

A training session report on
**Animal Cell Culture Techniques and
Screening of Drug Molecules (ACTSDM-2022)**

Under STUTI program funded by DST



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



Coordinated by

Prof. Pradeep K. Naik

Department of Biotechnology & Bioinformatics,

Sambalpur University

Jyoti Vihar, Burla, Dist- Sambalpur, State- Odisha, India-768019

10th -16th October 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, I want to express my sincere appreciation to the Indian Institute of Technology Gandhinagar, Gujarat and the Department of Science and Technology (DST), Govt. of India for entrusting our department for the execution of this training program. The workshop on '*Animal Cell Culture Techniques and Screening of Drug Molecules (ACTSDM-2022)*' was coordinated by the Head of the Department, **Prof. Pradeep Kumar Naik** and was successful due to instruments and facilities sponsored by the FIST program (Sanction No.: SR/FST/LS-1/2017/9 Date: 16.01.2018). The organizing team acknowledges the contributions of the resource persons for helping our department to execute the program and achieve the objectives of the training project, particularly **Dr. Iswar Baitharu** (Asst. Professor, Sambalpur University), **Dr. Samir Kumar Patra** (NIT Rourkela), **Dr. Ramavatar Meena** (JNU, New Delhi), **Dr. Subhoswaraj Pattnaik**, **Abhijit Sahu**, **Biswajit Mohanty**, **Namita Bhoi**, **Eeshara Naik**, **Monika Mishra** and others).

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

Prof. Pradeep K. Naik
Coordinator

Summary

The goal of this ACTSDM-2022 training session is to popularize cell culture techniques and drug screening protocols among students, faculty, scientists, and industry professionals through a week-long training workshop. The workshop was conducted at the Department of Biotechnology and Bioinformatics, Sambalpur University, Odisha from 10th to 16th October 2022 and comprised of both 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*). This workshop is aimed to provide an insight into the basic equipments and various techniques essential for an animal cell culture lab and screening of drug molecules. The participants were introduced to the principles of the equipments and aseptic techniques essential for animal cell culture lab maintenance followed by procedures for efficient utilization of the cell culture facility to screen potential bioactive molecules. The participants were provided hands-on experience for media preparation, sub culturing, and growth curve analysis followed by drug screening through MTT assay and DAPI staining. The participants also had a chance to interact with experts and analyze their own samples during the practical sessions. *More emphasis was given on hands-on use of equipment for demonstration by each participant and analysis of participant's samples*".

Introduction

The Department of Biotechnology and Bioinformatics (Dept. of BT and BI) Sambalpur University, Jyoti Vihar, Burla, Odisha conducted seven-day long workshop on “Animal Cell Culture Technique and Screening of Drug Molecules (ACTSDM-2022)” in its campus from 10th to 16th October 2022 with Indian Institute of Technology Gandhinagar as financial collaborator under DST-STUTI programme. Participants from various backgrounds, namely faculty members, research scholars and post graduates personnel were invited from 19 different universities/Institutions (**Annex-1**). Detailed characterization of various samples and operation of instruments has demonstrated to create awareness among the participants (**Annex-2 & 3**). This report provides a quick overview of both the lecture and technical sessions.

- Lecture Session

Prof. Sanjukta Das (Honourable Vice Chancellor) and **Mr. Ashok Kumar Behera** (The Registrar) of Sambalpur University welcome the participants and informing the participants about past and present activities of the Sambalpur University. **Prof. Pradeep Ku. Naik** explained the activities and facilities of department and importance of DST-STUTI programme. The participants gave their self-introduction and explained importance of this workshop. **Dr. Birendra Behera** (Dept. of BT and BI, Sambalpur University) explained the principle and importance of equipments highly required for animal cell culture and discussed various aseptic techniques that have to be followed while designing or establishing an animal cell culture laboratory. In another lecture **Dr. Birendra Behera** explained how to prepare water soluble and water insoluble samples, how to decide the doses of treatment and to design experiments for testing cytotoxicity of drugs. **Dr. Iswar Baitharu** (Dept. of Environmental Sciences, Sambalpur University) delivered an invited lecture on ‘*Road Map to Drug Discovery*’ where he explained the stages of drug discovery and development of a neuroprotective drug from a herb called *Withania somnifera*. **Prof. Pradeep Ku. Naik** (Dept. of BT and BI, Sambalpur University) discussed the virtual method of drug design using bioinformatic tools and its importance with case studies from his own research. **Prof. Subba Rao** (School Computational and Integrative Sciences, Jawaharlal Nehru University, New Delhi) delivered a lecture on ligand-based drug

