

बच्चों के लिए  
राज्य स्तरीय विज्ञान, गणित एवं पर्यावरण प्रदर्शनियाँ 2018-19  
तथा  
46वीं जवाहरलाल नेहरू राष्ट्रीय विज्ञान,  
गणित एवं पर्यावरण प्रदर्शनी 2019  
प्रदर्शों तथा मॉडलों को बनाने एवं प्रदर्शनियाँ आयोजित करने हेतु

## दिशानिर्देश

STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT  
EXHIBITION FOR CHILDREN — 2018-19

AND

46TH JAWAHARLAL NEHRU NATIONAL SCIENCE, MATHEMATICS AND  
ENVIRONMENT EXHIBITION FOR CHILDREN — 2019

## GUIDELINES

FOR THE PREPARATION OF EXHIBITS AND MODELS AND  
ORGANISING EXHIBITIONS



राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्  
NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

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## GUIDELINES FOR THE PREPARATION OF EXHIBITS AND MODELS

All children are naturally motivated to learn and are capable of learning. The knowledge acquired by them is the outcome of their own activity. Children learn through interaction with people and environment around. They construct knowledge by connecting new ideas to their existing ideas.

In order to stimulate creativity, inventiveness and the attitude for innovation in science and mathematics, National Curriculum Framework (NCF-2005) emphasizes on activities, experiments, technological modules, etc. It also encourages implementation of various activities through a massive expansion of channels such as organisation of science, mathematics and environment exhibition at the national level for school students, with feeder exhibitions at school/block/tehsil/district/region/state levels.

The National Council of Educational Research and Training (NCERT), New Delhi organises Jawaharlal Nehru National Science, Mathematics and Environment Exhibition (JNNSMEE) for Children every year for popularising science, mathematics and environmental education amongst children, teachers and public in general. This exhibition is a culmination of various exhibitions organised in the previous year by the States, UTs and other organisations at district, zonal, regional and finally at the state level. Selected entries from all States and Union Territories, the Kendriya Vidyalaya Sangathan, the Navodaya Vidyalaya Samiti, Department of Atomic Energy Central Schools, Central Board of Secondary Education affiliated Public (independent) Schools, Central Tibetan Schools Administration and Demonstration Multipurpose Schools of Regional Institutes of Education participate in this

national level exhibition. Like in the past several years such exhibitions are to be organised from district to state level during 2018-19 too. These would form the first phase of preparation for the JNNSMEE to be organised in November 2019. The objectives of the exhibitions are:

- to provide a forum for children to pursue their natural curiosity, creativity, innovation and inventiveness;
- to make children feel that science and mathematics are all around us and we can gain knowledge as well as solve many problems by relating the learning process to the physical and social environment;
- to lay emphasis on the development of science and mathematics as a major instrument for achieving goals of self-reliance, socio-economic and socio-ecological development of the nation and the world;
- to analyse how science and mathematics have developed and are affected by many diverse individuals, cultures, societies and environment;
- to appreciate the role of science and mathematics in meeting the challenges of life such as climate change, opening new avenues in the areas of agriculture, fertiliser, food processing, biotechnology, green energy, disaster management, information and communication technology, astronomy, transport, games and sports etc;
- to create awareness about environmental issues and concerns and inspire children to devise innovative ideas towards their prevention and mitigation;

The rising aspirations of human community for desire of more comfort and security has put tremendous pressure on the limited resources of the world leading to unequal access and unsustainable exploitation. Survival of mankind and its future will be in great danger if development is continued without caring about sustainable use of available resources. Development of any country or world at large can be sustainable only if it balances all the three dimensions: the economic, social and environmental. Science and mathematics act as powerful tools for investigating and understanding the world. They also play a crucial role in solving problems confronting the society and act as a major instrument for providing scientific solutions for different challenges in life. Children are naturally inquisitive and this inquisitiveness can be harnessed for finding new and innovative scientific solutions to solve different challenges in our lives. In order to provide an opportunity to our young innovators to show their talent and ideas for overcoming these challenges, the theme for the State Level Science, Mathematics and Environment Exhibition (SLSMEE) for Children–2018–19 has been chosen as **Scientific Solutions for Challenges in Life**.

Challenges are part of everyday life and we continuously try to solve them through innovative ways. Some of the major challenges we are facing today are hunger, poverty, health issues, depletion of resources, pollution, waste management, efficient transportation etc. Although our country has achieved significant outcomes in solving various problems like improvement in health care, poverty alleviation, development of new transportation system etc., yet more remains to be done.

In this context, it is envisaged that children and teachers would try to analyze all aspects of the role of science and mathematics for providing solutions

to challenges in lives. This will enable students and teachers to generate scientific and mathematical ideas and prepare models/exhibits for addressing various challenges in life. Scientific and mathematical ideas in this context may be regarding innovative ways of doing things, creating simple technologies/tools that meet new requirements; enabling the participation of the lower pyramid of the population in the development process through science and technology, creating an enabling innovation ecosystem in the country for enhancement of science, technology and mathematics. **However, there are instances when children and their teachers think of some ideas that are new and may be applicable in future. Often such ideas may not be possible to be presented in the form of model/exhibit. Organizers of exhibitions at all levels may provide opportunities to students and teachers to present such ideas in the form of presentations and discussions.**

Children and teachers should identify where and how new researches and innovations in science, technology and mathematics can help in providing solutions for challenges in life.

The theme for **SLSMEE–2018–19 and JNNSMEE–2019, “Scientific Solutions for Challenges in Life”** aims to cover sub-themes such as–

1. Agriculture and Organic Farming
2. Health and Cleanliness
3. Resource Management
4. Waste Management
5. Transport and Communication
6. Mathematical Modeling

(Sub-themes listed above are suggestive. Students are free to choose any other sub-themes and develop exhibits involving innovations in Science, Technology and Mathematics for meeting challenges in life)

A few exemplar ideas pertaining to the sub-themes listed in the context of the theme,

for the development of exhibits are given below.

**THEME: SCIENTIFIC SOLUTIONS FOR CHALLENGES IN LIFE.**

**1. Agriculture and Organic Farming**

The main objectives of this sub-theme are to make children and teachers aware of various ecofriendly techniques/ methods not only to enhance agricultural production but also for sustainable ecofriendly living. It is expected that children and teachers would explore various indigenous traditional practices and think of various ways and means towards organic agriculture to maintain sustainability.

