field, and the importance of clear and accurate information. We practiced writing introductory paragraphs and creating outlines for medical blog posts. The hands-on exercises helped us grasp the essentials of effective blog writing.



Internship day4 13.06.24 - Microsoft Word

1. Blog Topics: Thyroid Cancer

Write a Blog under 250 words using the keyword Thyroid Cancer with meta title and meta description

Meta Title: Understanding Thyroid Cancer: Symptoms, Diagnosis, and Treatment

Meta Description: Learn about thyroid cancer, its symptoms, diagnostic methods, and treatment options. Discover how early detection can lead to better outcomes for patients.

Understanding Thyroid Cancer: Symptoms, Diagnosis, and Treatment

Thyroid cancer, although less common than other cancers, is a significant health concern affecting the thyroid gland at the base of your neck. This butterfly-shaped gland plays a crucial role in regulating metabolism, heart rate, and body temperature through hormone production.

Symptoms

Thyroid cancer often presents without symptoms in its early stages. As it progresses, individuals might notice a lump in the neck, hoarseness, difficulty swallowing, or persistent cough not related to a cold. It's vital to seek medical advice if you experience any of these symptoms, as early detection significantly improves the prognosis.

Diagnosis

Diagnosis of thyroid cancer involves several steps. Initially, a physical examination is conducted to check for lumps or abnormalities. This is usually followed by blood tests to assess thyroid function and imaging tests such as ultrasound or radioactive iodine scans. A definitive diagnosis is made through a biopsy, where a small sample of thyroid tissue is examined for cancer cells.

2. Blog Topics: Oral Cancer

Write a Blog under 250 words using the keyword Oral Cancer symptoms with meta title and meta description

Meta Title: Recognizing Oral Cancer Symptoms: Early Signs and Diagnosis

Meta Description: Learn about the key symptoms of oral cancer, including early warning signs and diagnostic methods. Early detection is crucial for effective treatment and better outcomes.

Recognizing Oral Cancer Symptoms: Early Signs and Diagnosis

Oral cancer is a serious condition that affects the mouth, lips, and throat. Recognizing the symptoms early can lead to more effective treatment and significantly better outcomes. Here's what to look out for:

Early Symptoms

Oral cancer often begins with subtle signs that are easy to overlook. Common early symptoms include persistent mouth sores, unexplained bleeding, or white or red patches on the gums, tongue, or lining of the mouth. Other early signs might be a lump or thickening in the cheek, and difficulty chewing or swallowing.

Additional Warning Signs

As oral cancer progresses, symptoms may become more pronounced. These can include persistent sore throat, hoarseness, and changes in voice. Unexplained weight loss, numbness or pain in any area of the mouth, and ear pain can also be indicators. It's crucial to pay attention to any changes in oral health and seek

Page: 1 of 14 Words: 3,587 English (United States)

