

REPORT

on

DST sponsored
Synergistic Training program Utilizing the scientific
and Technological Infrastructure (STUTI) program

on

“Advanced Research Instrumentation”

Organized by



(SPOKE)

Department of Physics
Bareilly College
Mahatma Jyotiba Phule Rohilkhand
University, Bareilly (U.P.)

in collaboration with



Aligarh Muslim University, Aligarh (U.P.)

(HUB)

25th July 2022 to 31st July 2022

REPORT

The programme started with inauguration on 25th Jul, 2022, in which Prof. Ashok Kumar Jain, Advisor, at the Amity Institute of Nuclear Technology, Noida was the Chief Guest. Prof. O.P. Rai, the principal of the Bareilly college, and Dr. V. P. Singh, Head of the department of Physics were present. The PMU coordinator also participated in the inauguration session. Prof. Avinash Agrawal, coordinator of the programme at Bareilly college, Bareilly welcomed all the dignitaries and described about the STUTI project of DST.



Prof. Avinash Agrawal, Convener of the programme while presenting his welcome address during the inaugural function

Prof. Jain in his address presented his views to the participants as to how one can excel in his career of research and teaching. He also emphasised on learning through books and having a habit of self-reading. He also narrated the story of Sir C. V. Raman, how with the help of instrument made with a small amount of money he was able to discover and explain the phenomenon of scattering of light. The brochure of the seven days training programme was released by Prof. Jain.



Prof. A. K. Jain, Chief Guest of the programme while presenting his address during the inaugural function



Release of the brochure of the training programme

Prof. B. P. Singh in his address gave a detailed description of developing scientific spirit and temperament. The principal of the college gave a detailed description of the historical perspective of the college. The head of the department described in detail about the teaching and research activities in the department. Prof. Avinash Agarwal welcomed all the guests and presented in detail the facilities available at the college level and at nearby institutes.



Felicitation of Prof. A.K. Jain, Chief Guest of the inaugural function by head of the Physics Department Prof. V.P. Singh



Prof. B. P. Singh while delivering the talk in the programme

After the inaugural session key note talk entitled “Measurement of Time” “was delivered by Prof. A.K. Jain. He very nicely elaborated on how the development of measurement of time started and what are new techniques of measuring time including the working of atomic clocks. The second talk was delivered by Prof. B. P. Singh on the topic “Nuclear radiations and their applications for societal benefits”. He gave a detailed description of various types of nuclear radiations, their properties and how the radiations are being used for the medical diagnostic, treatment purposes. He also described about the food irradiation method and for preservation of food. After the talk participants visited laboratories and got hands on training about the working of various equipment.

The second day started with a talk by Dr. Praveen Singh from Indian Veterinary Research Institute (IVRI), Bareilly on the topic “Physical principles of SPR Bio sensors & its applications. The second talk was delivered by Prof. Sudhir Mehrotra from Lucknow University who discussed the topic “Importance of Polymerase Chain Reaction (PCR) in the modern era.”. After two informative talks, the participants of the training programme visited Biochemistry and Nano Technology Laboratory and performed hands on training on several equipment.

The third day started with a talk by Prof. Shahid Husain, AMU Aligarh who delivered his talk on “Structural Analysis of Materials Using X-ray Diffraction Technique”. He talked about the properties of X-ray diffraction and explained that X-ray diffraction is a versatile, non-destructive characterization technique that reveals detailed information about the chemical composition, crystallographic and microscopic structure of all types of natural and manufactured materials. He elaborated that X-rays can yield unique fingerprints of Bragg reflections associated with the crystal structure. He also discussed the crystal structure which can be thought of as a formation of layers, or planes, with each layer

acting as a semi-transparent mirror. He stated that X-rays with a wavelength similar to the distances between these planes can be reflected such that the angle of reflection is equal to the angle of incidence and one can determine the lattice parameters, unit cell volume, crystallite size and micro-strain with the help of this technique. The second talk of the day was delivered by Dr. M. Wasi Khan, AMU Aligarh on the topic "Nanomaterials: Synthesis and properties, Fundamentals of Transmission Electron Microscopy (TEM). The laboratory session was conducted after the lunch break for the demonstration Biochemistry and Nano Technology.

