



BIT MESRA



DEPARTMENT OF  
SCIENCE & TECHNOLOGY



IIT(ISM) DHANBAD

## One-Week Training Program on

# Advanced Instrumental Techniques in Chemistry and Material Sciences (AITCMS22)



09<sup>th</sup> -15<sup>th</sup> May 2022

Conducted by



DEPARTMENT OF CHEMISTRY

BIRLA INSTITUTE OF TECHNOLOGY MESRA (BIT MESRA) RANCHI-835215

Under

DST-STUTI PROGRAMME OF INDIAN INSTITUTE OF TECHNOLOGY (ISM) DHANBAD-826004

Funded by: Department of Science & Technology (DST), Govt. of India

The one-week training program on "Advanced Instrumental Techniques in Chemistry and Material Sciences (AITCMS22)" will be conducted by the Department of Chemistry, Birla Institute of Technology (BIT Mesra) Ranchi under the banner of 'Synergistic Training Program Utilizing the Scientific & Technological Infrastructure (STUTI)' project of Department of Science and Technology (DST), Government of India. The training content is considered to impart knowledge on some advanced instrumental techniques used for characterization in Chemistry, Physics, Polymers, Environment and other all areas of material sciences. This module will be beneficial for the researchers actively engaged in research or consultancy work. Participants will have to go through the classroom teaching which will be followed by the laboratory demonstration on each instrument. So, the practical operation procedures, interpretation of analysis results of each instrumental technique will be discussed in detail. The theory session will be followed by a hands-on laboratory demonstration for a better understanding of the principle and operation of the instruments and the use/ interpretation of the data. "Following schedule and topics shall be covered within this module."

### ACTIVITY

### DELIVERABLES

NMR  
(DST FIST Supported)

Most widely used instrument in determining molecular structure of the material when placed in a magnetic field. We will learn about NMR, its concepts, operation and interpretation of spectra using a 400 MHz NMR facility in the department.

FTIR & Computational  
Chem Lab  
(DST FIST Supported)

FTIR is one of the first hands instruments used for characterization of samples, know about the functional groups present in it. We will learn analysis, operation and interpretation of spectra using FTIR. Computational chemistry lab will give an exposure to molecular modeling softwares.

Flame Photometer,  
AAS & ICPOES

Flame photometry, Atomic absorption spectroscopy and Inductively coupled plasma optical emission spectroscopy will help to determine the concentration of metals in various samples in aqueous forms. Here, we will learn sample preparation, principles and operation of these instruments.

HPLC & other Separation  
Techniques

High Performance Liquid Chromatography is one of the prominent separation techniques. Here, we will learn concepts, operation and working of HPLC and other separation techniques used at industrial level.

FESEM & XRD

FESEM is used to determine the morphology of samples. We will learn principle, operation, sample preparation and various case studies of analysed samples. XRD is a technique used for determination of nature and structure of a molecule. We will learn about Xray diffraction & Bragg's law, crystal systems and structures.

Electrochemical  
Analyzer

Electrochemical analyzer is used for electrochemical measurements. This is largely used for determination of potential, current, applications in cells, batteries etc. We will learn basic principles, operation and applications of this system.

UV Vis &  
Spectrofluorometer

UV-Vis Spectroscopy is an indispensable analysis to know about sample information and its concentration. Spectrofluorometer uses fluorescent properties of compounds in order to provide information regarding their concentration and chemical environment in a sample. We will learn basic principles, sample preparation, operation procedure and applications of both these instruments.

### Contact Persons

**Prof. Sagar Pal**

Coordinator: DST-STUTI Project  
IIT(ISM) Dhanbad  
Email: sagarpal@iitism.ac.in  
Tel: 9471191529

**Prof. Ravi K. Gangwar**

Co-coordinator: DST-STUTI Project  
IIT(ISM) Dhanbad  
Email: ravi@iitism.ac.in  
Tel: 9771457994

**Prof. Parthasarathi Das**

Programme Coordinator  
IIT(ISM) Dhanbad  
Email: partha@iitism.ac.in  
Tel: 9419227993

**Dr. Sumit Mishra**

Program Coordinator  
BIT Mesra, Ranchi  
Email: smishra@bitmesra.ac.in  
Tel: 8210629045



