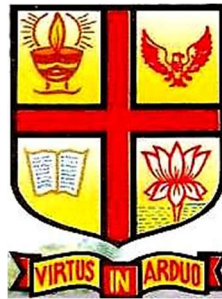


A training session report on
Analytical techniques

Under STUTI program funded by DST



In association with
Indian Institute of Technology, Gandhinagar
(Project Management Unit)



Coordinated by
Dr. Sonali Nigam
Department of Botany and Microbiology
St. Aloysius' College, Jabalpur
Madhya Pradesh India

21st to 27th November 2022

Acknowledgement

We convey gratitude for the encouragement and support received from multiple sources during the execution of this training since its beginning. First and foremost, we want to express our sincere appreciation to the IIT Gandhinagar (PMU) and Department of Science and Technology (DST) for entrusting us with this project. The workshop was coordinated by **Dr. Sonali Nigam** (Head Department of Botany and Microbiology, St. Aloysius College (Auto.) Jabalpur). The workshop was conducted on the '*Analytical techniques*' on the instrument funded by the FIST program (Sanction No.: SR/FST/College-231/2014). Organizing team acknowledge the contributions of the experts and training committee, in the implementation and the execution of the program to achieve the objectives of the workshop, particularly, **Dr. G. Vazhan Arasu** (Retired. Principal, St. Aloysius College (Auto.) Jabalpur), whose guidance has contributed to the successful execution of the workshop, **Dr. Anjali D'Souza** (Vice Principal (Academics), **Dr. Kallol Das** (Vice Principal (Discipline)) for their support cooperation in the organization of the workshop

I also acknowledge all the teaching and non-teaching staff for their contributions, without which these could not have been possible.

Dr. Sonali Nigam

Coordinator

Summary

The goal of this training session was to provide a general overview on the practical aspects of AFM, Reflectometer, FTIR, Flame Photometer, Trinocular Fluorescence Microscope and Air Sampler etc., along with hands on practical knowledge using sophisticated instrumentation techniques among research scholars, faculty, young scientists and industry professionals through a week-long training workshop. The workshop was conducted at Department of Botany and Microbiology, St. Aloysius College (Auto.) Jabalpur) 21st to 27th November 2022, which comprised of lectures and hands on training sessions. This initiative is funded by Department of Science & Technology under the program STUTI (Synergistic Training Program Utilizing the Scientific and Technological Infrastructure). The participants were introduced to the basic concepts of image generation, instrumentation and the advanced modes of operation. The focus of this workshop was to have a balance between theory and practical training on the equipment and schedule was designed in a way that if a theory session for a topic was organized in morning, the hands-on training session for the same topic was organized in afternoon/evening session. *‘Emphasis was given on hands-on use of equipment for demonstration/characterization of sample by each participant for better understanding’.*

Introduction

Department of Botany and Microbiology, St. Aloysius College (Auto.) Jabalpur) conducted 7-day long hands-on training program on 'Pre-Clinical Drug Screening and Characterization of Pharmaceuticals' organized by IIT Gandhinagar, (PMU). The participants from various backgrounds such as Post Graduate, Professors, Scientists, Post-Doc Fellows, Ph.D. Fellows and Industry persons participated in this workshop (**Annex-1**). The training program was organized during 21st to 27th November 2022, the activities of which are as mentioned in (**Annex-2 and 3**). This report provides a quick overview of both the lecture and technical sessions.

- Lecture Sessions

Dr. Anjali D'Souza (Vice Principal, SAC) gave a brief lecture on 'Operations and Applications of Flame Photometer'. **Dr. Nisha Pandey** (Department of Physics, SAC) and **Dr. Aradhana Dhanraj** (Department of Physic, SAIT) both explained about basics of 'Reflectometer' with reference to various example pertaining to its uses. **Dr. Pramod Chaitanya** (Department of Physics, SAC) discussed about the history of microscopy and various techniques on evaluating the microstructures. After this he explained the working of microscopy, Limitation of Optical Microscopy. **Dr. Yashpal Singh Katharria** (Department of Physics, Indian Institute of Information Technology Design & Manufacturing IIITDM) delivered lecture on Atomic Force Microscopy: Concept and Analysis". **Dr. Manju Gupta** (Department of Chemistry, SAC) presented an overview on IR Spectroscopy: Basic introduction, Principle working of the instrumentation and its Applications. **Dr. L. K. Pandey** (Department of Biotechnology, SAC) gave a comprehensive information on Fluorescence Microscopy with an in-depth introduction to the fluorescence phenomenon. **Prof. R. K. Asthana** (Department of Botany, Institute of Science, Banaras Hindu University, Varanasi) gave a detailed lecture on Interdisciplinary Methods for Drug Discovery. **Dr. Sutapa Roy** (Department of Chemistry, SAC) gave presentation on the topic "BOD and COD Analysis". **Dr. Femina Sobin** (Department of Botany and Microbiology, SAC) gave a lecture on 'Air Sampler'.