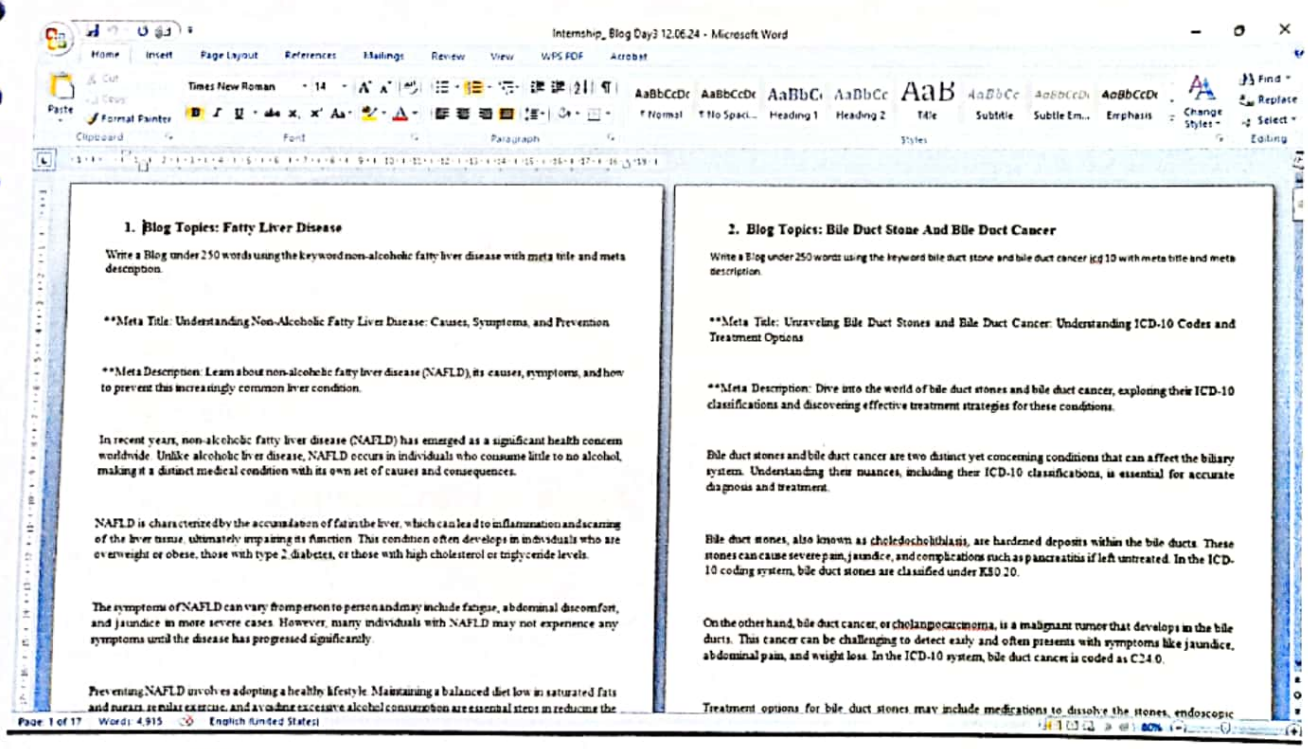
➢ Day 6 Report

Date: 17/06/2024

Module II: Medical Blog Content Writing

Activity: Training

Description: On the sixth day, we delved into search engine optimization (SEO) techniques for blog writing. We learned about keyword research, using tools like Google Keyword Planner to identify relevant keywords for medical topics. The trainer explained how to incorporate these keywords naturally into blog posts to improve search engine rankings. We also covered on-page SEO elements such as meta descriptions, headers, and internal linking. This session provided a comprehensive understanding of optimizing blog content for better visibility.



Internship_ Blog Day3 12.06.24 - Microsoft Word

1. Blog Topics: Fatty Liver Disease

Write a Blog under 250 words using the keyword non-alcoholic fatty liver disease with meta title and meta description.

**Meta Title: Understanding Non-Alcoholic Fatty Liver Disease: Causes, Symptoms, and Prevention

**Meta Description: Learn about non-alcoholic fatty liver disease (NAFLD), its causes, symptoms, and how to prevent this increasingly common liver condition.

In recent years, non-alcoholic fatty liver disease (NAFLD) has emerged as a significant health concern worldwide. Unlike alcoholic liver disease, NAFLD occurs in individuals who consume little to no alcohol, making it a distinct medical condition with its own set of causes and consequences.

NAFLD is characterized by the accumulation of fat in the liver, which can lead to inflammation and scarring of the liver tissue, ultimately impairing its function. This condition often develops in individuals who are overweight or obese, those with type 2 diabetes, or those with high cholesterol or triglyceride levels.

The symptoms of NAFLD can vary from person to person and may include fatigue, abdominal discomfort, and jaundice in more severe cases. However, many individuals with NAFLD may not experience any symptoms until the disease has progressed significantly.

Preventing NAFLD involves adopting a healthy lifestyle. Maintaining a balanced diet low in saturated fats and sugars, regular exercise, and avoiding excessive alcohol consumption are essential steps in reducing the

2. Blog Topics: Bile Duct Stone And Bile Duct Cancer

Write a Blog under 250 words using the keyword bile duct stone and bile duct cancer icd 10 with meta title and meta description.