The exhibits/ models in this sub-theme may pertain to:

- effect of climatic change on agriculture and its mitigation and adaptive techniques/ methods;
- preservative and conservative methods for prevention of soil degradation and judicious use of water;
- technology packages in organic farming practices for improved yield.
- importance of organic fertilisers over chemical fertilisers;
- planning and managing energy crops (Salix, Poplar, Jatropha, Jajoba, etc.);
- use of biotechnology for economically and ecologically sustainable biofuels;
- various pest control and management measures through organic farming practices;
- innovative/ inexpensive/ improved/ indigenous technologies/ methods of storage/ preservation/ conservation/ transport of agricultural products and food materials;

- innovative/ improved practices for reducing cost of cultivation;
- identification of medicinal plants and their applications;
- effect of electric and magnetic field on the growth of plants and protective measures;
- indigenous designs of farm machinery, agriculture implements and practices;
- improved/ improvised method of processing, preservation, storage and transport of food products;
- food production and demand of quality food and food security;
- advantages and disadvantages of genetically modified (GM) food;
- design and development of automatic weather recording device.
- ecologically sustainable methods of farming;
- schemes / designs to help reduce production cost and conservation of raw materials.

**2. Health and Cleanliness**

The main objectives of this sub-theme are: to bring awareness among the children about the factors affecting our health; to explore new scientific, technological and bio-medical inventions in prevention and cure of diseases; to explore various scientific and technological interventions for meeting nutritional requirements of human beings and innovative ideas for better management; awareness about the importance of cleanliness for our health etc.

The exhibits/models in this sub-theme may pertain to:

- factors affecting the health and resulting ailments in the body;
- infectious and non-infectious diseases, relationship with causative factors and their sources;

- innovative preventive measures to control diseases at different levels/ roles of various agencies;
- demonstration and use of traditional methods of medication;
- demonstration of known facts and findings, and health benefits of physical exercise and Yoga;
- demonstration of models/ projects to show the effect of junk food items, adulterated food items on our body and its preventive measures;
- ways to raise awareness and sensitise people to be careful in health matters, explore the possibilities and make use of the facilities available;
- innovative ideas for effective implementation of policies/ programmes/ schemes such as Swachh Bharat Abhiyan, National Leprosy Eradication Programme etc that have significant impact on health.
- development of knowledge-base and understanding new scientific, technological aids in bio-medical areas;
- presentation of known facts and research findings in different medical systems like Traditional, Modern, Homeopathy, Ayurvedic etc;
- lifestyle and its relationship with good and bad health based on known facts and researches;
- mechanisms/ways to control the spread of epidemics such as Dengue, Malaria etc;
- improved methods of sanitation and appropriate technology for waste disposal, both biodegradable and non-biodegradable;
- common prophylactic measures available for different diseases and advantages of inoculation and vaccination;
- appropriate measures for family planning and welfare;

- low cost medical diagnostic and therapeutic tools;

### **3. Resource Management**

This sub-theme is expected to make children think of various ways and means for making efficient use of available resources and also new techniques/methods of conservation and management of resources.

The exhibit/models in this sub-theme may pertain to;

- innovative / improvised designs for efficient harnessing of solar energy
- plans for proper management of resources and its monitoring;
- recycling of water, materials, solid wastes, etc;
- devices/methods that control air/ water/land pollution and technologies to manage them;
- stopping depletion of essential micro nutrients in the soil;
- forest, river, mangrove, wetland conservation and management;
- desilting and renovation of ponds, tanks and reservoir;
- self regulating water harvesting system/rainwater harvesting and storage in a manner that evaporation and transportation losses are minimised;
- development of low cost technology for producing potable water;
- innovative/improvised designs for reducing waste in extraction and processing of minerals;
- innovative methods of exploration and preserving minerals and crude oil, etc;
- cost effective heating and cooling system of buildings, etc.;
- models to control loss of natural resources due to mismanagement/ disasters, etc;

#### 4. Waste Management

In the modern world life style and development activities generates lot of biodegradable and non-biodegradable waste which are affecting our lives. Kepping in view the need of the hour, it is of utmost importance to stimulate children by involving them in bringing out some solutions for managing the waste and conservation of environment.

The exhibit/models in this sub-theme may pertain to;

- various way of waste disposal such as landfill, incineration, etc;
- new technique/methods for waste disposal;
- cost effective and environmental friendly waste management;
- various ways/methods/techniques of recycling waste materials;
- various ways/methods/techniques of extracting useful resources from waste materials;
- low cost waste management system;
- improvised/ improved devices for effective and efficient waste management system;
- issues involved in nuclear, biological, medical and chemical waste management;
- issues related to management of marine pollution, ocean dumping, eutrophication, marine debris, thermal pollution, algal boom, micro-plastic, etc.;
- implication of nano-technology (nano-toxicology and nano-pollution);
- improvised and innovative techniques/methods of harnessing energy from waste material;
- technique of separating/extracting harmful biological/chemical/nuclear waste and their storage;
- techniques and processes for reduces waste generation;

- efficient and effective methods/ technique of waste handling and transportation.

#### 5. Transport and Communication

The objectives of this sub-theme are:- to make general public and children understand different modes of transport and communication as well as the importance of transport and communication for Sustainable development; to make them aware about the issues and concerns of the present transport and communication systems and to promote innovations for efficient systems.

The exhibits/models in this sub-theme may pertain to:

- improvised/indigenous models for efficient transport and communication;
- working models of fuel efficient/pollution-free designs of automobiles /ships, boats etc;
- innovative ideas for efficient management of road, rail, water and air transport systems, e.g. better safety measures, managing traffic jams, etc;
- demonstrating the principle and functioning of modern devices of communication systems;
- demonstrating the use of information technology in sharing improved designs/indigenous designs/devices;
- developing innovative designs/models of equipments for children with special needs;
- improvised/improved devices for effective transport and communication between various emergency services, namely medical, police, military and other administrative bodies/committees;
- use of geo-stationary satellites in providing information pertaining to vehicular movements and

transportation, disaster management, etc;

- designs for improving existing transport and communication systems;
- innovative ways of using modern communication technologies for connecting people.

## 6. Mathematical Modeling

Mathematical modeling is the process of transformation of a physical situation into mathematical analogies with appropriate conditions. Physical situations need some physical insight into the problem. Then it is solved by using various mathematical tools like percentage, area, surface area, volume, time and work, profit and loss, differential equations, probability, statistics, linear, nonlinear programming, etc. It is a multi-step process involving identifying the problem. Constructing or selecting appropriate models, finding out what data need to be collected, deciding number of variables and predictors to be chosen for greater accuracy, testing validity of models, calculating solution and implementing the models. It may be an iterative process where we start from a crude model and gradually refine it until it is suitable for solving the problem and enables us to gain insight and understanding of the original situation. It is an art, as there can be a variety of distinct approaches to the modelling, as well as science, for being tentative in nature.

