



Birla Industrial & Technological Museum

(National Council of Science Museums, Ministry of Culture, Govt. of India)

19A, Gurusaday Road, Kolkata – 700 019

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Email : director@bitm.gov.in, Facebook - [facebook.com/bitm.kolkata](https://www.facebook.com/bitm.kolkata)

Museum Hours

Everyday from 10.00 a.m. to 5.30 pm.. including Sundays and Holidays
(closed on Doljatra and Kalipuja)

Admission Fee to Museum

Rs.40.00 (for General Public) and Rs.20.00 (for Students in group) per head

Inaugurated on - 2nd May 1959

BIOTECHNOLOGY LABORATORY



Birla Industrial & Technological Museum

(National Council of Science Museums, Ministry of Culture, Govt. of India)

Website: www.bitm.gov.in; Email: bitmbiotechlab@gmail.com

Introduction:

Recent advances in biotechnology have made great impacts on all areas of human life. It is a special field of biology that exploits cellular and bio-molecular processes to develop technologies and products that help improve quality of our lives. The advancement in biotechnology brought about solutions to many of the problems that the human race have been facing in the field of agriculture, healthcare, industries etc. Yet there are many unsolved problems that need continued research in the field for improving the overall quality of human life on this planet. The genomic revolution and advances in the many allied fields of life sciences are opening up new opportunities for biotechnological research.

To help students of schools and colleges better appreciate the promise of biotechnological research and understand its tools and processes, BITM Kolkata has set up a Biotech Lab that offers facilities for inquiry-based laboratory investigations as well as hands-on activities in the field. The laboratory is equipped with modern equipment and tools to conduct fascinating experiments from basic cell biology to modern DNA analysis and genomics.

Objectives of the Biotech Lab are to:

- Help students develop a better understanding of life science topics and issues
- Make them aware of basic biotechnological tools and techniques
- Help students perform basic biotechnological experimentations and research

About the Lab

The 1400 sq. ft, state-of-the art laboratory is equipped with Laminar Air Flow Unit, -20 °C Freezer, PCR Machine, Gel Electrophoresis Systems, Micropipettes, UV Trans-Illuminator, Orbital Shaker, Autoclave, Centrifuges, UV-VIS Spectrophotometer, Water bath, Incubators, Magnetic stirrer, pH meter, Desiccator and other biotechnology equipment required for conducting meaningful experiments. The lab can accommodate up to 30 students simultaneously for performing hands-on activities and experiments. College students and research scholars can also use the facility for their project works on prior arrangement with the lab-in-charge subject to payment of appropriate fees for such usage.

Access to Biotech Lab

The facility of the biotech lab is available to:

- registered members (individual or institutional)
- non-member student groups from schools and colleges on prior arrangement and payment basis.

Individual Membership

School students of classes VI to XII and college students (UG & PG) can become individual members for one year by paying a nominal fee of ₹ 5000 and ₹10000 respectively. Payment can be made in cash or by card at BITM or by demand draft in favour of Birla Industrial and Technological Museum, Kolkata. Duly filled in Membership Form (annexed), two passport size photographs and the proof of requisite payment are to be submitted in person for obtaining membership of the lab. A membership card valid for one year will be issued to each member, which can be renewed within 15 days of its expiry by paying requisite membership fee for the subsequent year.

Institutional Membership

Schools/Colleges can become institutional members by paying an annual membership fee of ₹10,000 (for schools) and ₹30,000 (for colleges). However, batch size per session at Biotech Lab will be restricted to 25 heads and 20 heads for school and college respectively. Lab sessions will have to be booked in advance for availing of the lab facilities.

Fees for Non-Member Student Groups

Non-member student groups from schools and colleges can perform basic biotech experiments in the lab on payment of appropriate fees given below for a full day session.

- ₹ 500 for school student groups (maximum batch size 25 per session).
- ₹ 1500 for college student groups (maximum batch size 20 per session).

Prior booking of lab session on payment is mandatory. Booking will be done on first come first serve basis.

Facility for Research Scholars

Research scholars can avail of the lab facilities on prior booking and on payment of requisite fees for use of specific instruments of the lab.

