

A Report

One-week Hands on Training Workshop On

**“Uses of Advanced Instruments and Numerical tools for Mining
Engineering Applications”**

16th January – 22nd January 2023

Under

Synergistic Training Program Utilizing the Scientific and Technological Infrastructure (STUTI), DST, Govt. of India

Organised by

Department of Mining Engineering IIT(ISM), Dhanbad



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<p>Prof. Ravi Gangwar Department of Electronics Associate Dean (R&D-SRIC) Indian Institute of Technology (ISM) Dhanbad</p>	
<p>Dr. Joydip Dutta Senior Project Associate DST STUTI PROJECT Indian Institute of Technology (ISM) Dhanbad</p>	
<p>Kumar Shanu Rajan Project Assistant DST STUTI PROJECT Indian Institute of Technology (ISM) Dhanbad</p>	
<p>Suraj Kumar Mishra Project Assistant DST STUTI PROJECT Indian Institute of Technology (ISM) Dhanbad</p>	

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Prof M S R Murthy Vemavarapu

Professor (HAG)

Department of Mining Engineering

Indian Institute of Technology (ISM) Dhanbad

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Assistant Professor

Department of Mining Engineering

Indian Institute of Technology (ISM) Dhanbad

**Prof Ram Madhav Bhattacharjee**

Professor

Department of Mining Engineering

Indian Institute of Technology (ISM) Dhanbad



INAUGURAL PROGRAMME SCHEDULE**VENUE:**

TIME	PROGRAMME
9:30 AM-10:00 AM	REGISTRATION
10:00 AM-10:03 AM	INVITING THE GUESTS TO THE DAIS <i>(Deputy Director, Dean R&D, Associate Dean, HOD Mining Engineering Dept. Programme Coordinators)</i>
10:07 AM-10:12 AM	WELCOME ADDRESS BY THE PROGRAM COORDINATOR FORMAL WELCOME
10:12 AM-10:20AM	ADDRESS BY THE HON'BLE DEPUTY DIRECTOR, Indian Institute of Technology (ISM) Dhanbad <i>Prof. Dheeraj Kumar</i>
10:22 AM-10:30 AM	ADDRESS BY DEAN, R&D & PMU COORDINATOR <i>Indian Institute of Technology (ISM) Dhanbad</i> <i>Prof. Sagar Pal</i>
10: 32AM- 10:38	ADDRESS BY Associate Dean (R&D-SRIC) Indian Institute of Technology (ISM) Dhanbad <i>Prof. Ravi Gangwar</i>
10:40 AM-10:45AM	VOTE OF THANKS <i>Prof. Radhakanta Koner</i>
11:00 AM	HIGH TEA



The Indian Institute of Technology (ISM), Dhanbad constituted under Institute of Technology Act, 1961 is administered through IIT Council the apex body, Government of India under the Chairmanship of Honorable minister, MoE for uniform and smooth governance of Pan- IIT in the country. Vision and mission of the institute are to be a nationally and internationally acclaimed premier institution of higher technical and scientific education with social commitment having an ethos for intellectual excellence, where initiative is nurtured, where new ideas, research, and scholarship flourish, where intellectual honesty is the norm and form, which will emerge the leaders and innovators of tomorrow in the realm of technology. Situated in the heart of the country's prime coking coal belt, 260 kms from Kolkata with a campus spread over an area of 393 acres (with 218 acres of existing campus and 175 acres under acquisition and development), the fully residential IIT(ISM) has all the facilities of world class academic institute. What started as an institution to impart mining education has graduated into full- fledged technical institution of international acclaim offering a host of programmed like B.Tech., M.Tech., M.Sc., MBA, and PhD. The current NIRF ranking of the institution among all the engineering colleges is 11.



Department of Mining Engineering, IIT(ISM) Dhanbad

The Department of Mining Engineering was established in 1926 with the founding of the School in that year by the then Viceroy of India, Lord Irwin. Over the past 90 years, it has developed and grown to become the largest Department of its kind in the country with excellent facilities for teaching and research and widespread activities in both coal, metalliferous mining, and construction sectors. Its high reputation attracts students from all parts of India as well as from abroad.

The Department has been recognized as a QIP Centre for the faculty members of other Mining Engineering Departments of the country to pursue higher studies (M.Tech. and Ph.D.). The Department has been accorded the status of “Centre of Advanced Studies” in Mining Engineering by the University Grant Commission, in recognition of its high standards of teaching, research and services to the mining industry.

