

MARCH 2023



स्वाध्यायान्ता प्रमदः

# TRAINING

SCERT, DELHI

# REPORT

06 DAYS TRAINING FOR TGT & PGT (SCIENCE)  
AT IIT MANDI



Coordinators: Dr. Apsara Ansari  
Dr. M. M. Roy

# ABOUT TRAINING

<b>Name of the Programme:</b>	6 days training Programme for PGTs and TGTs (Science) of DoE at IIT Mandi
<b>Target Group:</b>	PGTs and TGTs (Science)
<b>Duration:</b>	Six Days
<b>Date:</b>	10 March 2023 to 15 March 2023
<b>Timing:</b>	9:00 AM To 06:00 PM
<b>Organized By:</b>	SCERT, Delhi in Collaboration with IIT Mandi
<b>Venue:</b>	IIT Mandi (Himanchal Pradesh)
<b>Proposed Participants:</b>	52
<b>Participants Attended:</b>	52

## OBJECTIVES

- To prepare teachers to motivate the young generation of researchers, scientists, and engineers.
- To produce knowledge for the good of society both individually and as a team.
- To develop teachers' individuality and creativity as they work on real-world, current scientific issues.
- To inculcate a spirit of entrepreneurship and to impart the ability to devise globally recognized solutions for the problems of society and industry



# DAY-1

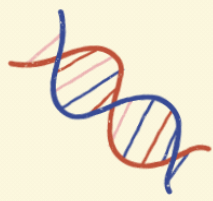
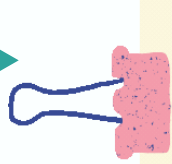
The first day began with a brief introduction of all the faculty of IIT Mandi specifically the various department of Bio sciences and Bioengineering, physical sciences, chemical sciences and computing and electrical engineering.



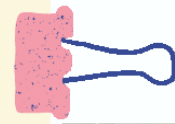
**Session 1:** This session covered the field of genetics and genetic engineering” taken by Dr. Bhaskar. The session was very engaging and enjoyable encompassing various topics like colour blindness, mutation, and All the queries of participant were answered very satisfactorily leading to the conclusion of this session.

**Session 2:** In sequence with the first session, the second session was taken by Dr. Prasad Kasturi on the topic of model Organism. In biological research, various Organism were discussed like *Drosophila melanogaster*, *Neurospora*, *E.coli* etc. The main animal Organism cited was. *C. elegans*, the nematodes worm, which is being used extensively in IIT Mandi as a sample Organism for the study of various neurodegenerative disorders like Alzheimer, Parkinson dementia. *C. Elegance* is a preferred Organism due to its life cycle duration and reversibility after Freezing. The session wrapped up nicely followed by a delicious lunch.

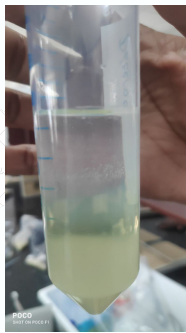




# Biology



**Session 3: the last session of the day, began with the short journey to the South Campus where all the advanced labs were located. The session consist of all the practical work related to the theory studied in the morning, given in exciting on hand experience, the first experiment was of DNA extraction.**



**Extraction from fruit using detergent, salt, water and alcohol. Fine strand of DNA was visible at the end.**

**Then all were introduced to the PCR machine in a group and it working was explained.**



**It was followed by visualizing the C. elegans samples showing distorted mobility due to the introduction of neurodegenerative. Gene, it was more clear under the spectrum fluorescent microscope, which clearly showed protein Agitations in the experiment Organism. Lastly, the process of gel electrophoresis was explained and demonstrated. The day ended with a lot of new learning.**