In mathematical modeling, we neither perform any practical activity nor interact with the situation directly, e.g. we do not take any sample of blood from the body to know the physiology, and still our mathematical tools reveal the actual situations. The rapid development of high speed computers with the increasing desire for the

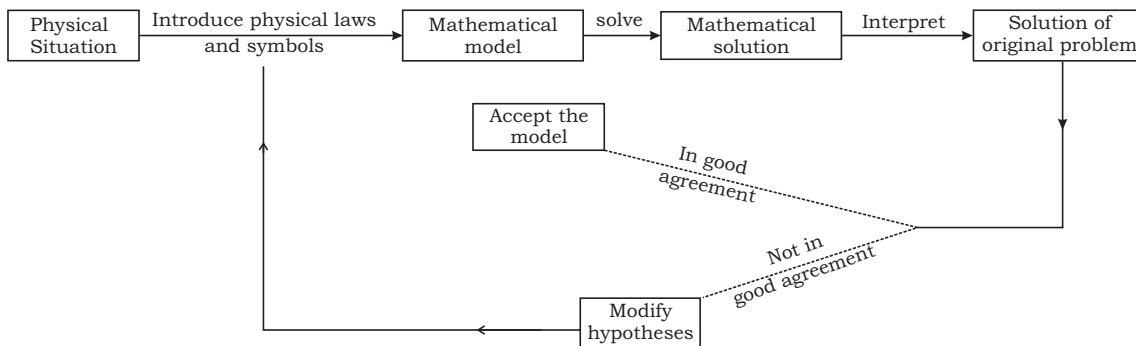
answers of everyday life problems have led to enhanced demands of modeling almost every area. The objective of this sub-theme is to help children to analyse how mathematical modelling can be used to investigate objects, events, systems and processes. It can be visualised by Fig.1.

The exhibits/models in this sub-theme may pertain to:

- mathematical modeling to solve various problems of our everyday life/environment related problem;
- mathematical modeling and computer simulation of climate dynamics/prediction of weather phenomena based on a number of predictors;
- mathematical modeling in physical geography such as rotation and revolution of earth, precession and equinoxes etc.;
- mathematical modeling to predict orbital path of comets, meteors and other minor planets;
- mathematical modeling to show how disease might spread in human in the event of epidemics/bioterrorism;
- mathematical modeling to predict the devastating effects of wars/nuclear explosions;
- mathematical modeling to show spread of forest fire depending on the types of trees, weather and nature of the ground surface;
- mathematical modeling to demonstrate the action of medicines in human system;
- mathematical modeling of the working of heart, brain, lungs, kidneys, bones and endocrine system;
- computer diagnosis of human diseases;
- mathematical modeling of fluid flow in drain, spillways, rivers, etc;



- using mathematical modeling and computer simulation to improve cancer therapy/wound healing/tissues formation/corneal wound healing;
- mathematical modeling of intracellular biochemical reactions and metabolism;
- mathematical modeling to describe traffic flow/stock market options;
- Studies of storage and retrieval techniques for computer systems;
- Data manipulation and information management techniques;
- mathematical modeling on social insects such as honeybees, termites, etc. to know how they use local information to generate complex and functional patterns of communication;
- mathematical modeling of maximum speed in fibre optic links;
- mathematical modeling of urban city planning;
- mathematical modeling to prevent an unwanted future/to understand various natural and unnatural phenomena;



More precisely the above diagram may be further explained as follows:

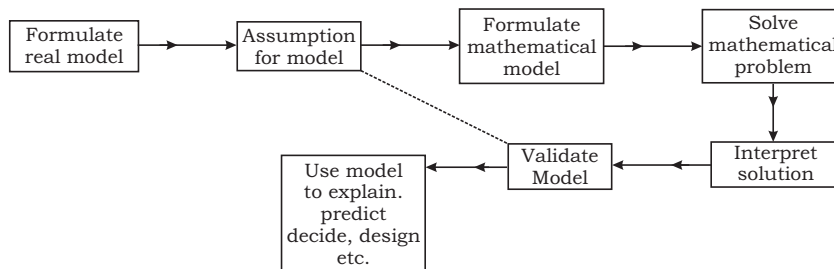


Fig 1: Mathematical Model

- Statistics and random number problems;
- Developing video games;
- mathematical modeling for increasing production of crops;
- mathematical modeling on balance of carbon cycle;
- mathematical modeling to show the effect of climate changes/global warming;
- mathematical modeling for predicting future population and knowing the impact of population;
- mathematical modeling for increasing production of crops etc.



## GUIDELINES FOR ORGANISING ONE-DAY SEMINAR

### TOPIC: WATER MANAGEMENT: POSSIBILITIES AND WAYS AHEAD

*NOTE: The One-Day Seminar should preferably be organised one day before the organisation of State Level Science, Mathematics and Environment Exhibition (SLSMEE) for Children.*

Nature has gifted us with several essential things for our survival and water is one of the most important things among them. Water is vital for the survival of all living organisms and that is why water has got a central place in most of the practices and religions. Everyday water is needed for different purposes, such as cleaning, bathing, cooking, agriculture etc.

Nearly 70% of our earth is covered with water. Only 2.5% of all the water available on earth is fresh water and a very small percentage of this fresh water is easily accessible. With growing population, the demand for fresh water is increasing day by day. Although it should be noted that there is no scarcity of water at global level, rather it is available in plenty but it is not evenly distributed over the globe. Also due to the increasing population, mismanagement of water resources and wastage of water many sectors are facing water scarcity.

India has about 4 percent of the world's fresh water resources and it caters to 17 percent of total population of the world. Most of the fresh water used in India comes from groundwater and our country is the highest user of groundwater in the world. A major fraction of this groundwater is utilised for agricultural purposes and rest of it is used for drinking and other purposes. Due to uncontrolled exploitation of water the condition of number of aquifers is no more sustainable. According to a World Bank report, if current trends continue, in 20 years around 60% of India's aquifers

will be in a critical condition. One of the main causes for this is uncontrolled and unregulated extraction of ground water.

According to United Nations, an estimated 1.8 billion people will live in areas plagued by water scarcity by 2025, with two-thirds of the world's population living in water-stressed regions as a result of use, growth, and climate change. The challenge now in front of us is how effectively we can conserve, manage and distribute the fresh water that we have.