The students passing out from this Department have traditionally occupied top positions in the government departments, academia, and research organizations as well as in the mining industry, both in India and abroad. The posts of Director-General of Mines Safety; Chairmen and Managing Directors of most of the mining companies and top executives of many other companies, both in the public and private sectors, have been traditionally occupied by the ex-students of the Department. Over 500 alumnus of Indian Institute of Technology (Indian School of Mines), Dhanbad are working in the USA, Australia, Europe, and other parts of the globe, in highly respectable positions.

Acknowledging the standards of teaching and research imparted and the contributions made to the mining industry, the Department has been ranked at 24th position in QS ranking among the global universities offering Mining and Mineral education.



SYNERGISTIC TRAINING PROGRAMME UTILIZING THE SCIENTIFIC AND TECHNOLOGICAL INFRASTRUCTURE (STUTI)

Synergistic Training Program Utilizing the Scientific and Technological Infrastructure (STUTI) Program of The Department of Science & Technology (DST), Government of India, is Intended to Build Human Resource and Its Knowledge Through Open Access to S & T Infrastructure Across the Country by organizing specialized training programs on DST-supported R&D equipment targeting Ph.D. Scholars, Post-Doctoral Fellows, Scientists, Faculty, etc. are actively involved in intensive research.

As a complement to the various schemes of DST funding for expansion of R&D Infrastructure at academic institutions, STUTI scheme envisions a hands-on training program and sensitization of the state-of-the-art equipment as well as towards sharing while ensuring transparent access of S&T facilities.

The training will be conducted on a hub-and-spoke model approach. The Department of Science and Technology as the apex body will identify an Institute that shall function as a Project Management Unit (PMU). The hubs will essentially be Organizations having availed projects under FIST/ PURSE/ CURIE/ SAIF/ SATHI schemes. The PMU then shall act as a hub further identify host institutes/ departments in the catchment areas for coordinating and imparting the training in a smooth and efficient manner.

The program is being organized as part of Azadi ka Amrit Mahotsav. The program consists of both theory and as well as hands on experience with various instruments, supported by DST. The uniqueness of the program includes minimum four hours' theory and remaining 50% of the duration is on practical training on the equipment. Effort would be made for hands-on use of equipment for demonstration/ characterization by each participant. The program's aim is to promote the research collaborations to the maximum extent. After completion of the workshop, participants can appreciate how these techniques will help in understanding social problems through knowledge and information gained from this programme. This training program provides a platform for interaction and exchange of innovative ideas on current trends in the fields of Science and Technology, with talks by eminent people in the field.

DEPARTMENT OF SCIENCE AND TECHNOLOGY
MINISTRY OF SCIENCE AND TECHNOLOGY
GOVT. OF INDIA



Department of Science & Technology (DST) was established in May 1971, with the objective of promoting new areas of Science & Technology (S&T) and to play the role of a nodal department for organizing, coordinating and promoting S&T activities in the country. The Department has major responsibilities for specific projects and programmes such as Formulation of policies relating to Science and Technology, Matters relating to the Scientific Advisory Committee of the Cabinet (SACC), etc.

The R&D Infrastructure Division of the Department aims to strengthen the S&T infrastructure of the country by fostering well-equipped R&D labs in the academic/research institutes/universities as well as a strong culture of research collaboration between institutions and across disciplines.