- Technical Session

On the **First** day, **Dr. Anjali D'Souza** and **Dr. Shweta Likhtkar** gave a demonstration on determination of Sodium Potassium ion concentration in the given sample solution by Flame Photometer. On the **Second** day, **Dr. Nisha Pandey** and **Dr. Aradhana Dhanraj** led hands-on session was on the demonstration on Spin coating unit and reflectometer respectively. On the **Third** day, demonstration on AFM was showed by **Dr. Pramod Chaitanya** and **Dr. Aradhana Dhanraj**. On the **Fourth** day, **Dr. Manju Gupta** and **Dr. Rumana Faraz** showed demonstration on the topic of IR-Spectroscopy. The **Fifth** day session, included with a hands-on over Fluorescence Microscopy guided by **Dr. L. K. Pandey**. The participants were initially divided into groups to facilitate hands-on fluorescence microscopy.. The **Sixth** day session was based on the analysis of different water samples by using BOD and COD. **Dr. Sutapa Roy** and **Dr. Amita Chhatri** gave demonstration to prepare reagents. The **Seventh** day session was guided by **Dr. Sonali Nigam** and **Dr. Roshni Choubey** based upon functioning of the Air Sampler.

- Types of samples tested

During the technical session, all the participants expressed an interest in learning through the workshop by performing sample preparation and analysis of the previously prepared samples. During the workshop, biological samples were prepared in the form the films to visualized under microscopes. Some other samples were provided to the participants to give an overview on bacterial cells, lymphocytes, and chicken liver cells.

Outcomes of the Workshop

The STUTI workshop attracted participants from 22 different institutes (**Figure 1**). About 30 participants enrolled and attended the workshop. The goal of this training event was to bring together participants from different disciplines and raise awareness of the institute's advanced facilities. Throughout the sessions, participants asked major questions regarding theoretical and practical aspects of instrumentations, basic operations of the instruments and know-how to operate, troubleshoot along with maintenance of the instrument. Finally, the feedback from the participants were considered in the evaluation of the workshop (**Annex-4**). The majority of the participants were pleased with the training session and suggested that more workshops be held in the future by the institution