Contact:

Sreenu Appikonda, Curator-in-charge of Biotech Lab.

Mob: 8335049927 or Sudipto Saha, Curator-in-charge, Innovation Hub. Mob: 9748598934.

Email: bitmbiotechlab@gmail.com



Membership Benefits

- Access to the Biotech Lab facilities for one year
- Access to BITM Library for reference study
- Free entry to the Galleries of the Museum
- Invitation to special educational programmes and Popular Science Lectures at BITM, Kolkata.

Working Hours

Individual Members

Saturday & Sunday: 10:30 a.m. to 5:00 p.m.
(except 2nd Saturday & National Holidays)

Institutional Members & Non-Member

Student Groups (on prior booking only)

Monday to Friday: 10:30 a.m. to 5:00 p.m.



Projects at Biotech Lab for Registered Members:

Experiments based on new ideas that are expected to result in useful outcomes shall be encouraged. The students, after becoming members, will have to submit their project proposal or ideas and can start working on the project after it is duly approved by the expert committee. Students will be required to document their daily works on completion of each project session. Good works/projects will be posted on the website of the centre and they may get opportunity to participate in the Science/Innovation Fairs organized by the Council or other scientific organization.



Suggestive List of Experiments for School Groups

A variety of hands-on laboratory experiences related to genetics and molecular biology is offered for students of class 6 to 12. Some of these activities are:

- 1) **Peep inside cells:** Microscopic viewing of different cells, identification of cell organelles, use of microscopes, microscopic measurement.
 - 2) **Microbes in action:** Different types of microbes, their basic shapes, Gram staining, microbes from curd, fermented food etc.
 - 3) **Isolating the stuff of life:** DNA isolation from living cells, estimation of DNA, building a model of double helix. RNA isolation from different sources.
 - 4) **See your DNA:** Extraction, preparation and precipitation of the participant's DNA from buccal mucosa/blood sample/fish fins
 - 5) **Racing of Molecules:** Gel electrophoresis techniques, micropipetting techniques, separation of different dyes.
 - 6) **Investigating DNA:** Loading and Running DNA in Agarose Gels, estimation of DNA size.
 - 7) **Plasmid isolation:** Isolation of plasmid DNA from Escherichia coli, transformation in bacteria.
 - 8) **Protein Analysis:** By gel electrophoresis under denaturing conditions (SDS-PAGE)
 - 9) **Molecular Scissors:** Restriction digestion and analysis of plasmid/lambda DNA.
 - 10) **DNA Copying:** Amplification of a DNA segment by Thermal Cycler (PCR).
 - 11) **Amazing Enzymes:** Investigating effect of enzymes on their substrates, assaying the enzymes.
 - 12) **Measuring Protein:** Use of spectrophotometer for quantitative analysis of protein in milk and other foods.
 - 13) **Detection of Adulteration:** In milk and any other samples.
 - 14) **Clean or Just unseen?** Sterilization techniques, making microbiology media, bacterial growth kinetics, checking contamination in water.
 - 15) **Chlorophyll chemistry:** Quantitative assay of chlorophyll content in green plants.
 - 16) **Yeast on the Rise:** Investigative study of fermentation.
 - 17) **Genes in Motion:** Study of various stages of cell division.
 - 18) **Amino acids separation:** Separation of Amino acids by thin layer Chromatography.
 - 19) **Carbohydrates analysis:** Quantitative analysis of Carbohydrates.
- and many more.....

SOME OF THE IMPORTANT EQUIPMENT IN BIOTECH LAB

Laminar Air Flow creates particle-free working environments by projecting air through a filtration system and exhausting it across a work surface in a laminar or uni-directional air stream. They provide an excellent clean air environment for a number of laboratory requirements.

LAMINAR AIR FLOW



AUTOClave

An Autoclave is a device to sterilize equipment and supplies by subjecting them to high pressure saturated steam at 121 °C or more, typically for 15-20 minutes. An autoclave using standard settings can kill most bacteria, spores, viruses and fungi.

SOME OF THE IMPORTANT EQUIPMENT IN BIOTECH LAB

PCR stands for Polymerase Chain Reaction, which is often used in biological and chemical labs. A thermal cycler, or PCR machine, has the ability to produce DNA copies of a specific segment that can range from thousands to millions in numbers.