**Meta Title: Unraveling Bile Duct Stones and Bile Duct Cancer: Understanding ICD-10 Codes and Treatment Options

**Meta Description: Dive into the world of bile duct stones and bile duct cancer, exploring their ICD-10 classifications and discovering effective treatment strategies for these conditions.

Bile duct stones and bile duct cancer are two distinct yet concerning conditions that can affect the biliary system. Understanding their nuances, including their ICD-10 classifications, is essential for accurate diagnosis and treatment.

Bile duct stones, also known as choledocholithiasis, are hardened deposits within the bile ducts. These stones can cause severe pain, jaundice, and complications such as pancreatitis if left untreated. In the ICD-10 coding system, bile duct stones are classified under K80.20.

On the other hand, bile duct cancer, or cholangiocarcinoma, is a malignant tumor that develops in the bile ducts. This cancer can be challenging to detect early and often presents with symptoms like jaundice, abdominal pain, and weight loss. In the ICD-10 system, bile duct cancer is coded as C24.0.

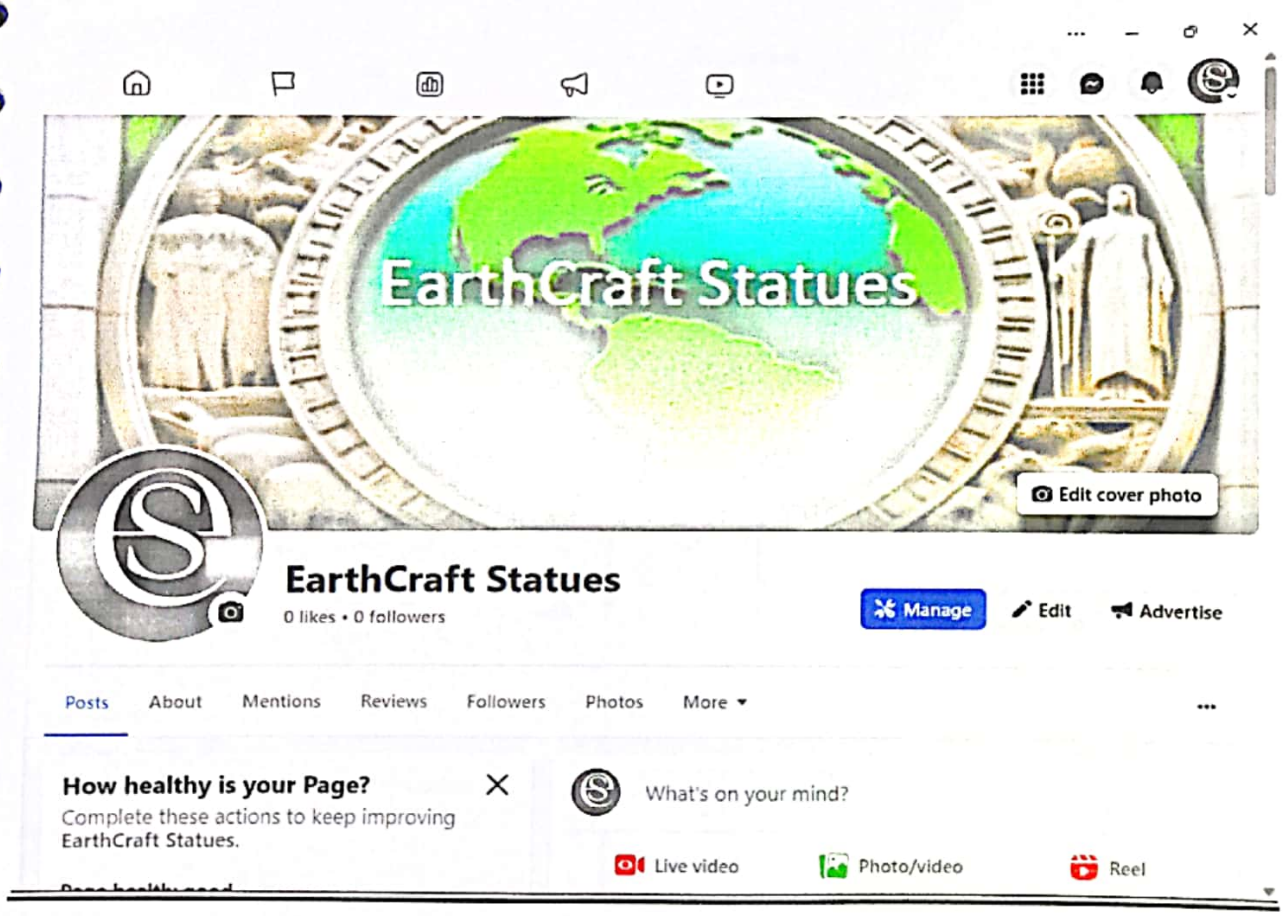
Treatment options for bile duct stones may include medications to dissolve the stones, endoscopic

