

**Birla Industrial & Technological Museum**  
**Guideline for using 'Acharya P. C. Ray Open Laboratory'**

**Facilities**

The 'Acharya P. C. Ray Open Laboratory' has the requisite facilities for doing both curricular & extra-curricular science activities, experiments and investigative projects in basic physics, chemistry and biology.

**Facilities include**

- Worktables, instruments, tools, raw materials, chemicals etc. for doing basic experiments/ projects.
- Worksheets for each activity / experiment
- Computerized 'Smart-Board' for presentation/ discussion of experimental results.
- High magnification 'Digital Microscope' for minute study of biological samples
- In addition, interested students enrolled for long-term investigative type projects shall also be provided access to the museum's fully equipped mechanical, electrical, electronics and computer labs.

**Who can join the Laboratory**

- a) Students of classes VII to XII can avail of the facilities of the lab by registering as individual members.
- b) Schools/science clubs can also book slots for performing projects in groups (Max. batch size: 40).

**Working Hours**

(A) **For School:** Monday to Friday: (i) 10:30 a.m. to 12:30 p.m. or (ii) 1:00 p.m. to 3:00 p.m.

(B) **For Individual Member** (total 30 session in one year) any one session per week:

Sessions: (i) Saturday 3:00 p.m. to 5:00 p.m. or

(ii) Sunday 11:00 a.m. to 1:00 p.m. or 3:00 a.m. to 5:00 p.m.

**Membership Tenure**

Individual Members must register for a minimum period of one year.

**Membership Benefits**

- Access to Open Laboratory facilities for project work under expert guidance.
- Access to BITM library for reference study.
- Invitation to attend special educational programmes including Popular Lectures at BITM.
- Free entry to museum galleries.

**Projects**

**For School booking:** Any one project in one session from:

- Curricular Experimentation Module (refer Annexure) or
- Investigative Projects Module (refer Annexure )

**For individual members:**

Initiation & curricular experimentation module (10 session)

Innovation Enhancement & Experimental Development Module (10 session)

Investigative projects & problem solving skill development module (10 session)

**Fees**

**For School booking:** Rs.1000/- per session for a group of maximum 40 students

**For individual members:** Annual membership fee: Rs.1000/-

**ENTRY FORM**  
**Acharya P C Ray Open Laboratory**  
**Birla Industrial & Technological Museum**  
**(School Groups)**

To  
The Director  
Birla Industrial & Technological Museum  
19A, Gurusaday Road  
Kolkata – 700 019

Date :-

Sir,

I want to book laboratory session for my students as mentioned below:-

Number of students:

Class:

Date:

Session: 10:30 to 12:30 / 01:00 to 03:00 (Monday to Friday)

Project (as per enclosed module wise project list):

Project No (as per Annexure) .: .....

Project Title (as per Annexure): .....

I am sending herewith an amount of Rs. .... (Rupees .....

.....only) as booking fee for the above.

Details of the  
Teacher in-charge

Name	Phone No. and e-mail address

Yours faithfully,

\_\_\_\_\_  
Signature of the Principal / Headmaster / Headmistress with seal

Name of the Principal / Headmaster / Headmistress: \_\_\_\_\_

Name of the School: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_  
Telephone no. \_\_\_\_\_ e-mail address: \_\_\_\_\_

**ENTRY FORM**  
**Acharya P C Ray Open Laboratory**  
**Birla Industrial & Technological Museum**  
**(Individual Entry)**

To  
The Director  
Birla Industrial & Technological Museum  
19A, Gurusaday Road  
Kolkata – 700 019

Date :-

Sir,  
I would like to enroll my son/daughter studying in \_\_\_\_\_ School  
in class \_\_\_\_\_ for Acharya P C Ray Open Laboratory. His / Her details are mentioned  
below:-

Name of the Student:

Preferred Lab session timing (please tick): (A) Saturday – 03:00 pm to 05:00 pm  
(B) Sunday – 11:00 am to 01:00 pm  
(C) Sunday – 03:00 pm to 05:00 pm

Residential Address:

Ph. No.:

E-mail:

I am remitting herewith an amount of Rs. 1000/- (Rupees one thousand only) in cash as yearly membership fee for the above.

Yours faithfully,

\_\_\_\_\_  
Signature of the Guardian

## Annexure

### Chemistry projects for Open Lab

#### Module 1: Curricular Projects

- C-M1 /1. To study the effect of concentration on the rate of reaction between sodium thiosulphate and hydrochloric acid
- C-M1 /2. To determine the heat of solution of hydrated copper sulphate ( $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ) in water
- C-M1 /3. To set up simple Daniel cell and determine its emf
- C-M1 /4. To separate the pigments from extracts of leaves by paper chromatography
- C-M1 /5. To identify the functional group present in the given organic compound
- C-M1 /6. To analyse the given sample of carbohydrate
- C-M1 /7. To detect the presence of oil and fat in the given sample
- C-M1 /8. To detect the presence of carbohydrates, fats and proteins in the foodstuffs
- C-M1 /9. To prepare M/10 solution of oxalic acid
- C-M1 /10. To prepare M/20 solution of ferrous ammonium sulphate (Mohr's salt)
- C-M1 /11. To determine the molarity and strength of the given solution of  $\text{KMnO}_4$
- C-M1 /12. Wet tests for acid radicals
- C-M1 /13. Wet tests for basic radicals
- C-M1 /14. To determine the pH of the given NaOH solutions of different strength using pH paper
- C-M1 /15. To determine the pH of different salt solutions using pH paper
- C-M1 /16. To determine the pH values of given samples of lemon juice, vinegar, tomato juice etc.