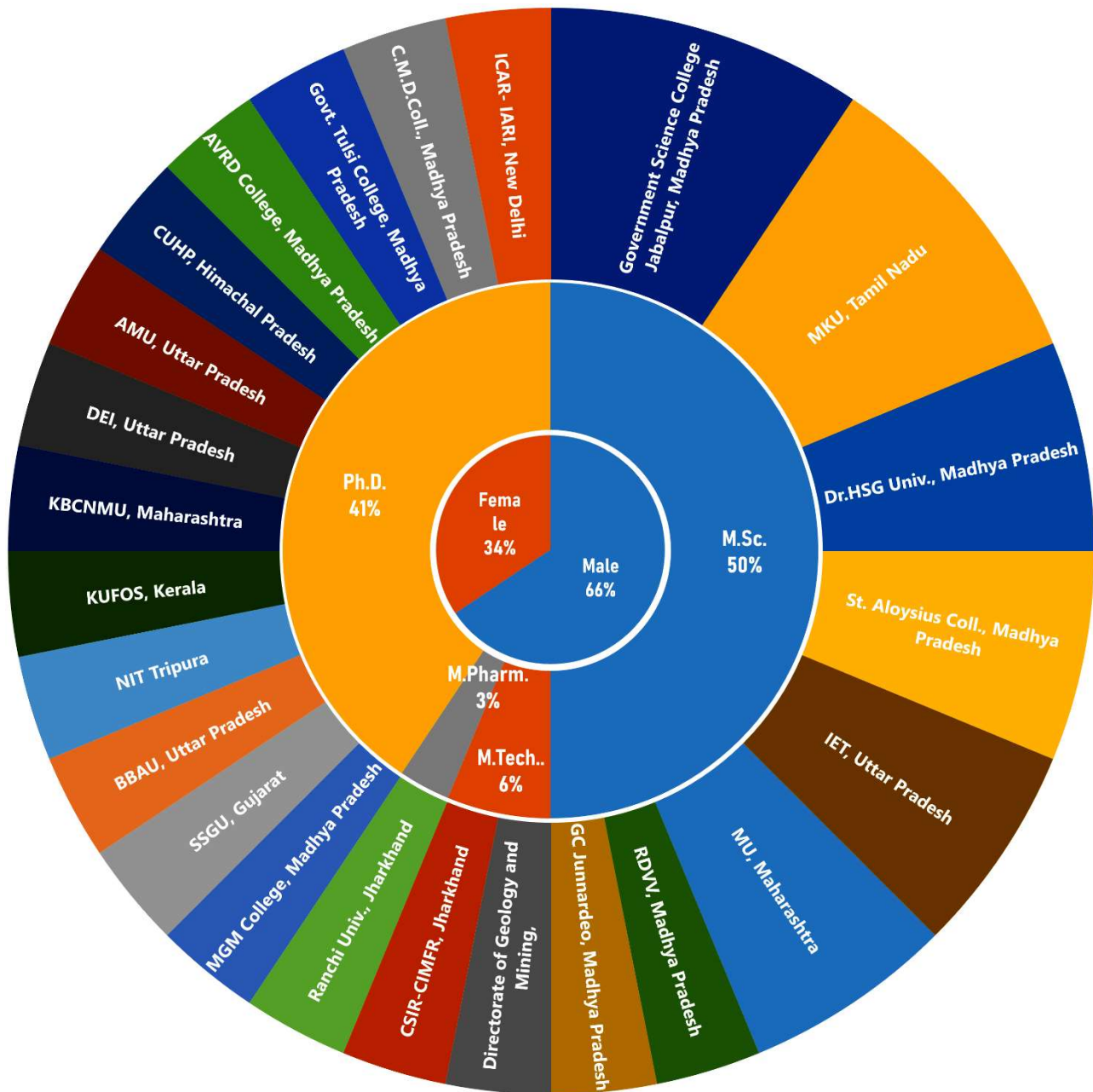



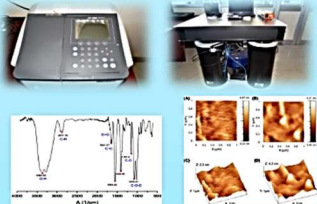


Figure 1. Participants registered workshop from different institutes.

Annexure 1: Brochure for the program

| | | |
|---|---|---|
| <p style="text-align: center;">Content of the Workshop</p> <p>Day1: Inaugural session Session I and II</p> <ul style="list-style-type: none">• Flame Photometer: Introduction and operation• Hands on Training <p>Day 2: Session I and II</p> <ul style="list-style-type: none">• AFM: Introduction and operation• Hands on Training <p>Day 3: Session I and II</p> <ul style="list-style-type: none">• Reflectometer: Introduction and operation• Hands on Training <p>Day 4: Session I and II</p> <ul style="list-style-type: none">• FT-IR in identification and characterization of material• Hands on training <p>Day 5: Session I and II</p> <ul style="list-style-type: none">• Trinocular Fluorescence Microscope• Hands on: instrument operation <p>Day 6: Session I and II</p> <ul style="list-style-type: none">• BOD and COD: Introduction and operation• Hands on instrument operation <p>Day 7: Session I and II</p> <ul style="list-style-type: none">• Air sampler: Introduction and operation• Lab Visit• Interactive session• Valedictory session | <p style="text-align: center;">Registration & Contact Details</p> <p>Interested participants must register and only selected candidates would be invited for the workshop.</p> <p>For selected candidates Registration fees, local travel, boarding and lodging will be covered by STUTI grant.</p> <p>Registration Start From 1st September 2022</p> <p>Interested participants should register using the following link: https://forms.gle/xNeMYP5fCwnpBx3s5</p>  <p>Registration Deadline: 31st October 2022</p> <p>Shortlisted candidates will be intimated by email, latest by 2nd November 2022.</p> <div style="border: 1px solid black; padding: 5px;"><p style="text-align: center;">Eligibility criteria:</p><p>(a) Minimum qualification: Post Graduate (Science) or B.Tech. (Technology)</p><p>(b) Professors/Scientists/Post-Doc Fellows/Ph.D.Fellows/ Industry persons who are actively involved in R&D</p><p>(c) Not more than 3 participants from one institute</p></div> <p>For more information: Mail: bot.sac@gmail.com Address: 1, Ahilya Bai Marg, Pentinaka Chowk, Sadar, Jabalpur, M.P. 482001</p> <p>Acknowledgements</p>  | <p style="text-align: center;">Department of Science & Technology (DST) funded Training workshop under STUTI (Synergistic Training Program Utilizing the Scientific and Technological Infrastructure)</p> <p style="text-align: center;">7 Days Workshop on Analytical techniques 21st - 27th November 2022</p> <p style="text-align: center;">Organized by Dept. of Botany and Microbiology St. Aloysius' College (Autonomous), Jabalpur (M.P.)</p>  <p style="text-align: center;">Reaccredited 'A*' by NAAC (CGPA 3.68/4.00) College with Potential for Excellence (CPE) by UGC DST-FIST Supported & Star College Scheme by DBT</p>  |
|---|---|---|