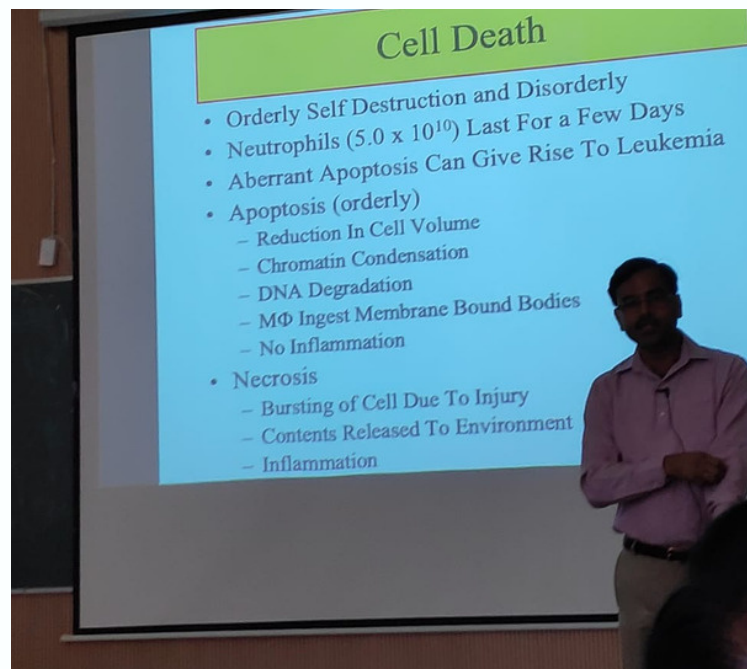




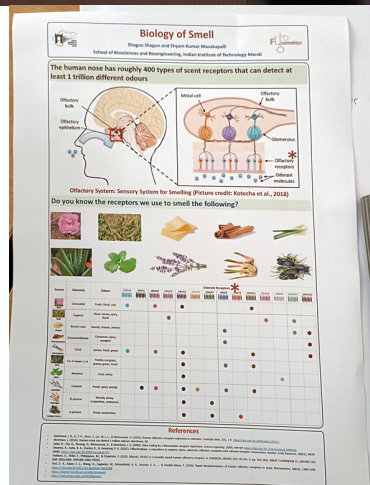
# Biology

## DAY-2

**Session-1:** Session one started with the concept of basic immunology, where the pathogens were discussed along with their disease capability, disease-causing abilities of a pathogen and their interaction with the environment. The concept of basic immunology along with the endemic and pandemic situations and how it will be can diagnose and how will we teach science students about immunology.



**Test of Smell**  
was also carried out through provided samples



**Session-2:** Session two was based on Biomolecules and their analysis in which the basic enzyme activity and their mode of action was discussed in detail. Faculty Describe the molecular structure of DNA and the enzyme associated with metabolic Reaction along with Physiology of human being is also discussed.





# Biology

**Session 3:** Was of lab session where Dr. Shyam Kumar Performed a cellulose enzyme activity. With the help of. Self-generated kit of cellulose enzyme. The kit utilized in the demonstration Was prepared by IIT Monday in the pandemic situation where they utilize. This kid. For the student to give an exposure of hands-on activities. Activity in a lab situation. To avoid the carcinogenicity of the enzyme or dye, they use a natural Resources in the enzyme activity kit. All the participants are instructed to perform the activity under the supervision of Dr. shyam and their Teaching assistants.



**Session 4:** lab session was given by Amit prasad where he discussed the ELISA method for the diagnosis of infectious diseases. Sandwich ELISA was demonstrated in the lab session.



# PHYSICS

## DAY-3



**Session 1:** Started at 9:00 AM by Dr. Subhajit Roy Chowdhury in Hall, a north campus of IIT Mandi, he highlighted the basics of semiconductor. He mentioned the resistivity and conductivity of semiconductors semiconductor in comparison with conductors and insulator after that. He explained how semiconductors conduct current. Then he focused resistivity versus temperature graph as well as he explained band theory and type of semiconductor, intrinsic or pure semiconductor and intrinsic or doped semiconductor. He also shared his research work and total about how we make. A certain interesting and how to engage student with that Context the he finished the session with some of the queries answered.