design taking examples from drugs that target G-protein coupled receptors. **Prof. Sameer Kumar Patra** (School of Life Sciences, NIT Rourkela) delivered a guest lecture on '*Exploiting Epigenetic Tools for Understanding Cancer and Search for Phytochemicals to cure*' where he discussed about importance of epigenetics and how therapeutic molecules from medicinal plants can modulate epigenetic mechanisms for cure of cancer. **Dr. Ramavatar Meena** (School of Environmental Sciences, JNU New Delhi), was invited for a talk on '*Engineered Nanoparticle: Therapeutic Applications and Health Risk Assessment*' where he explained how to test toxicity of various nanoparticles with examples from his own research.

- Technical Sessions

Day **One** session provided a lab visit to all the participants (viz. Parasite lab, Phytochemistry and Plant Tissue culture lab, Microbiology lab, and Animal cell culture lab) and all instrumental facilities available at the Dept. of BT and BI. Day **Two** session led by **Dr. Birendra Behera** (Dept. of BT and BI, Sambalpur University) and their research scholars for demonstration of the working principles and troubleshooting of instruments used for cell culture. Day **Three** session comprised of hands-on experience regarding how to prepare cell culture media, how to filter sterilize it and what are the supplements to be added to it. Day **Four** session consists of hands-on training and demonstration on the procedure to subculture animal cells. Participants were allowed to perform the experiment on their own sample. The participants also learned to make cell dilutions and seeded cells in 96-well cell culture plates for drug treatment. On the day **Five**, the participants performed the filtrated and sterilized the testing samples and made dilutions. All total 16 types of samples (including 14 samples of participants) were tested at three concentrations and in triplicates using two cancer cell lines (MCF7 and MDA-MB-239. Day **Six** session consist of MTT assay, obtained the results and analyze it. The participants also stained the cells with DAPI fluorescent dye and took pictures of apoptotic cells under fluorescent microscope. On the day **Seven**, feedback from the participants has been obtained regarding the workshop. **Dr. Ramavatar Meena** (School of Environmental Sciences, JNU New Delhi) acted as the chief guest in the valedictory ceremony and distributed the certificates to participants.

- Types of samples tested

As already mentioned in above section, the participants treated human breast cancer cells (MCF-7) and non-tumorigenic mouse fibroblast cells (L929) with a total 16 (sixteen) different samples at three different concentrations (50, 100 or 200 µg/ml) each along with appropriate controls. Among the samples, fourteen were from participants; the other two were standard drug molecules, i.e. Noscapine and Noscapine derivative. Among the fourteen samples of participants, four samples were organic solvent extract of leafy vegetable, and ten were alginate or alginate-based metal polymers. Cytotoxicity of the leafy vegetable was tested in contact mode, whereas the cytotoxicity of metal polymers was tested in non-contact mode, means the metal polymers were kept in soaked in media for 12 hours and the media was taken as the test sample.

Outcome of the workshop

The STUTI workshop attracted participants from 19 different institutes (**Figure 1**). About 30 participants enrolled and attended the “Animal Cell Culture Technique and Screening of Drug Molecules (ACTSDM-2022)” training sessions. The goal of this training event was to bring together participants from many disciplines and raise awareness of the institute's advanced facilities. Throughout the sessions, participants asked major questions regarding theoretical and practical aspects of animal cell culture, the equipments required to establish a cell culture lab, how to prepare media, isolate animal cells from tissues, and how to screen toxicity of samples through MTT assay. This ACTSDM-2022 workshop brought more than 5 collaborations from many small institutions and national level institutes. Finally, the feedback from the participants was considered in the workshop evaluation (**Annex-4**). The majority of the participants were pleased with the training session and suggested that more workshops to be held in the future.