➢ **Day 7 Report** **Date: 18/06/2024**

Module III: Facebook Page Creation & Optimization & Facebook Ads (Social Media Ads)

Activity: Training

Description: The seventh day introduced us to Facebook page creation and optimization. We learned how to create and set up a Facebook page for a business, including adding profile and cover photos, creating a bio, and adding contact information. The session also covered understanding Facebook page insights and analytics to track engagement and performance. We practiced creating a Facebook page and explored various features, such as setting up call-to-action buttons and creating posts. This training highlighted the importance of a well-optimized Facebook page in building an online presence.



➢ Day 8 Report

Date: 19/06/2024

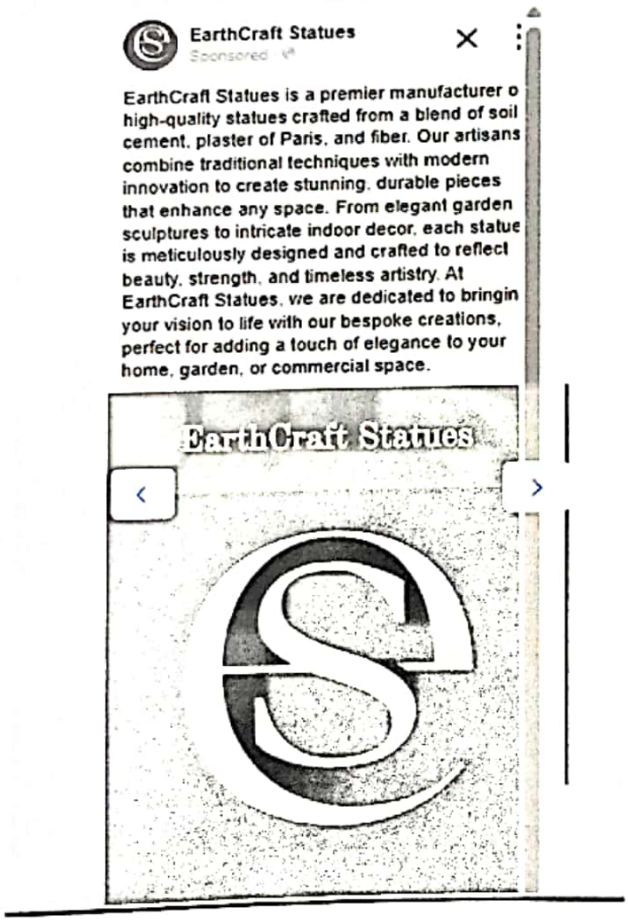
Module III: Facebook Page Creation & Optimization & Facebook Ads (Social Media Ads)

Activity: Training

Description: The eighth day focused on creating and managing Facebook ads. We learned about setting ad objectives, defining target audiences, and budgeting for ads. The trainer explained different ad formats, such as image ads, video ads, and carousel ads, and their best use cases. We practiced creating sample ads and learned about targeting and retargeting strategies to reach specific audience segments. This session provided practical insights into running effective ad campaigns on Facebook.