Looking at the immense need for accelerating the efforts towards meeting water related challenges, United Nations General Assembly has declared this decade (2018-2028) as "The Water Action Decade".

keeping these concerns in view one-day, seminar is to be organised to emphasize on this very important component for sustainable development. This seminar may help in creating awareness about the proper utilisation of water and different ways to manage water resources. It will also advocate the importance of promoting efficient water usage at all levels. Now the time has come to be aware about the concept of water foot print and modify our lifestyle in such a manner that we can contribute in decreasing water foot print.

Activities or major thrust areas may therefore focus on the following areas:

- increasing public awareness about the available fresh water resources.
- awareness about different ways for management of water resources.

- awareness about different schemes of government for management of water resources.
- awareness about the methods of conservations of water.
- awareness about the means by which every citizen can contribute in management of water resources.
- developing or finding new ways to solve the water management issue/problems.
- increasing public awareness about the concept of water footprint.



**GUIDELINES FOR ORGANISING STATE LEVEL SCIENCE,  
MATHEMATICS AND ENVIRONMENT  
EXHIBITION FOR CHILDREN 2018-19**

**A. CALL FOR ENTRIES**

1. The theme for SLSMEE-2018-19 for Children and for the 46th Jawaharlal Nehru National Science, Mathematics and Environment Exhibition (JNNMEE-2019) for children would be “Scientific Solutions for Challenges in Life” pertaining to the sub-themes such as –

1. Agriculture and Organic Farming
2. Health and Cleanliness
3. Resource Management
4. Waste Management
5. Transport and Communication
6. Mathematical Modeling

(Sub-themes listed above are suggestive. Students are free to choose any other sub-themes and develop exhibits involving innovations in Science, Technology and Mathematics for meeting challenges in life)

2. In order to facilitate the preparation of exhibits and models for display in district to state level exhibitions during 2018-19, *Guidelines for the Preparation of Exhibits and Models* are being communicated.
3. Wide publicity should be given for inviting entries. *SLSMEE-2018-19 Guidelines for the Preparation of Exhibits and Models should be provided to all schools*. These guidelines may also be translated in local languages and be given wide publicity. This may also be given on the website(s) of the respective states/union territories and other participating organisations. It is also envisaged that guidelines be printed in local language(s), Hindi and English in the form of a booklet for their dissemination among all the schools

for generating ideas and for developing exhibits and models. These guidelines can also be downloaded from NCERT website ([www.ncert.nic.in](http://www.ncert.nic.in)).

4. Children from all schools [including government, government-aided, public and private, catholic, mission, armed-forces (Army, Air Force, Navy, Sainik, BSF, ITBP, Assam-Rifles, CRPF, Police etc.), DAV management, Maharshi Vidya Mandir, Saraswati Vidya Mandir, Navyug, Municipality, Bhartiya Vidya Bhavan, Science Clubs etc.] are eligible to participate in State Level Exhibitions. Preference may be given to students in senior classes (i.e. secondary and higher secondary stages).

**Note: For State/UT Coordinator:**

Following organisations conduct their own exhibitions separately:

- Kendriya Vidyalaya Sangathan;
- Navodaya Vidyalaya Samiti;
- Department of Atomic Energy Central Schools;
- Central Tibetan Schools Administration;
- CBSE affiliated Public Schools (independent schools); and
- Demonstration Multipurpose Schools of Regional Institutes of Education.

These organisations send their selected entries for consideration for participation in Jawaharlal Nehru National Science, Mathematics and Environment Exhibition (JNNSMEE) for Children to NCERT directly. Therefore, it may please be ensured that

entries belonging to these organisations are not forwarded to NCERT by States/UTs.

5. Public Sector Undertakings, Industries, and other Non-government Organisations (NGOs) working in the areas (where these exhibitions are organised) may also be invited to participate as the exhibits displayed by them would be of instructional value for children and teachers

## **B. SCREENING, EVALUATION AND MONITORING OF ENTRIES FOR SLSMEE**

1. In case Districts/Regional Level Exhibitions are not being organised by the State/UT, a Screening Committee should be set up to finalise the selection of entries from various institutions for participation in the State Level Science, Mathematics and Environment Exhibition (SLSMEE) for Children.
2. The Screening Committee may consist of representatives of SISE/SIE/SCERT and some selected representative institution(s). All records about the meeting of the committee should be maintained. The selection procedure adopted should lay more emphasis on the quality of the exhibits rather than quantity. It should be ensured that the exhibits are not crude and hazardous and have good finish and are presentable.
3. The above mentioned Screening Committee or a separate panel of judges should evaluate the exhibits according to the criteria of evaluation as mentioned for SLSMEE. Best three exhibits in each sub-theme should be selected; preferably developed by secondary and higher secondary students; by the said panel of judges. However, an outstanding exhibit developed by upper primary students and members of science clubs may also be considered if the said panel of judges feel so.
4. A list of the selected entries of the

exhibits and models under each sub-theme (to be displayed in the state level exhibition) must be prepared. This must contain the name of the exhibit/model, names of the student(s) and guiding teacher(s), name of the school and a brief information about the exhibit (may be in two sentences only).

Such a list may be prepared in accordance with the NCERT's un-priced publication "List of Exhibits", displayed in the National Exhibition. It is published every year and distributed to all participating children, teachers, and visitors during the exhibition. A copy of this may be obtained from the NCERT, New Delhi. This list may also be distributed among all participating children and teachers. A copy of this list should be forwarded to NCERT together with the formal report of the exhibition.

## **CRITERIA FOR EVALUATION OF EXHIBITS IN SLSMEE**

In order to keep a uniform criteria for evaluating the exhibits in all States/UTs and on the basis of the feedback received from different agencies, the following criteria for judging the exhibits is suggested (the percentages given in bracket are suggestive weightages):

1. Involvement of children's own creativity and imagination (20 percent);
2. Originality and scientific and mathematical innovations in the exhibit/model (15 percent);
3. Scientific thought/ principle/ approach (15 percent);
4. Technical skill, workmanship and craftsmanship (15 percent);
5. Utility for Society, scalability (15 percent);
6. Economic (low cost), portability, durability, etc. (10 percent); and
7. Presentation-aspects like demonstration, explanation and display (10 percent).

**(i) 5% extra weightage may be given to exhibits from**

**rural/backward regions.**

**(ii) 3% extra weightage may be given to exhibits from semi urban regions.**

On the basis of the criteria suggested above and also as mentioned in proforma VI, three entries from each sub-theme developed by students of classes IX–XII may be selected and forwarded to NCERT for consideration for participation in JNNSMEE–2019. However outstanding exhibits developed by upper primary students and members of science clubs may also be considered provided the total entries from each sub-theme does not exceed three.