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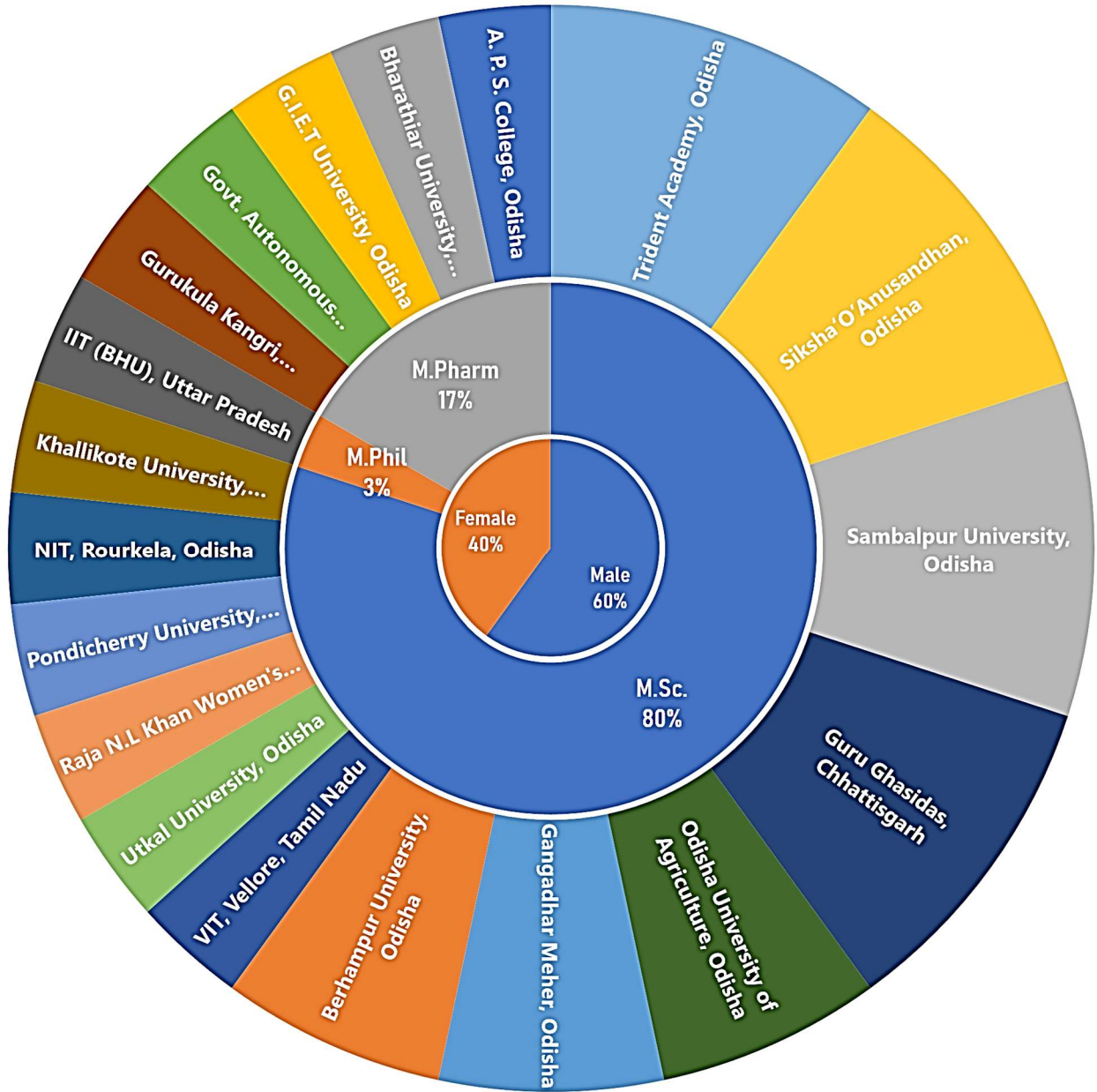


Figure 1. Participants registered workshop from different institutes.

Annexure 1: Brochure for the program

Trainers



Prof. Pradeep K. Naik,
Professor and Head
Dept. of Biotechnology
and Bioinformatics
Sambalpur University
Specialization:
Anticancer therapeutics,
Computer Assisted Drug
Designing



Dr. Birendra Behera,
Asst. Professor
Dept. of Biotechnology
and Bioinformatics
Sambalpur University
Specialization:
Anticancer therapeutics,
Cancer immunotherapy

Registration and Contact Details

Interested participants must register and only selected candidates would be invited for the workshop.