Annexure 2: List of registered participants for the workshop.

| Sr. No. | Candidate Name | Gender | Educational Qualification | Email address | University/Institute |
|---------|-------------------------------|--------|-------------------------------|---------------------------------|---|
| 1 | Neetu Das | Female | M.Phil (Bioscience) | microdept.07@gmail.com | Government V.Y.T. PG Autonomous College, Chhattisgarh |
| 2 | Nidhi | Female | M.Sc. (Botany) | thenidhiverma@gmail.com | Maharaja Chhatrasal Bundelkhand University, Madhya Pradesh |
| 3 | Vipendra Kumar Ahirwar | Male | M.Sc. (Botany) | vipendrakumarahirwar@gmail.com | |
| 4 | Parth Vishnubhai Nayi | Male | M.Sc. (Applied Physics) | parthnayi1000@yahoo.com | Sardar Patel University, Gujarat |
| 5 | Amit Kumar | Male | M.Sc. (Botany) | 1011amitkumar@gmail.com | Chaudhary Charan Singh University, Meerut, Uttar Pradesh |
| 6 | Jayapal Subramaniam | Male | Ph.D. (Zoology) | jayapalsubramaniam@gmail.com | Bharathiar University, Tamil Nadu |
| 7 | Mritunjay Rai | Male | M.Sc. (Zoology) | mrrioua2020@gmail.com | Babasaheb Bhimrao Ambedkar University, Uttar Pradesh |
| 8 | Arti Kumari | Female | M.Sc. (Zoology) | artinandan95@gmail.com | Bhupendra Narayan Mandal University, Bihar |
| 9 | M.D. Tanwir Alam | Male | M.Sc (Physics) | tanwiralampd@gmail.com | |
| 10 | Shashikant Shingdilwar | Male | Ph.D. (Bio-Polymer Chemistry) | shashikant007@gmail.com | Raipur Institute of Technology (RITEE), Chhattisgarh |
| 11 | Ravi Das | Male | M.Sc. (Zoology) | ravidas744@gmail.com | Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh |
| 12 | Hitesh Kumar Khaniya | Male | M.Sc. (Botany) | kumarkhaniyahitesh123@gmail.com | Gujarat University, Gujarat |
| 13 | S.M.Nawaz Akhtar | Male | M.Sc. (Biotechnology) | nawazbiotech11@gmail.com | Madurai Kamaraj University, Tamil Nadu |
| 14 | Dhruvkumar Hareshchandra Dave | Male | M.Phil (Life Science) | redgarden2009@gmail.com | Hemchandracharya North Gujarat University, Gujarat |
| 15 | Amanullakhan Pathan | Male | Ph.D. (Chemistry) | amankhan255@gmail.com | Shri Sarvajani Science college, Gujarat |
| 16 | Suraj Singh | Male | M.Sc. (Life Sciences) | suraj109rajput@gmail.com | Central University of Gujarat, Gujarat |
| 17 | Udaypal | Male | M.Sc. (Botany) | udaypal637228789@gmail.com | Central University Of Himachal Pardesh, Himachal Pradesh |
| 18 | C.Vanisree | Female | M.Phil (Biotechnology) | Vanisree3108@gmail.com | St.Pious X Degree & PG College for Women, Telangana |
| 19 | Pritha Ghosh | Female | M.Phil (Biotechnology) | mukherjeepritha79@gmail.com | |
| 20 | Tamina Benarji Patrudu | Male | Ph.D. (Analytical Chemistry) | benarjipatrudu@gmail.com | Gandhi Institute of Technology and Management (GITAM) Hyderabad Campus, Telangana |
| 21 | Pradeep Kumar Ahirwal | Male | Ph.D. (Physics) | kumar86app@gmail.com | Government College Baksawa, Madhya Pradesh |
| 22 | Sushil Kumar Behera | Male | M.Sc.(Physics) | kumarsushil5566@gmail.com | Dr. Harisingh Gour University, Madhya Pradesh |
| 23 | Nanasaheb Pandharinath Huse | Male | Ph.D. (Physics) | nphuse26@gmail.com | G. T. Patil Arts, Commerce and Science College, Maharashtra |
| 24 | Dhananjay Shivajirao Patil | Male | Ph.D. (Zoology) | patildhananjay2007@gmail.com | |
| 25 | Neha Prashant Chaware | Female | M.Sc. (Physics) | neha1995chaware@gmail.com | |
| 26 | Janhavi Sunil Patil | Female | M.Sc. (Physics) | janhavispatil07@gmail.com | Kavayitri Bahinabai Chaudhari |
| 27 | Komal Mahesh Sant | Female | M.Sc. (Physics) | komalsant1999@gmail.com | North Maharashtra University, Maharashtra |
| 28 | Ankita Badhai | Female | M.Sc. (Biotechnology) | mukta15manjari@gmail.com | St. Aloysius College (Autonomous), Madhya Pradesh |
| 29 | Vaishali Sunil Mishra | Female | M.Sc. (Microbiology) | vaishali19987@gmail.com | |
| 30 | Monika Kumari | Female | M.Sc. (Biotechnology) | monika.mp321@gmail.com | IHUB-Data, IIIT-Hyderabad, Telangana |