On the fourth day, the talks were given by Dr. M. Wasi Khan and Prof. Shahid Husain. Dr. M. Wasi Khan delivered an enlightening lecture on "Transmission Electron Microscopy Characterization of Nanomaterials". He discussed the widespread application of the microscopic technique, Transmission Electron Microscopy (TEM), for the complete characterization of nanomaterials and devices. He said that TEM plays a vital role in the characterization of specimens in diverse areas such as physical and life sciences and provides information about material structure and chemical composition through the interaction of electrons with the specimen. In his lecture, he introduced some of the historical developments in TEM and covered instrumentation, sample preparation, imaging and analytical microscopy. In addition, he also highlighted some of the specific drawbacks or limitations of TEM and discussed the interpretation of TEM images which would be useful for the research work of the participants. Prof. Shahid Husain delivered a scientific lecture on "Role of dielectric spectroscopy in investigation of material properties". He discussed several characterization tool to study the optical properties of materials. Thereafter, participants visited Labs as per their interest and interacted with distinguished faculty members.



Participants While attending the programme

The fifth day was started with talk by Dr. Pragati Kumar from Central University of Jammu who delivered his talk on the topic "Fabrication and characterization of Quantum Dot

Light Emitting Diodes.. The second talk was delivered by Prof. B. C. Yadav from BBAU, Lucknow on the topic "Scanning Electron Microscope and Energy Dispersive X-Ray Analyser". After the lunch break, the demonstration of High performance computational (HPC) Lab was conducted.

On the sixth day the talks were delivered Dr. Praveen Singh and Prof. Avinash Agarwal. Dr. Praveen Singh talked on the topic "Magnetic and Au-Nanoparticles: Synthesis and Diagnostic applications" while as Prof. Avinash talked on the topic "Instrumental Nuclear Activation Technique: A sensitive probe for elemental identification and quantification Thereafter, demonstration in Limnology and aquatic biotechnology lab was conducted.

The seventh day started with talk by Dr. Sunil Kumar from Bareilly College Bareilly who talked on the topic "Physiochemical Characteristics of Water". he also discussed about fisheries and discussed the various types of fishes found world-wide. Dr. Jai Prakash, Department of Physics, AMU Aligarh delivered talk on Liquid Crystal Materials and their Applications. Dr. Prakash started his talk with states of matter and explained about four states of matter Solid, Liquid, Gas, Plasma and specially the orientation of molecules in crystalline solid and Liquid. He also discussed about different phases like nematic, smectic, cholesteric and discotic etc. and informed contribution of Indian Scientist in the field of soft matter. He discussed various applications of liquid crystal materials like Pocket PC phone, Laptop Monitors, High-Definition LCD TV Flexible Wrist watch, Tunable Fabry-Perot etalon, Tunable focus liquid crystals lens, optical devices, Liquid crystal photonic bandgap etc. He also discussed about his work like Memory devices based on gold nanoparticles doped ferroelectric liquid crystals, Realization and application of liquid crystal phase shifting interferometer etc.

At the end of the program, the valedictory function took place in which the participants were given certificates for their participation. Prof. N. L. Sharma, Ex-principal, Bareilly College, Bareilly was the chief guest. He encouraged the participants and shared his views. Overall, this program was very successful and useful to know about Advanced Research Instruments, their working and applications. In the feedback session participants appreciated a lot about the quality of lectures and training provided. The programme came to an end with the vote of thanks delivered by Prof. Agarwal to all the speakers, research scholars, non-teaching members and participants for their support in successful organisation of the programme.