**In addition to this, two best exhibits developed by disabled students from any of the sub-themes may also be forwarded to NCERT. It must be kept in mind that entries submitted under this category should be displayed only by the disabled students. Further the entries forwarded should be accompanied with disability certificate from a competent authority. Disability norms followed by the government of India will be considered under this category.**

***(Note: There are instances when children and their teachers think of some ideas that are new and may be applicable in future. Often such ideas may not be possible to be presented in the form of model/exhibit. Organizers of exhibitions at all levels may provide opportunities to students and teachers to present such ideas in the form of presentations and discussions. SLSMEE Coordinators may forward two such innovative ideas written in a few paragraphs to NCERT for consideration for participation in the National Exhibition.)***

Judges are also requested to judge whether the model is traditional or an improvement over the traditional model or it is innovation as per proforma IV. Various skills involved in constructing the exhibit and model, the degree of neatness

and craftsmanship may also be taken into account. Every effort must be made to rule out the tendency of procuring the ready made exhibits/models. General layout of the exhibit, relevance, clarity of charts accompanying the exhibit and overall attractiveness to the masses and children should also be assessed. Working models should be encouraged.

### **C. EXPENDITURE NORMS**

The ‘Grant-in-Aid’ provided by NCERT to respective states/UTs is a **catalytic grant** for organising State Level Exhibitions and one day Seminar. States and UTs are expected to spend the additional expenditure, if any, from the state funds. The funds given to the States/UTs are to be utilised *exclusively for meeting the travel and boarding costs of participating students and their teachers and experts.* It is suggested that the following norms of payment may be followed:

#### **1. For Organising One-Day Seminar**

- (i) The seminar should be organised one day before the organisation of SLSMEE or during the days of exhibition in morning/evening hours
- (ii) Honorarium to four experts/scientists may be disbursed at the rate of Rs 1800.00/- each.  
*Note : The expert/scientist should be preferably from a research institute/ laboratory/ university/ SCERT/ SIE.*
- (iii) Daily allowance and conveyance charges to experts/scientists may be disbursed as per state/central government rules.
- (iv) Contingency grant for tea/coffee with light snacks: typing/ photocopying/ cost of transparencies/ pens/ printing of banners/ stationery etc: upto ₹20,000.00/-.

#### **2. For Organising the SLSMEE**

- (i) Honorarium to **ten** judges may be disbursed at the rate of ₹1800.00/- each. **NCERT faculty members**

**should not be provided any Honorarium from this head, if invited as a judge in the exhibition.**

- (ii) Only one student and one teacher may be permitted to participate with each exhibit. Even if more than one exhibit is selected from a single school, only one teacher from that school may be allowed to participate.
- (iii) Traveling allowance: actual second class sleeper rail/ bus (non-AC) fare.
- (iv) Participants may be provided incidental charges maximum upto ₹400.00/- for to and fro journey by rail or bus, provided the journey time is more than 6 hours For journeys less than 6 hours no incidental charges should be paid.
- (v) Boarding expenses: ₹200.00/- per head per day for each participant for a maximum of 4 days. *In case the boarding facilities are not provided by the organisers, a sum of ₹300.00 per person per day may be provided.*
- (vi) Local conveyance charges may be disbursed as per state/central government rules.
- (vii) Contingency grant for typing/ photocopying, printing of publicity materials, exhibition material, banners, stationery etc. upto ₹50,000.00/-

#### **D. MAINTENANCE OF ACCOUNTS**

It is necessary to **maintain a separate account** for the expenditure of the grants-in-aid provided by the NCERT and the same should be forwarded to the NCERT, along with all relevant vouchers and receipts, in original **within one month of the conclusion of the exhibition** for adjustment in the NCERT account. Proforma V is given for convenience. All vouchers may be signed by the Coordinator/In-charge of the exhibition. All those vouchers/receipts that are in

regional language should accompany a translated copy in English certified by the Coordinator/In-charge of the State Level Exhibition to facilitate audit and settlement of accounts. All payments exceeding ₹5000.00/- should be supported by payee's receipt with a revenue stamp.

It may please be ensured that each Voucher/Receipt against the expenditure is duly verified for the amount and then passed for payment. The specimen of this certificate is indicated below for convenience:

*Verified and passed for payment of Rs .....  
(Rupees .....  
..... only.*

Signature and Seal of the Co-ordinator/  
Incharge. State Level Science, Mathematics  
and Environment  
Exhibition (SLSMEE) for  
Children – 2018–19

**Note:** *Only those Vouchers/Receipts against such items of expenditure, which are covered under the expenditure norms, may please be sent to this department for adjustment/settlement of accounts.*

#### **E. REPORTS OF SLSMEE TO BE SENT TO NCERT**

A formal report of the State Level Science, Mathematics and Environment Exhibition and One-Day Seminar should reach NCERT within one month after the conclusion of the exhibition. It should include the following:

- i. Dates and venue of exhibition.
- ii. Proformas I – V duly filled up.
- iii. List of schools participating and the number of students/teachers participating as per the proforma attached. Break-up of the male and female participants should also be given. It should also reflect on the number of rural and urban schools that participated in the exhibition.
- iv. List of entries of the exhibits and models being displayed in the

state level exhibition. Number of exhibits displayed under each sub-theme should also be mentioned separately.

- v. Highlights of the exhibition including other activities such as lectures, film shows, book exhibition etc. and participation of other scientific/ industrial organisations.
- vi. Panel of judges for evaluating the exhibits/models displayed in the exhibition (in accordance with the Criteria for Evaluation of Exhibits).
- vii. List of selected exhibits being sent for consideration for participation in 46th JNNSEMEE-2019 bearing the name of student, teacher, school, complete write-up of exhibits, 5 minutes video presentation in CD about the exhibit by the student, etc. (A proforma for information about the exhibit/model is also attached for this purpose Proforma I).
- viii. Number of visitors to the exhibition.

**F. CRITERIA FOR EVALUATION OF EXHIBITS FOR JAWAHARLAL NEHRU NATIONAL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION (JNNSEMEE) FOR CHILDREN**

Selected entries from all State Level Science, Mathematics and Environment Exhibition (SLSMEE) for children organised in different states, union territories and other organisations are forwarded to NCERT for consideration for participation in Jawaharlal Nehru National Science, Mathematics and Environment Exhibition (JNNSEMEE) for Children. JNNSEMEE is organised every year by NCERT in a state/ union territory on rotation basis usually during a period which falls around the birth anniversary of Pandit Jawaharlal Nehru, that is 14th November (Children's Day). These entries are forwarded to NCERT as per Proforma I (given in this booklet). At NCERT, these entries are screened and short-listed on the basis of their write-ups and a 5 minutes video presentation in

CD by the student. For this purpose the following criteria for evaluating exhibits is adopted (the percentages given in bracket are weightages). NCERT reserves the right to alter the criteria to include adequate number of exhibits from rural/backward regions and exhibits developed by disabled students.