STUTI HANDS-ON TRAINING WORKSHOP SCHEDULE, 16 JAN. – 22 JAN. 2023,
IIT(ISM), DHANBAD

Detail Program Schedule		
Venue: - EDC, 4th Floor, Epiroc Smart classroom-2		
Technical Program & Date	Lecture Time	Name of the expert
Cavity Auto Scanner, Anchor borehole inspection tool & Borehole triaxle geophone. (16- Jan- 2023, Monday)	10:00 a.m. – 11:15 a.m.(Theory) 11:30 a.m. 12:45 p.m. (Theory) 02:00 p.m. 05:00 p.m. (Lab Demo)	Prof. V.M.S.R. Murthy Dept. of Mining Engg. IIT (ISM) Dhanbad
Gyromat – 3000 (17- Jan- 2023)	10:00 a.m. – 11:15 a.m.(Theory) 11:30 a.m. 12:45 p.m. (Theory) 02:00 p.m. 05:00 p.m. (Lab Demo)	Prof. Dheeraj Kumar Dept. of Mining Engg. IIT (ISM) Dhanbad
Universal Testing Machine (UTM) & Material Testing System (MTS) (18- Jan- 2023)	10:00 a.m. – 11:15 a.m.(Theory) 11:30 a.m. 12:45 p.m. (Theory) 02:00 p.m. 05:00 p.m. (Lab Demo)	Prof. R.K. Sinha Dept. of Mining Engg. IIT (ISM) Dhanbad
Ventilation (19- Jan- 2023)	10:00 a.m. – 11:15 a.m.(Theory) 11:30 a.m. 12:45 p.m. (Theory) 02:00 p.m. 05:00 p.m. (Lab Demo)	Prof. Deviprasad Mishra Dept. of Mining Engg. IIT (ISM) Dhanbad
UAV setup for mining engineering application. (20- Jan- 2023)	10:00 a.m. – 11:15 a.m.(Theory) 11:30 a.m. 12:45 p.m. (Theory) 02:00 p.m. 05:00 p.m. (Lab Demo)	Prof. Radhakanta Koner Dept. of Mining Engg. IIT (ISM) Dhanbad
Local Field Visit(21- Jan- 2023)	10:00 a.m. – 05: 00 p.m.	Prof. Radhakanta Koner Dept. of Mining Engg. IIT (ISM) Dhanbad
Safety and Legislation (22- Jan- 2023)	10:00 a.m. – 11:15 a.m.(Theory) 11:30 a.m. 12:45 p.m. (Theory) 02:00 p.m. 05:00 p.m. (Lab Demo)	Prof. Rammadhab Bhattacharya Dept. of Mining Engg. IIT (ISM) Dhanbad

HIGHLIGHTS OF THE WORKSHOP

- The seven days STUTI training program enabled the participants to have a close look, acquire skill-based knowledge and hands-on training into the sophisticated instruments, viz., Cavity Auto Scanner, Anchor borehole inspection tool & Borehole triaxle geophone, Gyromat-3000, Universal Testing Machine(UTM)& Material Testing Machine(MTS), Ventilation, UAV Setup, etc.
- Elaborate descriptions on the working principle of the sophisticated instruments, sample preparation and some of the applications.
- The participants received expertise on sophisticated instruments to gain deeper understanding of operating techniques.
- Participants received the opportunities to learn important rescue procedure & actual coal mines internal structure during local sight Visit.
- Participants received opportunities to interact with the resource persons and technical person's one to one basis.
- Participants were encouraged to bring their own samples for analyses and in fact, their samples were analysed too.
- Participants were also briefed and demonstrated about the laboratory safety, instrument safety and precautions to be taken during running of the sophisticated instruments.

PARTICIPATING INSTITUTES STATE WISE

SI. No.	State	Institutes/Industries	No. of Registered Participants
1.	Jharkhand	PKRM College Dhanbad*	04
		SSLNT College Dhanbad	03
		BCCL, Dhanbad	03
		ISI Giridih	01
		IIT(ISM), Dhanbad*	05
		CSIR -CIMFR Dhanbad	01
2.	Bangalore	Dr. TTIT, KGF	02
		SVIT, KGF	01
3.	Odisha	NIT Rourkela	03
	Rajasthan	Manipal University Jaipur	01
	West Bengal	Calcutta University	01
4.	Jammu & Kashmir	NIT, Srinagar	01
5.	Guwahati	IIT Guwahati	01
		NIT Silchar	01
5.	Madhya Pradesh	AGI Satna	01
		Mining GGI Satna	01
TOTAL			30

List of Registered Participants

SI No	Name	Affiliation	State	Designation
01	Mr. Jajneswar Biswal	Department of Mining Engineering (NIT, Rourkela)	Odisha	Ph.D. Fellows
02	LINGAMPALLY SAI VINAY	DEPARTMENT OF MINING ENGINEERING, IIT ISM DHANBAD	Jharkhand	Research Scholar
03	Dr. Manjunath A.	Department of Mining Engineering, Dr. T. Thimmaiah Institute of Technology, KGF	Bangalore	Professor
04	Mr. PAUL PRASANNA KUMAR	Department of Mining Engineering, Dr T Thimmaiah Institute of Technology, Kolar Gold Fields	Bangalore	Professor
05	Ms. Poulami Konar	Department of Mining Engineering (National Institute of Technology, Rourkela)	Odisha	Ph.D Fellow
06	Mr. Abhishek Kumar Singh	Department of Mining Engineering (National Institute of Technology, Rourkela)	Odisha	Ph.D. Fellows