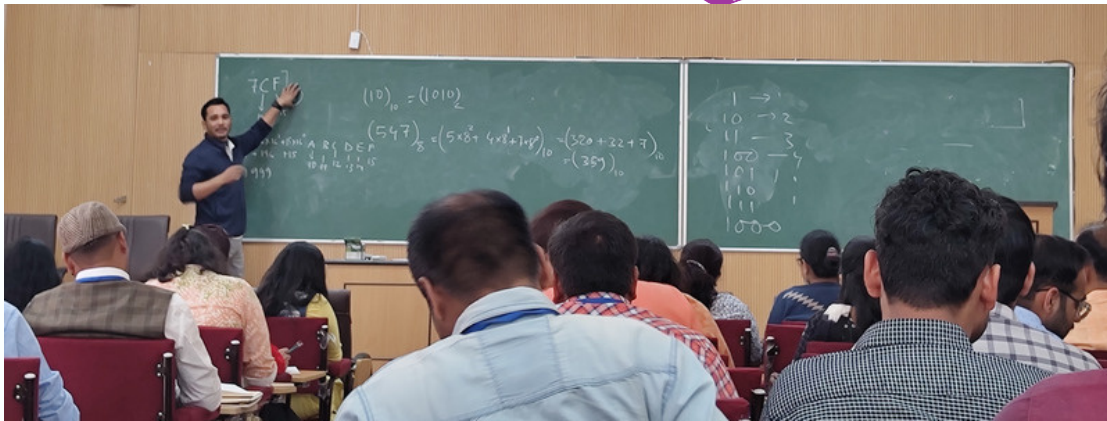


**Session 2:** Next session was Dr. Gopal Rawat. He focused ON Semiconductor electronics and told us brief story of electronic device and explain the evolution of these devices from time period of 1900 ADE to till date. He also mentioned the difference between. Different type of electronic devices. Then he discuss PN Junction diode and depletion region. He finished his session at 11 with the solution of some queries and vote of thanks.

**Session 3:** Dr. Pratyush took the session the topic electronic circuit. He emphasized about the difference between network and circuit. He mentioned how the circuit work and also about the connection of voltage sources and current sources in the circuit. He finished his session with the queries.



# PHYSICS



**Session 4: Dr. Amal Sarkar took the training session. His session was very interesting as he focused on Boolean algebra and logic gate circuit. He mentioned the brief detail of decimal, binary, octal, hexadecimal numbers and how to convert these numbers in other system he also solved many examples for better understanding. Then he focused about logic circuit with the diagrams and truth tables of AND or NOT gates and their combination too. He finished his session with queries.**



**Session 5: lab session Lab session Was conducted in electronic lab in which different experiments were demonstrated which are as follows. Characteristics of PN Junction diode, half wave and full wave rectifier characteristic of NPN bipolar junction transistor. Common emitter amplifier, Digital ICS, simple arithmetic circuit. The electronic lab was very big and equipped with latest technological instruments and apparatus. The instructor made ten groups of five teachers. Each with two teaching assistants in a group for better demonstration and hands on practice in lab. The experience was very amazing, amazing and interesting. After that Subhajit Roy Chaudhary gave vote of thanks and answer A lot of queries related to electronics and physics concept.**

# PHYSICS DAY-4

On fourth day, in morning session started with a demonstration class of physics experiments on various topics. Lab session was conducted in an electronic lab in which different experiments were demonstrated which are as follows. Characteristics of PN Junction diode, half wave and full wave rectifier characteristic of NPN bipolar junction transistor. Common emitter amplifier, Digital ICS, simple arithmetic circuit. The electronic lab was very big and equipped with latest technological instruments and apparatus. The instructor made ten groups of five teachers. Each with two teaching assistants in a group for better demonstration and hands on practice in lab. The experience was very amazing, amazing and interesting. After that Subhajit Roy Chaudhary gave vote of thanks and answer A lot of queries related to electronics and physics concept. Then in the evening session all learned about different physical concepts in theory classes.





# PHYSICS



**Session 2 :First class was on "Photoelectric Effect and Dual Nature of matter and radiation" by Dr. Bindu Radhamany. In which we discussed about particle nature of light. We discussed "quanta" of energy proposed by Max Planck and how Einstein further developed his theory of "Photon" from it. Einstein's explanation of photoelectric effect was discussed. We learned a way to make a cheaper form of electroscope by household items like glass jar, aluminium foil, copper wire etc. By using which we can show photoelectric effect to school students. Then we discussed about wave-particle duality of radiation in the class. Further on we discussed about Young's double slit experiment using electron as source. Which showed that electron behaving as a wave. Then we discussed Heisenberg's uncertainty principle and de-Broglie's hypothesis we concluded the idea of matter also having dual nature like radiation.**



**Session 3: Second class was on topic of " How Electricity actually moves in a circuit" by Dr. Nirmalya. In this class we discussed about how electricity actually moves in a circuit when a battery is connected into electric circuit. Concept of electric field and potential difference in a circuit is discussed. Concept of drift velocity of electron and effect of applied electric field and potential difference on drift velocity was being discussed. How potential difference occurs in a circuit was discussed. Then we discussed about how switching on/off in an electric circuit takes place and actual phenomenas happening behind that and how we can easily convey that idea to school students.**



# PHYSICS

**Session 4: Third class was on topic of "Physics of Atoms and Molecule" by Dr. Hari Verma. In this class we discussed about history of atomic models by great philosophers and scholars. .**