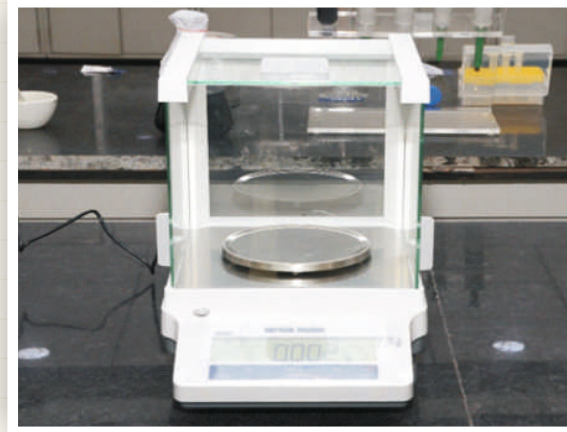
This machine, also called a DNA amplifier, can serve various purposes such as gene analysis, the evolutionary study between organisms or phylogeny and for diagnosing various long term diseases with the help of DNA structure.



PCR MECHINE

SOME OF THE IMPORTANT EQUIPMENT IN BIOTECH LAB

An electronic balance is a device used to find accurate measurements of weight. It is used very commonly in laboratories for weighing chemicals to ensure a precise measurement of those chemicals for use in various experiments.



ELECTRONIC BALANCE



SPECTROPHOTOMETER

Spectrophotometry techniques are used to measure the concentration of solutes in solution by measuring the amount of the light that is absorbed by the solution in a cuvette placed in the spectrophotometer. It is widely used for spectroscopic analysis of samples. The incident light from the light source can be transmitted, absorbed or reflected through the sample.

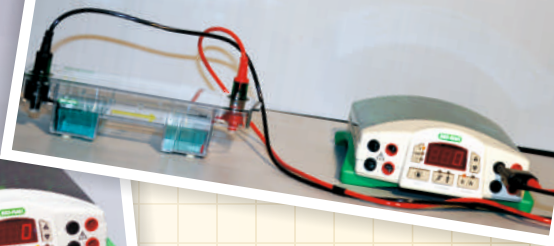
Centrifuge is mainly used to separate solids from liquids in suspension or separate two liquids with different density. It promotes accelerated settling of particles in a solid-liquid mixture. Two distinct major phases are formed during the process. A centrifuge handles most teaching laboratory applications, including sample spin downs.



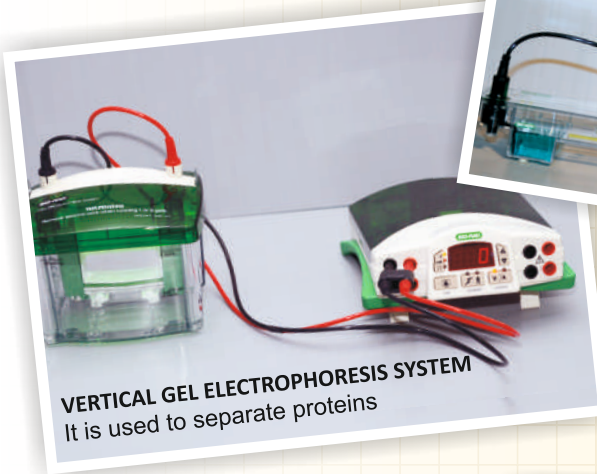
CENTRIFUGE

SOME OF THE IMPORTANT EQUIPMENT IN BIOTECH LAB

HORIZONTAL GEL ELECTROPHORESIS SYSTEM
It is used to separate DNA or RNA fragments.