#### Module 2: Investigative Projects

- C-M2 /1. Determination of the strength of oxalate in guava fruit at different stages of its ripening
- C-M2 /2. Determination of the quantity of casein present in different samples of milk
- C-M2 /3. Study of digestion of starch by salivary amylase and effect of pH and temperature on it
- C-M2 /4. Comparative study of the rate of fermentation of various food materials
- C-M2 /5. Identification of common food adulterants
- C-M2 /6. Comparison of the hardness of water from different localities / sources
- C-M2 /7. Comparison of the foaming capacity of given samples of soaps
- C-M2 /8. Study of the effect of addition of washing soda on the foaming capacity of a soap
- C-M2 /9. Investigation of the effect of detergent on hard water
- C-M2 /10. Study of acidity of different samples of tea leaves and correlate it with their taste
- C-M2 /11. To compare the rate of evaporation of water, acetone and diethyl ether
- C-M2 /12. Study of the effect of acids and bases on the tensile strength of fibre
- C-M2 /13. Analyse fruit and vegetable juices for their acidity
- C-M2 /14. Testing the presence of nitrate, sulphate, chloride, sulphide, iron and arsenic ion in drinking water

## Annexure

### Physics projects for Open Lab

#### Module 1: Curricular Projects

- P-M1 /1. Measurement of the length of a rod by slide callipers
- P-M1 /2. Measurement of volume of a cylinder by a pair of slide callipers
- P-M1 /3. Measurement of the cross - section of a wire by screw gauge
- P-M1 /4. Measurement of the thickness of a glass / metal plate by a spherometer
- P-M1 /5. Measuring the mass of a body by a common balance
- P-M1 /6. Measurement of atmospheric pressure by Fortin's Barometer
- P-M1 /7. Determination of volume and Sp. Gravity of a solid insoluble in water
- P-M1 /8. Determination of Specific gravity of a liquid by a sp. Gravity bottle and Hare's apparatus
- P-M1 /9. Determination of acceleration due to gravity (g)
- P-M1 /10. Verification of Boyle's Law
- P-M1 /11. Determination of velocity of sound in air by resonance air column
- P-M1 /12. Determination of the frequency of a tuning fork by using a sonometer
- P-M1 /13. To verify the Laws of Reflection of Light
- P-M1 /14. Verification of Laws of Refraction of Light and determination of refractive index of glass
- P-M1 /15. Determination of focal length of convex lens by u-v method
- P-M1 /16. Determination of focal length of convex lens by u-v method
- P-M1 /17. Determination of the focal length of a concave mirror by coincidence method
- P-M1 /18. Mapping the lines of force of a bar magnet
- P-M1 /19. Study of Ohm's Law
- P-M1 /20. Determination of unknown resistance with a P.O. box
- P-M1 /21. Verification of laws of combination of two resistances using P.O. box in series & parallel

#### Module 2: Investigative Projects

- P-M2 /1. Study of Laws of Flotation and Archimedes Principle
- P-M2 /2. Determination of density of a solid insoluble in water
- P-M2 /3. Study of different aspects of simple pendulum (effect of time period of oscillation of a simple pendulum on mass of the bob, length and amplitude of oscillation )
- P-M2 /4. To establish the relation between object distance and the image distance due to reflection
- P-M2 /5. To locate the positions of the poles of a bar magnet
- P-M2 /6. Study of Oersted's experiment
- P-M2 /7. Study of Faraday's Laws of Electro Magnetic Induction
- P-M2 /8. Heat conductivity through different methods

## Annexure

### List of Projects on Biology

#### Module 1: Curricular Projects

- B-M1 /1. Study of plant cell
- B-M1 /2. Study of animal cell
- B-M1 /3. Study of different parts of a flower
- B-M1 /4. Study of germination
- B-M1 /5. Study of Photosynthesis
- B-M1 /6. Tests for Carbohydrate, Protein & Fat
- B-M1 /7. Study of blood cells
- B-M1 /8. Study of sections of dicot & monocot stem
- B-M1 /9. Study of osmosis with the help of potato osmoscope
- B-M1 /10. Study of sections of dicot & monocot root
- B-M1 /11. Study of tissues from permanent slides
  - a) Liver                      b) Pancreas                      c) Ovary                      d) Testis
- B-M1 /12. Study of Invertebrates
- B-M1 /13. Study of Vertebrates

#### Module 2: Investigative Projects

- B-M2 /1. Study of lung function
- B-M2 /2. Study of movable joints in a human skeleton
- B-M2 /3. Study of the effect of osmosis in plant cells with the help of hypertonic & hypotonic solutions.
- B-M2 /4. Study of transpiration
- B-M2 /5. Identification of blood groups
- B-M2 /6. Dissection of frog to study digestive system
- B-M2 /7. Dissection of Lata fish (Channa punctatus)
- B-M2 /8. Dissection of Tilapia fish
- B-M2 /9. Preparation of Herbarium sheet
- B-M2 /10. Study of different characteristics of soil
- B-M2 /11. Measurement of heart-beat in different animals
- B-M2 /12. Study of life cycle of butterfly
- B-M2 /13. Study of life cycle of frog
- B-M2 /14. Separation of green pigments & yellow pigments from leaf extract
- B-M2 /15. Extraction & qualitative estimation of plant pigments
- B-M2 /16. Determination of absorption of water by different types of seeds
- B-M2 /17. Determination of comparative rate of Transpiration & Evaporation