1. Originality and innovations in the exhibit/model (25 percent);
2. Scientific thought/ principle/approach (20 percent);
3. Utility for Society, Scalability ; (20 percent)
4. Economic (low cost), portability, durability, etc. (15 percent); and
5. Presentation of write-up: (20 percent).



**The Report**

and

**Proformas I-V**

should strictly follow the above format and be forwarded

**within one month**

after the conclusion of the exhibition to :

**Dr. Ashish Kumar Srivastava**

*Coordinator*

**State Level Science, Mathematics and Environment**

**Exhibition (SLSMEE) for Children – 2018-19**

**DEPARTMENT OF EDUCATION IN SCIENCE AND MATHEMATICS**

**National Council of Educational Research and Training**

Sri Aurobindo Marg, New Delhi 110 016

• **Phone:** 011-26962030; • **Fax:** 011-26561742

**e-mail:** [slsmee.ncert@gmail.com](mailto:slsmee.ncert@gmail.com) • **Website:** [www.ncert.nic.in](http://www.ncert.nic.in)



**Proformas**

**46TH JAWAHARLAL NEHRU NATIONAL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION  
(JNNSMEE – 2019) FOR CHILDREN**

**THEME : SCIENTIFIC SOLUTIONS FOR CHALLENGES IN LIFE**

**Proforma I**

**INFORMATION ABOUT THE EXHIBIT/MODEL**

1. Title of the Exhibit/model .....  
(in BLOCK letters)

2. Sub-theme:

1. Agriculture and Organic Farming
2. Health and Cleanliness
3. Resource Management
4. Waste Management
5. Transport and Communication
6. Mathematical Modeling
7. Other (please specify sub-theme);.....

3. Name(s) of Contributing Student(s) .....(M/F); Class.....  
(in BLOCK letters) .....(M/F); Class.....  
.....(M/F); Class.....  
.....(M/F); Class.....

4. Name(s) of Guiding Teacher(s) ... (M/F)  
(in BLOCK letters) .....(M/F)

5. Name of school with complete postal address (in BLOCK letters) :  
.....  
.....  
.....State/UT..... Pin .....

Phone: .....; Email .....

6. Type of school\* Government/Local Body/ Private Aided/Private  
Unaided/ Any other (Please Specify) .....

7. Affiliation of the School State Board/ICSE/CBSE, Any other (Please Specify)  
.....
8. Location of the School Tribal/Rural/Backward/Semi Urban/Urban  
.....
9. Nature of the Exhibit/Model (A) Innovative/Improvised Apparatus  
(B) Working/Static Model/Study Report  
Any Other (Please Specify) .....
10. Whether Dark Room Space is needed for the display of Exhibit: Yes/No
11. Approximate space required for the display of Exhibit.....
12. Source of inspiration/help for preparing the exhibit/model:  
(Please explain briefly about the nature and form of help received from the following):
- (i) From Teachers/School  
.....  
.....
- (ii) From Parents  
.....
- (iii) From Peer Group  
.....  
.....
- (iv) Any other  
.....  
.....
13. Brief Summary (Please explain the purpose (or aim) and the scientific principle involved in the exhibit/model in not more than three lines).  
.....  
.....  
.....
14. Write-up of the Exhibit/Model (not more than 1,000 words) in the following format.  
*[Note: Proper submission of the write-up will ensure that if selected for participation in the 46 Jawaharlal Nehru National Science, Mathematics and Environment Exhibition (JNNSMEE-2019) for Children-2019, it will be considered for publication in the booklet entitled: Structure and Working of Exhibits. For convenience, examples of write-ups of exhibits are also given in this booklet.]*

- 
- \*G. Government: A Government School is that which is run by the State Government or Central Government or Public Sector Undertaking or an Autonomous Organisation completely financed by the Government;
- LB. Local Body: A Local Body School is that which is run by Panchayati Raj and Local Body Institutions such as Zila Parishad, Municipal Corporation, Municipal Committee or Cantonment Board;
- PA. Private Aided: A Private Aided School is that which is run by an individual or a private organisation and receives grants from the Government or Local Body;
- PU. Private Unaided: Private Unaided School is that which is managed by an individual or a private organisation and does not receive any grant from the Government or Local Body.

I. *Introduction*

- (i) Purpose (or Rationale) behind the development or construction of the exhibit; and
- (ii) The scientific principle involved.

II. *Description*

- (i) Materials used for the construction;
- (ii) Construction and working of the exhibit/model; and
- (iii) Applications, if any.

III. *References*

Books, journals or magazines referred for preparation of the exhibit/model.

IV. *Illustrations*

- (i) Black and white line and labelled diagram of the model, illustrating the working of the exhibit/model.
- (ii) Close-up photographs of the exhibit/model.

15. **Five minutes video presentation in CD by the student about the exhibit containing (i) title of the exhibit (ii) sub-theme of the exhibit (iii) working of the exhibit (iv) scientific principle involved in it (v) application etc. should also be sent along with the write-up.**

- Note:**
- (i) Please do not pin or paste the photographs of the exhibits. Enclose them in a separate envelope. Description of the photograph may be written on its back.
  - (ii) Please do not enclose the photographs of participating student(s) and their guide teacher(s)
  - (iii) Please do not send the scanned/soft copies of write-ups instead of video presentation.

CERTIFICATE OF ORIGINALITY

We,.....  
hereby declare that the submitted exhibit/model is our original creative work / modified form of available work and to the best of our knowledge, this exhibit/model has never been developed by any other person in this form.  
(Strike off, whichever is not applicable.)

(Signatures of all students and teachers)

State/UT \_\_\_\_\_

Duration \_\_\_\_\_

**STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION FOR CHILDREN-2018-19**

**PROFORMA II**

**PANEL OF JUDGES – SUB-THEME WISE\***

**VENUE** \_\_\_\_\_

**THEME : SCIENTIFIC SOLUTIONS FOR CHALLENGES IN LIFE**

PERTAINING TO THE SUB-THEMES OF

- Sub-themes :** 1. Agriculture and Organic Farming  
 (Please tick marks on the area being evaluated)
- 2. Health and Cleanliness
  - 3. Resource Management
  - 4. Waste Management

- 5. Transport and Communication
- 6. Mathematical Modeling
- 7. Others (Please specify sub-theme).....

Sl. No	Name(s) of the Judge(s)	Designation	Official Address, Phone Fax, e-mail	Residential Address Phone, Mobile
1.				
2.				
3.				
4.				