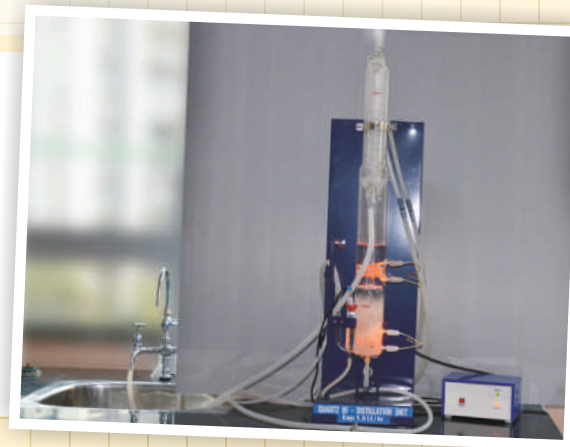


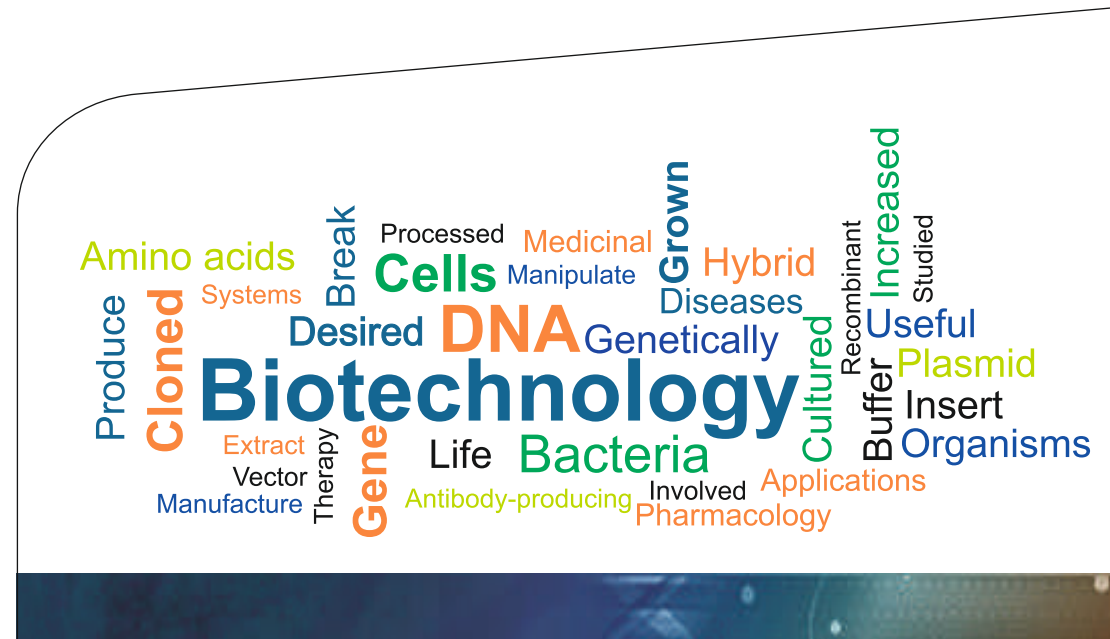
VERTICAL GEL ELECTROPHORESIS SYSTEM
It is used to separate proteins



DOUBLE DISTILLATION UNIT

Water distillers produce highly treated and disinfected water for laboratory usage. The distillation process removes minerals and micro-biological contaminants and can reduce levels of chemical contaminants.





Membership Form

☐ Individual ☐ Institutional

Name of the Member/Instituion :

Address :

Class (for individual members) :

Biotech course being currently
pursued (if any) :

Contact Phone Number :

Email :

Preferred day(s) for Lab work :

Date:

Signature

PARENTAL DECLARATION
(For individual membership requests from school students only)

I, _____, father/mother/guardian of _____ give my unconditional consent to my son/daughter joining the Biotechnology lab of BITM, Kolkata. I declare that my ward is physically fit to take part in the activities of the lab and is not suffering from any allergic condition in general (medical certificate is required in case the child is allergic to specific substances).

(Signature of Parent/Guardian)

Note:

Please submit this form to the Curator in-charge of Biotechnology Laboratory, BIRLA INDUSRIAL AND TECHNOLOGICAL MUSEUM, KOLKATA. Necessary membership fee will have to be deposited after the application request is accepted by BITM, Kolkata.

For assistance or further queries, please contact: Sreenu Appikonda, Curator-in-charge of Biotechnology Laboratory. Mob: 8335049927, or Sudipto Saha, Curator-in-charge, Innovation Hub. Mob: 9748598934. Email: bitmbiotechlab@gmail.com