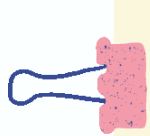


**Cathode ray experiment by J.J. Thompson was discussed and based on observations how J.J Thompson created the model of atom based on experimental observations. Then we discussed about the alpha - scattering experiment performed by Rutherford and observations and outcomes of that experiment. Failure of Thompson's atomic model and how Rutherford complied observations of alpha scattering experiment to form his Atomic model. In which he coined the term "Nucleus" and idea of electrons rotating around it. Then we discussed about Hydrogen spectra observed by Balmer and failure of Rutherford's model of atom. Then discussed how Neil Bohr proposed his postulates by observing Rutherford's model and Balmer's equation for hydrogen spectra and how Neil Bohr was able to bring quantum mechanics in his model. Then we discussed about drawbacks of Bohr's model and latest model of atom including s, p, d ,f orbitals and how their shape was predicted using Schrodinger's equation.**

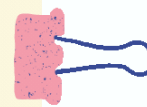
**Session 5: Fourth class was on topic of "Laws of Thermodynamics" by Dr. Harsh. In which we discussed about Thermodynamics in real life senario and how we can connect students with that.**



**Then we discussed about first law of thermodynamics and various processes by which we can change temperature of an system. Real life examples which shows how first law of thermodynamics is applicable. And then we discussed second law and zeroth law of thermodynamics. Applications of thermodynamics was also discussed. Morning and evening sessions were more like brainstorming session rather than being class- room lectures. We discussed how we can make science more fun and easy to learn for our school students. In these sessions we discussed about what's the latest research is going on in physics in the world. Moreover we also discussed how physics , chemistry and biology somehow connected in a way that one must have basic understanding of other to properly learn one discipline.**



# Chemistry



## DAY-5

The day started with the first session in the morning under the able guidance of Dr. Subrato Ghosh. He told about the Teaching Course Feedback being practiced at the IIT Mandi and how to incorporate it in classroom teaching as well.

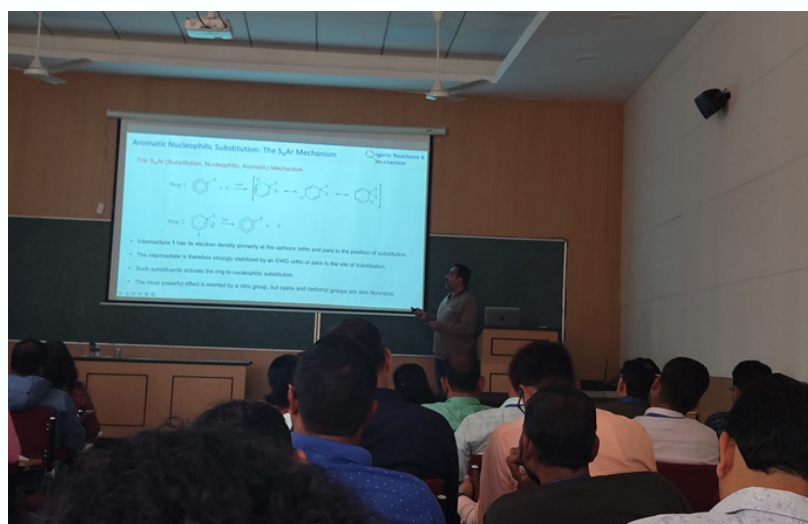


Then came the very important topic of organic chemistry wherein nitration and the structure of various useful molecules like furan, glycerol, Ranitidine, Paracetamol were discussed in detail.

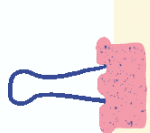


Session 2 followed on the topic of organic reaction mechanism by Dr. Bhaskar Mondal in which he told about the thermodynamics of a reaction, reaction rate and nucleophilic substitution reaction were also clearly explained. SN1 and SN2, racemization, zero order reaction all were explained marvelously.

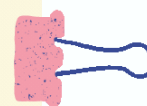
Session 3 on 'Aromatic substitution and Elimination reactions' was taken by Dr. Amit B. Pawar where we got to know about the tetrahedral intermediates and Mesenheimer complexes. The activating and deactivating groups in a Benzene ring were also discussed.