For selected candidates Registration fees, local travel, Boarding and lodging will be covered by Sambalpur University.



Link for Registration:
https://docs.google.com/forms/d/e/1FAIpQLSc5zJWXncVoB3lkgG3lEYteGnEbF4yc4s-1NgLYRfKOUaYkA/viewform?usp=pp_url
Registration Deadline: 30th September 2022
Short listed candidates will be intimated by email, latest by 1st Oct 2022

Eligibility Criteria

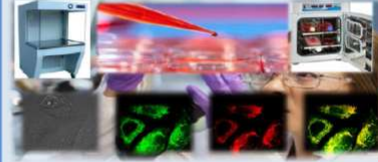
- Minimum qualification: Post Graduate (Sciences) or B. Tech. (Biotechnology)
- Professors/Scientists/ Post-Doc Fellows/Ph. D. Fellows/ Industry persons who are actively involved in R&D
- Not more than three people from one institute.

For more Information

Access: <https://events.iitgn.ac.in/stuti/> or <http://www.suniv.ac.in/notice-board.php>
Mail: brbistuti@gmail.com
pknai1973@suniv.ac.in
bbehera@suniv.ac.in
Address: Sambalpur University,
Po: Jyotivihar, Burla, Dist: Sambalpur,
State: Odisha, INDIA-768019

7 Day Workshop on ANIMAL CELL CULTURE TECHNIQUES AND SCREENING OF DRUG MOLECULES

From 10th Oct. to 16th Oct, 2022



Department of Science & Technology (DST) funded Training workshop under STUTI
(Synergistic Training Program Utilizing the Scientific and Technological Infrastructure)



Organized by:
Department of Biotechnology & Bioinformatics
Sambalpur University
Jyoti Vihar, Sambalpur.- 768 019, Odisha

In collaboration with:
India Intitute of Technology Gandhinagar,
Gujrat

Acknowledgement



Over view of STUTI

DST welcomes all their participants for the workshop on Animal Cell Culture Technique and Screening of Drug Molecules organized under STUTI. The STUTI program envisions hands-on-training and sensitization of the state-of-the-art equipment as well as towards sharing while ensuring transparent access to S&T facilities. Department of Science and Technology has identified IIT-Gandhinagar to function as a Project Management Unit (PMU) and as co-ordinator for this workshop.

Over view of the Workshop

This workshop is aimed to provide an insight into the equipments and techniques essential for an animal cell culture lab and screening of drug molecules. The participants will be introduced to the principle of the equipments and aseptic techniques essential for maintenance of animal cell culture lab followed by procedures for efficient utilization of the cell culture facility to screen potential bioactive molecules. The participants will be provided with hands on experience for media preparation, sub-culturing, and growth curve preparation followed by drug screening through MTT assay and SRB assay etc. The participants will also have a chance to interact with experts and analyse their own samples (with prior approval).

Content of the Workshop

- Session 1:** Inauguration and welcome note
A. Introduction of the Participants and the Host
B. Overview of DST sponsored Programme
- Session 2:**
A. Principle of equipments in cell culture lab
B. Traditional method of drug screening
- Session 3:**
A. Basics of Animal cell culture media
B. Basics of drug design techniques
- Session 4:**
A. Basics of cell culture initiation
B. Virtual screening methods and advantages
- Session 5:**
A. Basics of sub-culturing and growth curve
B. Ligand based techniques of drug screening
- Session 6:**
A. Cytotoxicity testing and analyzing the data
B. ADME screening and its importance
- Session 7:**
A. Screening of anticancer agents and experimental validation: a case study
B. Analyzing and presenting results of the cytotoxicity data
C. Collection of feedback from participants
D. Valedictory meeting