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### About The Program

The Department of Science and Technology (DST) intends to build human resources and knowledge capacity by arranging training programs through open access science and technology infrastructure across the country under the banner of 'Synergistic Training program Utilizing the Scientific & Technological Infrastructure (STUTI)'. Each training session will be for seven (7) days and thirty (30) participants can be accommodated. All the training expenditures (travel by train, food and accommodation, training materials) will be borne by the DST. The present proposed program will be conducted by the Department of Chemistry, Birla Institute of Technology Mesra, Under DST-STUTI Programme of Indian Institute of Technology (ISM) Dhanbad to impart knowledge on some advanced instrumental techniques used for characterization in Chemistry, Physics, Polymers, Environment and all other areas of material sciences. This module will be beneficial for the researchers actively engaged in research or consultancy work. Participants will have to go through the classroom teaching which will be followed by the laboratory demonstration of each instrument. So, the practical operation procedures, interpretation of analysis results of each instrumental technique will be discussed in detail. The training program will be arranged from 9th May to 15th May, 2022. The participants may be allowed to bring their samples, if any, for hands-on analysis. Eligibility Criteria for Participants of the Training Program Person of Indian origin; Minimum qualification should be Post Graduate (Science) or B.Tech. (Technology); Professors/Scientists/ Post-Doc Fellows/ Ph.D. Fellows/ Industry persons who are actively involved in research and development (R&D). Not more than 3 participants from one institute per training should be allowed from outside the host institute.

### About The Department

The Department of Chemistry, BIT Mesra was established in 1955, offers undergraduate, postgraduate & Ph.D. programmes in Chemistry. The Department has received support under "Fund for Improvement in Science & Technology Infrastructure" (FIST-2012) programme of the Department of Science and Technology, New Delhi for NMR and Computational Chemistry facilities. The Department is actively involved in promoting environmental awareness amongst the tribal and rural population in Jharkhand. The Department is committed to high quality research programmes supported by DST-SERB, UGC, DBT, CSIR, AICTE, UNICEF and World Bank in major thrust areas like Fuels & Energy, Nonlinear Chemical Dynamics, Frontal Polymerization, Electrochemical Machining, Organic and Molecular Synthesis, Environmental controls and monitoring, Nanotechnology and Computational Chemistry.

### About The Institute

Established in 1955 by the visionary industrialist Mr. BM Birla, BIT Mesra was founded with a clear vision to offer its young minds a space, where their imagination could take wings and their ideas fruition. The first institution to be granted autonomous status in 1972 under UGC Act, BIT initiated the concept of small manufacturing enterprises in 1970 by establishing the Small Industries Research and Development Organization (SIRDO). The first example of Science and Technological Entrepreneurs Park (STEP) in the country subsequently conceptualized and established by the Government of India in several IITs. The main campus of BIT in the outskirts of Ranchi at Mesra is spread over approximately 780 acres of a well laid out township with adequate civil infrastructure of buildings, metallic roads, parks and social amenities in the midst of a generous spread of lush green natural Sal Forest located at the confluence of Subarnrekha and Jumar rivers.

The academic program of the Institute comprises 17 Departments and Centres with active support from modern and sophisticated research facilities like High Performance and Desktop Computing Laboratory, Central Instrumentation Facility, Central CAD Laboratory, Central Workshop with machine, foundry and fabrication facilities, Design and Architecture Studios, Teaching and Specialized Research Laboratories and Language laboratory. BIT Mesra has a strong foothold in research activities with a large number of sponsored research projects with funding from ISRO, DST, DRDO, BRNS, ICMR, CSIR, AICTE, ICSSR, Rural Development, etc. BIT Mesra was ranked 38th among the Engineering Institutions, 66th among the Universities and 85th in the overall ranking categories by NIRF for the 5-year period of 2016 to 2020.

### Contact Persons

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### LOCAL ORGANIZING COMMITTEE

Patron	:	Dr. Indranil Manna, Hon'ble Vice-Chancellor, BIT, Mesra
Chairperson	:	Dr. Ashoke Sharon, Professor & Head, Dept. of Chemistry, BIT Mesra
Program Coordinator	:	Dr. Sumit Mishra, Dept. of Chemistry, BIT Mesra
Organizing Secretary	:	Dr. Subhendu Naskar
Treasurer	:	Dr. S S Mahapatra and Mr. A. K. Singh
Registration Committee	:	Dr. Atul Kumar, Dr. G. K. Agarwal
Accommodation & Food	:	Dr. Joydeep Dhar, Dr. J. P. Pandey
Transport	:	Dr. Anirban Pradhan, Dr P Kar
Press, Web & Media	:	Dr. Gautam Sen, Dr. Debdutta Chakraborty, Dr. P. K. Srivastava
Venue Management	:	Dr. B D Ghosh, Dr. Usha Jha, Dr. Chandralata Bal, Dr. Deep Shikha

Caretaker, Electricity, Water, Transport, Dispensary, Network: In-charge Concerned Department,  
[Coordination by Deepak Kumar, Department of Chemistry]