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07	Dr. Manas Kumar Mallick	Department of Mining Engineering, BIT Sindri	Jharkhand	Asst. Professor
08	Shubhanshu Singh	Department of Mining Engineering (Aditya group of institutions Satna)	Madhya Pradesh	Industry
09	Ashish Mishra	Department of Mining Engineering (ACTS, Satna)	Madhya Pradesh	Asst. Professor
10	Mr Raj Kumar Jaiswal	Department of Fuel Mineral and Metallurgical engineering IIT ISM Dhanbad	Jharkhand	PhD
11	MINARUL ISLAM SARKAR	Sir Gurudev Mahavidyalaya C.V.	West Bengal	Ph.D. Fellows
12	Ziaul Haque	Department of Fuel Mineral and Metallurgical Engineering	Jharkhand	Ph.D
13	Mr.Shankar	Department of Mining Engineering (SVIT, KGF)	Bangalore	Assistant Professor
14	Kanishka Kulshrestha	Coal India Ltd (BCCL)	Jharkhand	Assistant Manager Mining
15	Tripti Maurya	Coal India Ltd (BCCL)	Jharkhand	MT(Min.)
16	Rohit Kumar	Coal India Ltd (BCCL)	Jharkhand	Dy. Mgr. (Min.)

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17	Palak kumari jaiswal	P.K.Roy Memorial College	Jharkhand	Involved in research
18	Neelam kumari	P.K.Roy Memorial College	Jharkhand	Involved in research
19	Anjali kumari	P.K.Roy Memorial College	Jharkhand	Involved in research
20	Rakesh Prasad	IIT Guwahati	Guwahati	Involved in Research
21	Ms. Puja Kumari	PKRM College	Jharkhand	Student
22	Gudiya Kumari	S.S.L.N.T College	Jharkhand	Guest faculty
23	Prerna kirti	S.S.L.N.T College	Jharkhand	Assistant professor
24	Amit Kumar Mankar	IIT ISM DHANBAD	Jharkhand	Research Scholar
25	Kapoor Chand	IIT ISM DHANBAD	Jharkhand	Research Scholar
26	Dr. J Pandey	CSIR-CIMFR, Dhanbad	Jharkhand	Sr. Tech. Officer
27	Peeyush Garg	Manipal University Jaipur	Rajasthan	Research Scholar
28	Malay Pramanik	NIT Silchar	Guwahati	Research Fellow
29	Bilal Ahmad Malik	NIT Srinagar	Jammu & Kashmir	Research Fellow
30	Suman Midda	ISI Giridih	Jharkhand	Research Fellow

DAY BY DAY PROCEEDINGS

Highlights of the Day-1 (Dated: 18th July, 2022)

The First session of the training program started with the lecture by Prof. V.M.S.R. Murthy Dept. of Mining Engg. IIT (ISM) Dhanbad. Two lecture given based on Cavity Auto Scanner, Anchor borehole inspection (From 12:45 PM to 1:30PM).

Next, after the lunch break, a practical demonstration (from 02:00 PM to 05:00 PM) on on Cavity Auto Scanner, Anchor borehole inspection tool & Borehole triaxle geophone was provided by Prof. V.M.S.R. Murthy.



Prof. V.M.S.R. Murthy delivering lecture on Cavity Auto Scanner, Anchor borehole inspection



Prof. V.M.S.R. Murthy interacting with the participants during CAC, Anchor borehole hands-on training session.

Highlights of the Day-2 (Dated: 19th July, 2022)

On the second day, two lectures were given by Prof. Dheeraj Kumar Dept. of Mining Engg. IIT (ISM) Dhanbad on Gyromat. The first lecture (from 10:00 AM to 11:15AM) and the second lecture (from 11:30 AM to 12:45 PM).

Next, after the lunch break, a practical demonstration (from 02:00 PM to 05:00 PM) on Gyromat was provided by Prof. Dheeraj Kumar.