Schedule

- Day 1**
09.00 : Breakfast and Registration
10.00 : Inaugural Meeting
11.00 : Session 1A
12.00 : Session 1B
13.00 : Lunch
14.00 : Lab and Campus Visit
15.30 : User requirements of Participants
16.00 : Tea/Coffee Break
- | | |
|----------------------|----------------------|
| Day 2 | Day 5 |
| 10.00 : Session 2A | 10.00 : Session 5A |
| 11.00 : Tea Break | 11.00 : Tea Break |
| 11.30 : Session 2B | 11.30 : Session 5B |
| 13.00 : Lunch | 13.00 : Lunch |
| 14.00 : Lab Session | 14.00 : Lab Session |
| 17.00 : Tea Break | 17.00 : Coffee Break |
| Day 3 | Day 6 |
| 10.00 : Session 3A | 10.00 : Session 6A |
| 11.00 : Tea Break | 11.00 : Tea Break |
| 11.30 : Session 3B | 11.30 : Session 6B |
| 13.00 : Lunch | 13.00 : Lunch |
| 14.00 : Lab Session | 14.00 : Lab Session |
| 17.00 : Coffee Break | 17.00 : Tea Break |
| Day 4 | Day 7 |
| 10.00 : Session 4A | 10.00 : Session 7A |
| 11.00 : Tea Break | 11.00 : Tea Break |
| 11.30 : Session 4B | 11.30 : Session 7B |
| 13.00 : Lunch | 13.00 : Lunch |
| 14.00 : Lab Session | 14.00 : Session 7C |
| 17.00 : Tea Break | 15.00 : Session 7D |
| | 16.00 : Coffee Break |

Annexure 2: List of registered participants for the workshop

Sr. No.	Candidate Name	Gender	Educational Qualification	Email address	University/Institute
1	Buddhadeb Panda	Male	M.Sc. (Botany)	bdpsrk@gmail.com	A. P. S. College Roth, Rajendra University, Odisha
2	Abhijit Pati	Male	M.Sc. (Biotechnology)	patiabhijit19@gmail.com	Berhampur University, Odisha
3	Debabrata Dash	Male	M.Sc. (Bioscience and Bioinformatics)	2017debabratadash@gmail.com	
4	Antony Anista M.	Female	M.Sc. (Zoology)	anista2127@gmail.com	Bharathiar University, Tamil Nadu
5	Baishali Basundhara Naik	Female	M.Sc. (Biotechnology)	baishaligolu@gmail.com	G.I.E.T University, Gunupur, Odisha
6	Priyanka Gartia	Female	M.Sc. (Bioinformatics)	gartia.priyanka@gmail.com	Gangadhar Meher University, Sambalpur, Odisha
7	Smaranika Sahu	Female	M.Sc. (Biotechnology)	sahusmaranika95@gmail.com	
8	Sriya Pattnaik	Female	M.Sc. (Biotechnology)	pattnaiksriya@gmail.com	Govt. Autonomous College, Sundargarh, Odisha
9	Sinchan Das	Male	M.Pharm (Pharmacognocny)	sinchandasa1996@gmail.com	Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G), Chhattisgarh
10	Varsha Yadav	Female	M.Pharm (Pharmacology)	231995varsha@gmail.com	
11	Nirupama Rani Dewangan	Female	M.Pharm (Pharmacology)	nirupamarani211096@gmail.com	
12	Dibya Ranjan Sahoo	Male	M.Pharm (Pharmaceutical Analysis and Quality Assurance)	dibyaranjan321@gmail.com	Gurukula Kangri (Deemed To Be University), Haridwar, Uttarakhand
13	Somesh Agrawal	Male	M.Pharm (Pharmacology)	someshagrwal.phe18@iitbhu.ac.in	Indian Institute of Technology, B.H.U., Varanasi, Uttar Pradesh
14	Bikash Chandra Behera	Male	M.Sc. (Biotechnology)	bikashjoker.bb@gmail.com	Khallikote University, Berhampur, Odisha
15	Rahul Sahoo	Male	M.Sc. (Zoology)	rahulsahoo60@gmail.com	National Institute of Technology, Rourkela, Odisha
16	Radhakanta Nag	Male	M.Sc. (Microbiology)	nagrufus@gmail.com	Odisha University of Agriculture & Technology, Bhubaneswar, Odisha
17	Animesh Pattnaik	Male	M.Sc. (Bioinformatics)	pattnaik.animesh0@gmail.com	
18	Adhitthan S.	Male	M.Sc. (Bioinformatics)	adhitthan.shanmugam@bicpu.edu.in	Pondicherry University, Kalapet, Puducherry
19	Maitreyee Gope	Female	M.Sc. (Human Physiology)	mg06041998@gmail.com	Raja N.L Khan Women's College (Autonomous) West Midnapore, West Bengal
20	Deepali Naik	Female	M.Phil (Life Science)	deepalinaik2104@gmail.com	Sambalpur University, Odisha
21	Ritvik Guru	Male	M.Sc. (Biotechnology)	rguru1997865@gmail.com	
22	Reshma Pradhan	Female	M.Sc. (Bioinformatics)	pradhanreshma456@gmail.com	
23	Swagat Mohanty	Male	M.Sc. (Biotechnology)	swagatrude@gmail.com	Siksha'O' Anusandhan Deemed To Be University, Bhubaneswar, Odisha
24	Omprakash Mohanta	Male	M.Sc. (Biotechnology)	imomofficial@gmail.com	
25	Soumya Swarup Panda	Male	M.Sc. (Agriculture with Plant Biology)	soumyapanda38@gmail.com	
26	R. Chetan Rao	Male	M.Sc. (Applied Microbiology)	rchetanrao21@gmail.com	Trident Academy of Creative Technology, Bhubaneswar, Odisha
27	Archana Pradhan	Female	M.Sc. (Biotechnology)	richipradhan65@gmail.com	
28	Dibyajit Pattanayak	Male	M.Sc. (Applied Microbiology)	dibyajit2016@gmail.com	
29	Manini Hansda	Female	M.Sc. (Biotechnology)	maninihansda58@gmail.com	Utkal University, Bhubaneswar, Odisha
30	Gutti Pavan	Male	M.Sc. (Biochemistry)	gutti.pavan2020@vitstudent.ac.in	Vellore Institute of Technology, Tamil Nadu