Annexure 3: Schedule date and activities during the workshop

Day I

21st November 2022

09:00 Registration
10:00 Inaugural Session
11:00 Tea Break
11:30 Session IA-Expert Talk
12:30 Session IB-Discussion
01:30 Lunch
14:00 Session IIA-Hands on training
15:30 Tea Break
16:00 Session IIB-Hands on training (contd.)

Day II

22nd November 2022

10:00 Session IA –Expert Talk
11:00 Tea Break
11:30 Session IB-Data Analysis
12.30 Discussion
13:00 Lunch
14:00 Session IIA- Hands on training
15:30 Tea Break
16:00 Session IIB-Hands on training (contd.)

Day III

23rd November 2022

9:30 Session IA –Expert Talk
10:30 Tea Break
11:00 Session IB- Expert Talk
12.30 Discussion
01:00 Lunch
14:00 Session II- Data Analysis
15:30 Tea Break
16:00 Session II- Data Analysis.

Day IV

24th November 2022

10:00 Session IA –Expert Talk
11:30 Tea Break
12:00 Lab Visit
1:30 Lunch
14:30 Session II - Hands on training
15:30 Tea Break
16:00 Session II-Hands on training (contd.)

Day II

25th November 2022

9:30 Session IA-Expert Talk
10.30 Tea Break
11:00 Session IB-Expert Talk
12.30 Discussion
1:00 Lunch
14.00 Session II-Hands on training
15.30 Tea Break
16.00 Session II-Hands in training (contd.)

Day VI

26th November 2022

09:30 Session I A-Expert Talk
10.30 Tea Break
11:00 Session II-Hands on training
01:00 Lunch
14.00 Site Visit
20.00 Networking Dinner

Day VII

27th November 2022

9.30 Session I-Expert Talk
10.30 Tea Break
11:00 Session II –Hands on training
12:30 Interactive session
01:30 Lunch
14:30 Valedictory session

Annexure 4: Feedback summary

| Sr. No | Content | % Rating |
|--------|--|--------------------------------|
| 1 | Overall grading of the program with reference to relevance of course, module/ content etc. | 98% Rated on or above 8 points |
| 2 | Overall grading of the facilities provided by the institute, i.e., Hostel, Mess, Classrooms, Transport/infrastructure etc. | 97% Rated on or above 8 points |
| 3 | Overall grading of the faculty members conducting the training | 97% Rated on or above 8 points |
| 4 | How do you rate the overall training methodology | 97% Rated on or above 8 points |
| 5 | How far the field visit is relevant and related to your research study | 98% Rated on or above 8 points |
| 6 | Usefulness of this training in your current role | 98% Rated on or above 8 points |
| 7 | Usefulness of this training in future work/job you may handle | 96% Rated on or above 8 points |
| 8 | How far have you benefitted from interaction with the fellow participants of the training | 97% Rated on or above 8 points |
| 9 | How far the course material supplied relevant and related to the training curriculum | 95% Rated on or above 8 points |
| 10 | Overall grading of the process of training | 98% Rated on or above 8 points |
| 11 | Your recommendation to your peers/ colleagues for the training Program | 97% Rated on or above 8 points |