\* Respective judges may have their opinions, suggestions and comments about the organisation of science, mathematics and environment exhibition. NCERT welcomes all such opinions. Kindly enclose them on separate sheets.

**STATE LEVEL SCIENCE,  
MATHEMATICS AND ENVIRONMENT EXHIBITION FOR CHILDREN-2018-19**

**PROFORMA III**

**INFORMATION ABOUT PARTICIPATING SCHOOLS**

State/Union Territory : .....

Dates of Exhibition : .....

Venue of Exhibition : .....

Type of School*	Tribal (T)/ Rural (R)/ Urban (U)	Number of Schools	Number of Exhibits/ Models	Participants from the School							
				Teachers			Students				
				Male	Female	Total	Boys	Girls	Total	SC/ST	
G	T										
	R										
	U										
LB	T										
	R										
	U										
PA	T										
	R										
	U										
PU	T										
	R										
	U										
<b>Total</b>											

- \* **G. Government:** A Government School is that which is run by the State Government or Central Government or Public Sector Undertaking or an Autonomous Organisation completely financed by the Government;
- LB. Local Body:** A Local Body School is that which is run by Panchayati Raj and Local Body Institutions such as Zila Parishad, Municipal Corporation, Municipal Committee or Cantonment Board;
- PA. Private Aided:** A Private Aided School is that which is run by an individual or a private organisation and receives grants from the Government or Local Body;
- PU. Private Unaided:** A Private Unaided School is that which is managed by an individual or a private organisation and does not receive any grant from the Government or Local Body.

**STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION FOR CHILDREN – 2018–19**

**PROFORMA IV**

**INFORMATION ABOUT NATURE AND NUMBER OF EXHIBITS DISPLAYED**

**THEME : SCIENTIFIC SOLUTIONS FOR CHALLENGES IN LIFE**

State/Union Territory: .....

Dates of Exhibition: .....

Venue of Exhibition: .....

Sub-themes	Nature and Number of Exhibits Displayed				Total No. of Exhibits
	Innovative/Improved/ Aparatus/Working Model	Static Model	Study/Survey Report	Any other (please specify)	
Agriculture and Organic Farming					
Health and Cleanliness					
Resource Management					
Waste Management					
Transport and Communication					
Mathematical Modeling					
Others (Please specify sub-theme) .....					

**STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION  
FOR CHILDREN-2018-19**

**PROFORMA V**

**MAINTENANCE OF ACCOUNTS**

State/Union Territory : .....

Dates of Exhibition : .....

Receipt				Expenditure				Signature of Coordinator
Voucher	Date	Particulars	Amount	Voucher	Date	Particulars (Head)	Amount	
		Draft No.						
		Other in- come, if						
						Balance Refunded to NCERT, if any,		
		<b>Total</b>				<b>Total</b>		

Certified that the expenditures have been made in accordance with the norms and Guidelines as given by the NCERT for organising the State Level Science and Environment Exhibition for Children. It is also certified that no other voucher is included.

Date .....

Signature of the In-Charge (Controlling Officer)



**STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION FOR CHILDREN – 2018–19****PROFORMA VI****THEME: SCIENTIFIC SOLUTIONS FOR CHALLENGES IN LIFE**

VENUE.....

**JUDGES' PROFORMA FOR EVALUATION OF PARTICIPATING ENTRIES-SUB-THEME WISE**

**Sub-themes :** 1. Agriculture and Organic Farming  
 (Please tick marks on the area being evaluated)  
 2. Health and Cleanliness  
 3. Resource Management  
 4. Waste Management

5. Transport and Communication  
 6. Mathematical Modeling  
 7. Others (Please specify sub-theme) .....

Sl No	Code of the Exhibit	Involvement of Children's Own Creativity and Imagination 20%	Originality/Innovations in the Exhibit/ Model 15 %	Scientific Thought/ Principle/ Approach 15 %	Technical Skills/Workmanship/ Craftmanship 15 %	Utility for society, Scalability 15 %	Economic (low cost)/ Portability/ Durability 10 %	Presentation 10%	Total 100 %
1	...	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...	...
3	...	...	...	...	...	...	...	...	...
4	...	...	...	...	...	...	...	...	...
5	...	...	...	...	...	...	...	...	...
6	...	...	...	...	...	...	...	...	...
....	...	...	...	...	...	...	...	...	...
....	...	...	...	...	...	...	...	...	...

Date \_\_\_\_\_

Signature.....

Name.....

Designation and Affiliation.....

**Note:** 5% and 3% extra weightage may be given to exhibits belonging to rural/backward and semi urban regions respectively.

## EXAMPLES OF WRITE-UPS OF THE EXHIBITS

TWO EXAMPLES OF WRITE-UPS OF THE EXHIBITS DISPLAYED IN EARLIER EXHIBITION ARE GIVEN BELOW TO FACILITATE STUDENTS TO DEVELOP THE WRITE-UP OF THEIR EXHIBIT

### (A) NEW PADDY THRESHER

**Student :** Akoijam Kheroda Devi

**School :** Anand Purna Schol, Thoubal District, Manipur

**Teacher :** Robindro Singh

#### INTRODUCTION

In most of the agricultural land area of Manipur, people mainly cultivate paddy. Agriculture sector contributes a major share to the total state domestic product. It provides employment to about half of the total farmers in Manipur. During harvest, farmers spend a lot of money as labour charges to thresh the paddy. In view of this, an eco-friendly machine (model) called 'New Paddy Thresher' is developed. 'New Paddy Thresher' is a manual threshing machine. It can thresh the paddy plants without cutting the straws. Such an eco-friendly machine will help the poor farmers of the country in general and farmers of Manipur in particular to improve their economy.



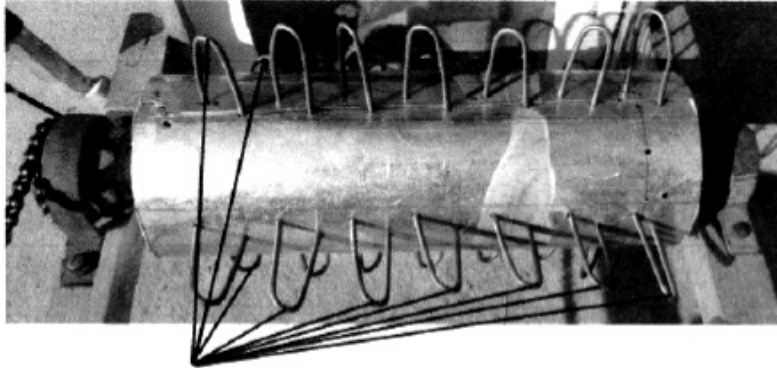
Figure 1: New Paddy Thresher

#### MATERIAL REQUIRED

The material used in this exhibit are: U-shape beating rods; Bearing; Crank shaft; Iron chain; Wood; Bolts and nuts; Paddle; Paddy straw fixer.