Annexure 3: Schedule date and activities during the workshop

10th October 2022	Day 1	11th October 2022	Day 2
	08:30 Registration		09:00 Session I
	09:00 Inaugural Session		11:00 Break
	10:45 Tea Break		11:30 Expert Talk
	11:00 Session I		12:30 Lunch
	12:30 Lunch		14:00 Session II (Hands on)
	14:00 Session II (Hands on)		15:30 Tea Break
15:30 Tea Break	16:00 Lab visit		
16:00 Campus Visit			
12th October 2022	Day 3	13th October 2022	Day 4
	09:00 Session I		09:00 Session I
	11:00 Tea Break		11:00 Tea Break
	11:30 Expert Talk		11:30 Expert Talk
	12:30 Lunch		12:30 Lunch
	14:00 Session IIA		14:00 Session IIA
	15:30 Tea Break		15:30 Tea Break
16:00 Session IIB	16:00 Session IIB		
17:00 Discussion	17:00 Discussion		
14th October 2022	Day 5	15th October 2022	Day 6
	09:00 Session I		09:00 Session I
	11:00 Tea Break		11:00 Tea Break
	11:30 Expert Talk		11:30 Expert Talk
	12:30 Lunch		12:30 Lunch
	14:00 Session IIA		14:00 Session IIA
	15:30 Tea Break		15:30 Tea Break
16:00 Session IIB	16:00 Session IIB		
17:00 Discussion	17:00 Discussion		
16th October 2022	Day 7		
	9:00 Interactive session		
	11:15 Tea Break		
	11.30 Closing remarks		<i>Sessions IIA & IIB will be Hands on training</i>

Annexure 4: Feedback summary

Sr. No	Content	% Rating
1	Overall grading of the program with reference to relevance of course, module/ content etc.	97% Rated on or above 8 points
2	Overall grading of the facilities provided by the institute, i.e., Hostel, Mess, Classrooms, Transport/infrastructure etc.	100% Rated on or above 8 points
3	Overall grading of the faculty members conducting the training	95% Rated on or above 8 points
4	How do you rate the overall training methodology	96% Rated on or above 8 points
5	How far the field visit is relevant and related to your research study	94% 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	97% Rated on or above 8 points
8	How far have you benefitted from interaction with the fellow participants of the training	98% Rated on or above 8 points
9	How far the course material supplied relevant and related to the training curriculum	94% Rated on or above 8 points
10	Overall grading of the process of training	93% Rated on or above 8 points
11	Your recommendation to your peers/ colleagues for the training Program	92% Rated on or above 8 points