Prof. Dheeraj Kumar delivering lecture on Gyromat



Participants during hands-on training



Participants during hands-on training

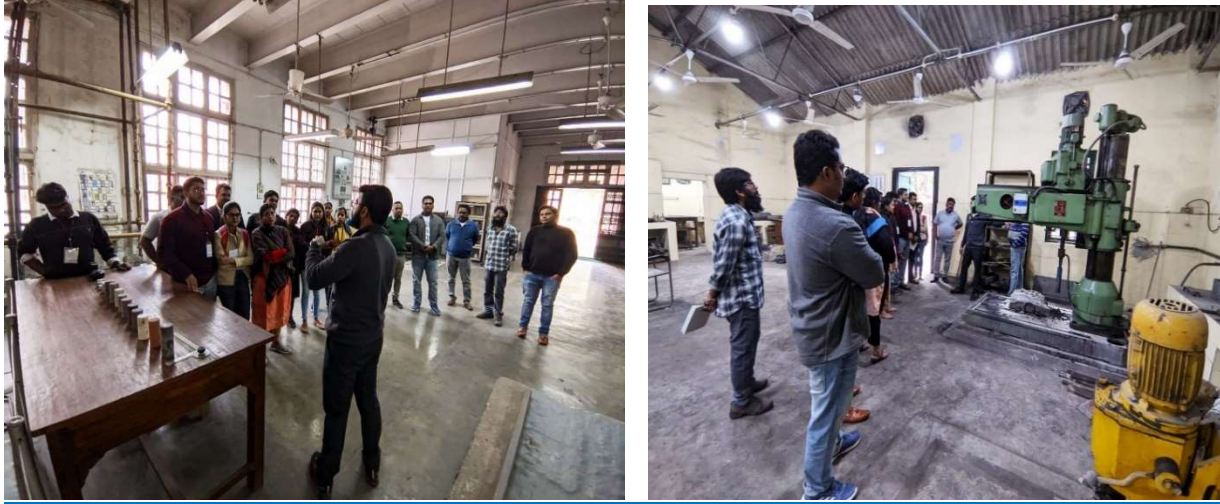
Highlights of the Day-3 (Dated: 20th July, 2022)

Similarly, on the third day, two lectures were conducted. Universal Testing Machine (UTM) & Material Testing Machine (MTS) was the prime focus of these lectures. Both lecture was delivered by Prof. R. K. Sinha Dept. of Mining Engg. IIT (ISM) Dhanbad.

Following the lunch break, a practical demonstration (from 02:00 PM to 05:00 PM) on Universal Testing Machine (UTM) & Material Testing Machine (MTS) provided by Prof. R. K. Sinha.



Prof. R. K. Sinha delivering lecture on Universal Testing Machine (UTM) & Material Testing Machine (MTS)



Participants during hands-on training

Highlights of the Day-4 (Dated: 21st July, 2022)

On the fourth day, two lectures were given based Ventilation the first lecture (from 10:00 AM to 11:15 AM) and the second lecture (from 11:30 AM to 12:45 PM) was delivered by Prof. Devi Prasad Mishra Dept. of Mining Engg. IIT (ISM) Dhanbad.

Next, after the lunch break, a practical demonstration (from 02:00 PM to 05:00 PM) on the Ventilation was provided by Prof. Devi Prasad Mishra.



Prof. Devi Prasad Mishra delivering lecture on Ventilation



Participants during hands-on training

Highlights of the Day-5 (Dated: 22nd July, 2022)

Similarly, on the fifth day, two lectures were conducted. UAV setup for mining engineering application were the prime focus of these lectures. The first lecture (from 10:00 AM to 11:15 AM), and the second lecture (from 11:30 AM to 12:45 PM) was delivered by Prof Radhakanta Koner Dept. of Mining Engg. IIT (ISM) Dhanbad.

Next, after the lunch break, a practical demonstration (from 02:00 PM to 05:00 PM) on UAV setup was provided by Prof Radhakanta Koner.



Prof. Radhakanta Koner delivering lecture on UAV setup for mining engineering application

Highlights of the Day-6 (Dated: 23th July, 2022)

On the sixth day, participants visited at Mines Rescue Station, Dhansar Dhanbad where after introduction with mines rescue employee and participants. Mining Instruments demonstrated by instructor Ram (Mines Rescue Station Dhansar) along with Prof. Radhakanta Koner (IIT, ISM Dhanbad). After that One practical demo session conducted by their staff on rescue during the mining incidents.

Next, after the lunch break, participants visited a Chand Mari coal mines their they know many things by instructor.