Ad preview

Ad preview



➢ Day 9 Report

Date:20/06/2024

Module IV: Google Optimization

Activity: Training

Description: The ninth day was dedicated to Google optimization. We learned about on-page and off-page SEO techniques to optimize content and pages for Google search. The trainer explained the importance of high-quality content, mobile-friendly design, and fast loading times in improving search rankings. We also learned how to use Google Analytics to track website performance and user behavior. Practical exercises involved optimizing sample web pages and analyzing their performance using Google Analytics. This session provided valuable insights into improving online visibility through Google optimization.

➢ Day 10 Report Date:21/06/2024

Hands-On Work

Activity: Practical Work

Description: The tenth day marked the beginning of the hands-on work phase. We applied the skills learned in Module I to create content and festive posts using Canva. Each intern was assigned different themes and tasks to design engaging posts for various occasions. We focused on using advanced design techniques and ensuring the visual appeal of the posts. This practical work allowed us to experiment with different design elements and receive feedback from the trainer to improve our designs.

➢ Day 11 Report

Date:22/06/2024

Hands-On Work

Activity: Practical Work

Description: On the eleventh day, we applied the knowledge from Module II to write and optimize medical blog content. Each intern chose a medical topic and created a detailed blog post outline. We conducted keyword research and incorporated relevant keywords into our posts to optimize them for SEO. The trainer provided feedback on our drafts, emphasizing clarity, accuracy, and readability. This hands-on work helped us refine our writing skills and understand the importance of SEO in reaching a broader audience.

➢ Day 12 Report

Date:24/06/2024

Hands-On Work

Activity: Practical Work

Description: The twelfth day involved creating and optimizing Facebook pages, as learned in Module III. Each intern created a Facebook page for a hypothetical business, adding profile and cover photos, contact information, and creating initial posts. We also set up call-to-action buttons and explored different page settings. The trainer provided guidance on optimizing the pages for better engagement and visibility. This practical work enhanced our understanding of Facebook page management and optimization techniques.

➢ Day 13 Report

Date:25/06/2024

Hands-On Work

Activity: Practical Work

Description: Continuing with Module III, the eleventh day focused on managing Facebook ads. Each intern created multiple ad campaigns, setting different objectives, target audiences, and budgets. We experimented with various ad formats and analyzed their potential effectiveness. The trainer provided feedback on our ad designs and targeting strategies, emphasizing the importance of precise audience targeting and clear ad messaging. This hands-on work helped us gain practical experience in creating and managing Facebook ads.

➢ Day 14 Report

Date:26/06/2024

Hands-On Work

Activity: Practical Work

Description: On the fourteenth day, we applied the Google optimization techniques learned in Module IV. Each intern optimized a sample web page, focusing on on-page elements like meta descriptions, headers, and internal links. We also used Google Analytics to track the performance of our pages and identify areas for improvement. The trainer provided feedback on our optimization efforts and offered tips for further enhancement. This practical work helped us understand the importance of SEO in improving online visibility and user experience.

➢ Day 15 Report

Date:27/06/2024

Hands-On Work

Activity: Practical Work

Description: The final day of the internship was dedicated to reviewing and optimizing all practical work done during the program. We revisited our Canva designs, blog posts, Facebook pages, and ad campaigns, applying final touches and improvements based on the feedback received. The trainer conducted a comprehensive review of our work, highlighting strengths and areas for improvement. This session provided a sense of accomplishment and reinforced the practical skills we acquired during the internship

➢ CONCLUSION

The 15-day Digital Marketing internship program at Digital4Doc was an enriching experience that provided me with valuable skills and knowledge in various aspects of digital marketing. The structured blend of theoretical training and hands-on practical work allowed me to apply the concepts learned in real-world scenarios. The guidance and support from our course coordinator, Mr. Hrishav Mukherjee, and the collaborative environment with my fellow interns, Suman Das, made this internship a rewarding journey. I am confident that the skills acquired during this program will significantly contribute to my future career in digital marketing.

DIGITAL 4 DOC
Hrishav Mukherjee.
PARTNER

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