#### SCIENTIFIC PRINCIPLE INVOLVED

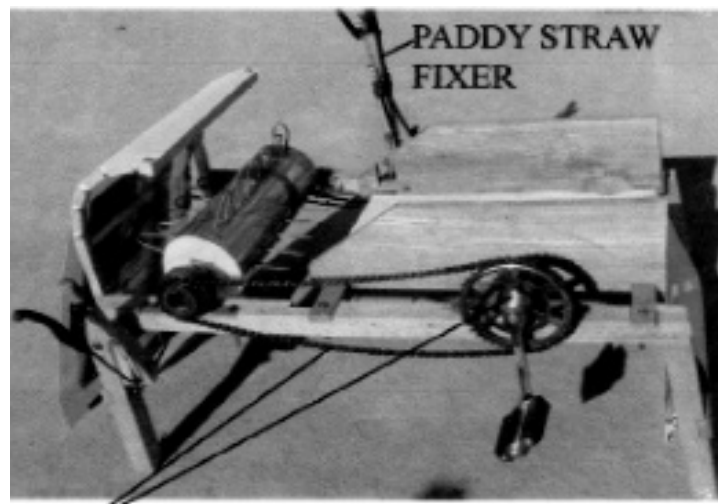
'New Paddy Thresher' is based on the principle of pulley and Lever system.



*Figure 2: U-Shape Beating Rods*

### **CONSTRUCTION AND WORKING**

Four rows of U-shape beating rods are fixed on a cylinder. The two end of the beating cylinder are fixed by two bearing so as to rotate freely. A pulley is fixed on one end of the beating cylinder and joins the crank shaft with the iron chain. In one complete rotation of the crank, the beating cylinder rotates twice. An armful of paddy straw can be beaten eight times in one complete crank rotation. Three crank rotation is enough for threshing one armful of paddy.



*Figure 3: Crank Shaft with the Iron Chain*

### **ADVANTAGES**

- (i) It is low cost and portable.
- (ii) It is an eco-friendly machine.
- (iii) A farmer can save labour and money by using this thresher.

## (B) VEHICULAR EXHAUST FILTER

**Student :** Vaibhav Dhama, Saransh Mathur

**School :** Demonstration School, RIE, Ajmer, Rajasthan

**Teacher :** Amarendra Tripathy

### INTRODUCTION

We know that many vehicles are increasing air pollution which increases global warming or the temperature of the earth. Many steps have been taken to reduce the emission level of gases coming out from the vehicle exhaust. We can see in heavy traffic areas the level of air pollution is very high. We feel uncomfortable and even feel itching in our eyes in such areas. Increasing air pollution is a danger sign for all living organisms on earth. Exhaust gases coming out from all types of automobiles contains mainly carbon mono-oxide, carbon dioxide, nitrogen dioxide, hydrocarbons, sulphur dioxide and other harmful gases. These gases are very harmful for our environment and ecological system. This project is an attempt to solve the problem of high pollution level in cities due to automobiles in heavy traffic areas. This project helps us to reduce the air pollution caused by the vehicles.

### SCIENTIFIC PRINCIPLE INVOLVED

In the cooling chamber two aluminium plates which have charge on them attract dust particles. The exhaust gases pushed by the exhaust fan on the nets made of synthetic fibers and solution of sodium hydroxide (NaOH) is sprayed by the sprayer. NaOH reacts with the harmful exhaust gases and neutralizes them. This way, the level of polluted air is very low.

### MATERIALS REQUIRED

Bottles of two litre capacity, T-shape water pipe joint, two exhaust fans, aluminium foil, NaOH solution, sprayer, battery, etc.

### CONSTRUCTION AND WORKING

In this project the exhaust gases are collected in the cooling chamber (the shape of the cooling chamber is like a frustum) where due to the expansion of gases their temperature becomes low. In the cooling chamber there are two aluminium plates which create charge on them and attract the acidic/basic dust or harmful particles and then an exhaust fan sucks the gases and pushes the gases in NaOH treatment chamber. We can identify it in given figure 4 where the NaOH reacts with harmful gases and make them neutral. There is a machine called sprayer placed after the exhaust fan which sprays NaOH on the nets of synthetic fibers after every 2 km distance period when the vehicle is running.

In the vertical chamber the remaining dust particles are separated by exhaust fan which pushes the gases on a filter so the heavy solid harmful particles settle down. Then the remaining gases are again treated with NaOH. We can identify it in figure 5. Finally, cool and fresh air with very low air pollution comes out and spread out in the environment.

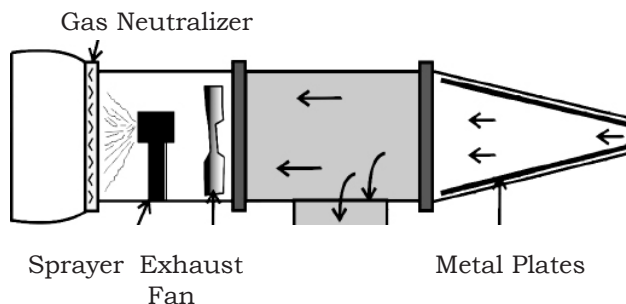


Figure 4

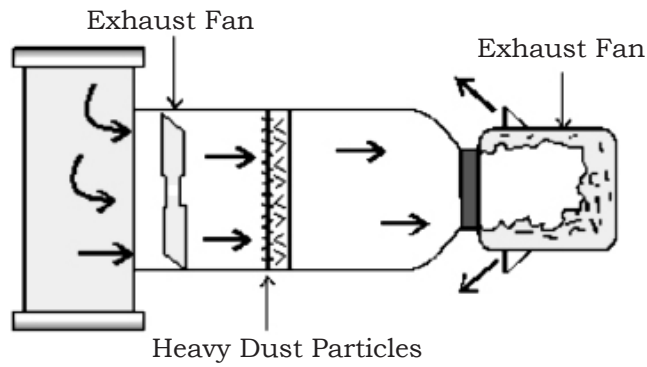


Figure 5

### **REMOVAL OF HARMFUL PARTICLES/CHEMICALS**

Take out the nets of synthetic fibers and wash them in NaOH solution to remove solid sediments and harmful chemicals periodically.

### **RESULT**

It ensures lowering of the pollution level in air due to automobiles. So we can save our earth from pollution.