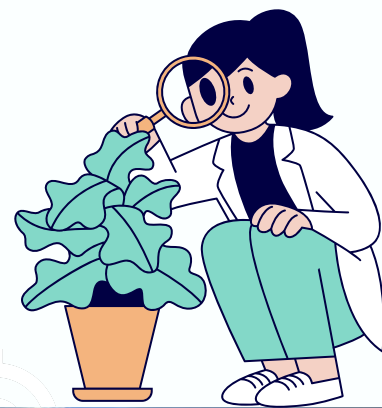


# Chemistry



The 4th session on the topic of Molecular Bonding was taken by Dr. Chayan K Nandi wherein the Octet theory, VSEPR theory and Valence Bond theory were revised before explaining the Molecular orbital theory in detail which included the bonding and anti bonding orbitals and their overlap.

The last session was on the topic of Chemical bonding. It was a brief and sound session taken by Dr. Garima Agarwal. She discussed all the important topics like Fajan's rule and also some cancer fighting molecules like cis-Platin on which research work is being pursued.



The day concluded with an enjoyable trip to the Parashar lake where the beauty was just mesmerizing and we all got to see unseen flora like Rhododendron etc.







# DAY-6

**Session 1:** This session started with the lecture of Prof. Anirudha Chakraborty on 'Stoichiometry,' an important concept in chemistry that helps us use balanced chemical equations to calculate amounts of reactants and products.



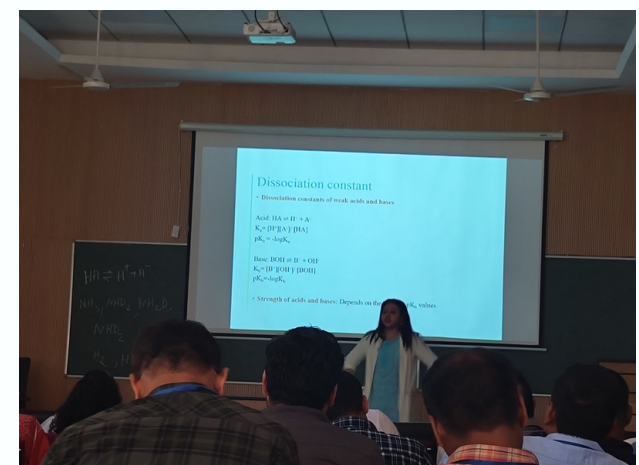
**Session 2 :** session is focussed on Chemical equilibrium refers which to the state of a system in which the reactant and the products' concentration do not change with time and the system does not display any further change in properties.



**Session 3:** Classification of Elements was discussed in details necessary since many elements were being discovered in the 19th century, and studying these elements individually was proving difficult.



**Session 4:** theory session was on Electrochemistry which is the subdiscipline of chemistry that studies the relationship between electrical energy and chemical changes. Chemical reactions that involve the input or generation of electric currents are called electrochemical reactions.



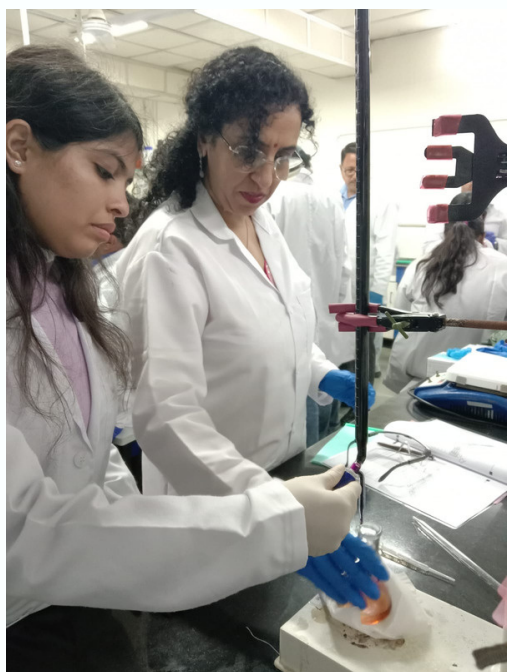


# Chemistry

**Lab Session:** Lab session was conducted with proper safety measures and participants were asked to wear lab kit for performing the experiments.

**Experiments were conducted:**

- Titration of  $\text{KMnO}_4$  with (A) Mohr's Salt (B) Oxalic Acid, Salt Analysis
- Functional Group Analysis: (A) Alkene, Alkynes, (B) Alcohol, (C) Aldehydes, (D) Ketone, (E) Carboxylic Acid, (F) Ester, (G) Phenol, (H) Aniline, (I) Benzaldehyde





**Training was ended with a valedictory Session in which feedback from the participants were taken as well as IIT Mandi Faculty share thier views on the Training.**





# THANK YOU