Group Photo at Mines Rescue Station



Group Photo at Mines Rescue Station



Small Group Photo at Chandmari Coal Mine

Highlights of the Day-7 (Dated: 24th July, 2022)

On the seventh day (the last day of the training program), two lectures were conducted. Safety & Legislation were the prime focus of these lectures. The first lecture (from 10:00 AM to 11:15 AM), and the second lecture (from 11:30 AM to 12:45 PM) was delivered by Prof. Rammadhab Bhattacharya, Dept. of Mining Engg. IIT (ISM) Dhanbad.

Next, after the lunch break, a practical demonstration (from 02:00 PM to 04:00 PM) on Safety & Logistics was provided by Prof. Rammadhab Bhattacharya.

VALEDICTORY SESSION

Valedictory Program [Sunday 22-01-2023 @ 04:05 PM - 5:40 PM]	
Time (IST)	Event
04:05 PM – 04:15 PM	Address by Deputy Director IIT(ISM), Dhanbad Prof. Dheeraj Kumar
04:15 PM – 04:25 PM	Address by Dean, R&D & PMU Coordinator Prof. Sagar Pal
04:25 PM – 04:35 PM	Address by Associate Dean (R&D-SRI) Prof. Ravi Gangwar
04:35 PM – 04:40 PM	Address by Training Workshop Coordinator Prof. Radhakanta Koner
04:40 PM – 05:00 PM	Feedback by Participants
05:00 PM – 05:15 PM	Certificate Distribution to participants
05:15 PM – 05:20 PM	Vote of Thanks
05:20 PM – 05:35 PM	Photo session
05:40 PM	High Tea

Photos



Prof. Sagar Pal addressing the participants Prof. D.P. Mishra addressing the participants



Group Photo



Small Group Photo



Prof. V.M.S.R. Murthy addressing the participants

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Prof. Ravi Gangwar & Prof. Sagar Pal presenting the certificate to the participants



Prof. Somnath Chattopadhyay & Prof. Radhakanta Koner presenting the certificate to the participants

WAY FORWARD

Based on the responses, interactions and feedbacks received from the participants, it is realised that such programmes where hand on training component is attached are highly beneficial. We are encouraged and motivated to organize such programmes with further improvements in near future.

ACKNOWLEDGEMENTS

The Department of Science and Technology (DST) New Delhi has sanctioned a project under Synergistic Training Program Utilizing the Scientific & Technological Infrastructure (STUTI) program to IIT(ISM) Dhanbad. We would like to thank DST for funding such kinds of programmes Support. A big round of applause to the volunteers and the organising team members. This training program would not have been successful without their constant and active support. Thank you, dear students and organising committee members for your contributions and enthusiasm in each and every aspect of the event. This also motivates us to conduct more program in the near future. Last but not least, the organising committee want to put on record the help and support of all administrative and staff and everyone who has contributed to making this training program a grand success.

OUTCOME

These seven days unique STUTI training workshop received overwhelming responses from institutes/ universities/colleges/industries across the country. Applicants were from different backgrounds such as Mining, Civil, chemistry, Physics Science and technology. Although it was not possible to include all the applicants into the programme, but reasonably a good number of participants were selected with diversification with regard to location and background. The program enabled the participants to have a close look, acquire skill- based knowledge and hands-on training into the sophisticated analytical instruments, viz., Cavity Auto Scanner, Anchor borehole inspection tool & Borehole triaxle geophone, Gyromat-3000, Universal Testing Machine(UTM)& Material Testing Machine(MTS), Ventilation, UAV Setup, etc. The participants were provided the elaborate descriptions on the working principle of the sophisticated instruments, sample preparation and some of the applications. Through the examples and hands on training,

Participants received expertise to gain deeper understanding of instrumental techniques, develop Data analysis skill and interpretation skills. Most importantly, participants received opportunities to interact with the resource persons and technical persons one to one basis. We were happy to analyse some samples of the participants. Nevertheless, participants were also briefed and demonstrated about the laboratory safety, instrument safety and precautions to be taken during running of the sophisticated instruments. After all, it was a package. It is expected that the participants will also try to address social problems through knowledge and information gained from this programme.

FEEDBACK

From the feedback received from the participants, it seems that the programme was well-received by the participants. All the participants are happy and have shown their satisfaction in respect of the content, delivery, and presentations of all the topics covered during the presentation. Resource persons also conveyed positive feedbacks in respect of the programme. The organising committee took special interest in the foods provided to the participants and resource persons.

Prof. Sagar Pal
Coordinator (DST-STUTI)

Prof. Ravi Kumar Gangwar
Co-Coordinator (DST-STUTI)

Prof. Radha Kanta Koner
Program Coordinator