

**STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION  
FOR CHILDREN–2014–15**

and

**42ND JAWAHARLAL NEHRU NATIONAL SCIENCE, MATHEMATICS AND  
ENVIRONMENT EXHIBITION FOR CHILDREN–2015**

**GUIDELINES**

**FOR THE PREPARATION OF EXHIBITS AND MODELS, AND  
Organising Exhibitions**

विद्यया ऽ मृतमश्नुते



एन सी ई आर टी  
NCERT

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

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## 1 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 nature, 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 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 2014 - 15 too. These would form the first phase of preparation for the JNNSMEE to be organised in November 2015.

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.

Children are naturally inquisitive and innovate in response to a variety of problems facing the society. The rapidly aspiring human community for want of more comfort has put tremendous pressure on the limited resources of the world leading to unsustainable exploitation which may result in threatening the very existence of human life. 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. To recognise and encourage these powerful tools so that the problems confronting the society can be overcome through science and mathematics led solutions for a sustainable World, the theme for the State Level Science, Mathematics and Environment Exhibition (SLSMEE) for Children – 2014-15 has

been chosen as **Science and Mathematics for a Sustainable World**.

It is envisaged that children and teachers would try to analyse all aspects of the role of science and mathematics for a sustainable world. This will enable students and teachers to generate scientific and mathematical ideas for addressing various problems of the society. Scientific and mathematical ideas in this context may be referred to as innovative ways of doing things or development of new values through solutions that meet new requirements leading to sustainable production and uses.

Children must be aware about how human society's unsustainable use of natural resources affects the quality of life and environment. Children and teachers should identify where and how new researches and developments in science, mathematics and technology can bring sustainable development of society.

The theme for SLSMEE-2014-15 and JNNSMEE-2015, **Science and Mathematics for a Sustainable World** aims to cover areas such as-

1. Community Health and Environment;
2. Landmarks in Science and Mathematics;
3. Information and Communication Technology;
4. Energy-Resources and Conservation;
5. Transport;
6. Waste Management.

**(Areas listed above are suggestive. Students are free to choose any other area and develop exhibits involving Science and Mathematics for a Sustainable World)**

A few exemplar ideas pertaining to the areas listed in the context of the theme for the development of exhibits are given below.

**THEME: SCIENCE AND MATHEMATICS FOR A SUSTAINABLE WORLD.**

**1. Community Health and Environment**

The main objectives of this area are: to bring awareness among the children about health

and factors affecting our health; to explore new scientific, technological and bio-medical inventions in prevention and cure; to analyse the role of self and society in keeping our environment healthy in order to maintain good health and promote innovative ideas for better management.

The exhibits/models in this area may pertain to:

- various levels of good health and ill health;
- factors affecting the health and resulting ailments in the body;
- infectious and non-infectious diseases, relationship with causative factors and their sources;
- innovative control measures at different levels/roles of various agencies;
- presenting medical assistance and facilities of rural/urban and gender aspects;
- ways to raise awareness and sensitise people to be careful in health matters, explore the possibilities and make use of the facilities available;
- development of knowledge-base and understand new scientific, technological aids in bio-medical area;
- presentation of known facts and research findings in different medical systems like Indian, Modern, Homeopathy, Ayurvedic etc.;
- lifestyle and its relationship with good and bad health based on known facts and researches;
- demonstration of the role of traditional knowledge of herbal products for community health; etc.
- improved methods of sanitation and appropriate technology for waste disposal, both biodegradable and non-biodegradable;
- common prophylactic measures available and advantages of inoculation and vaccination;
- need for appropriate measures for family planning and welfare;
- ideas for developing low-cost nutritious food;
- occupational hazards to health and innovative techniques to overcome them;

- general awareness about community medicine;
- new medical diagnostic and therapeutic tools;
- improvised aids for visually impaired, hearing impaired, physically challenged persons, etc;
- need to curb menace of alcohol consumption, smoking, drug abuse etc.
- genetic studies;
- developing simple technologies for diagnostics and environmental problems monitoring; etc.

## 2. Landmarks in Science and Mathematics

The main aim of this area is to make our school children and teachers aware of the milestones in science and mathematics that have contributed for a sustainable world. The exhibits/models in this area may pertain to:

- developing innovative experiment or design of models/exhibits on the landmark discovery and invention in science and mathematics;
- significant contributions to the advancement of science and technology;
- policies, programmes and schemes in science and mathematics that have a significant impact on human life;
- scientific and mathematical applications, that have a wide ranging impact on issues such as agriculture, energy, health, environment, space, industry, communication, education etc;
- effective and efficient ways of communicating an experiment that revolutionise scientific and mathematical ideas;
- cost effective demonstration of known facts and research in science and mathematics;
- impact of scientific and mathematical ideas on other subject areas such as medicine, psychology, social science etc;
- contribution of science and mathematics for economic growth, mass literacy, eradication of poverty and malnutrition; etc.

## 3. Information and Communication Technology

The main objectives of this area are: to promote innovations in knowledge networks involving information and communication technology in all segments of the society; to promote children to think, reason and communicate to solve problems; to understand effective use of information and communication technology for a variety of purposes.

The exhibits and models in this area may pertain to:

- developing innovative designs/models of multimedia equipments/materials and packages for children with special needs, especially visual and audio impairment;
- exploring uses/applications of information and communication technology in generating employment/eradicating illiteracy;
- technologies of emerging web designs;
- projects against attack aimed on information services/cyber security/cyber war;
- effective and efficient ways of communicating scientific and mathematical ideas and concepts;
- technologies in forecasting and warning of cyclones, floods and storms;
- better information and public address systems in the event of disaster to prevent chaos and confusion;
- improvised/improved devices for effective communication between various emergency services-medical, police, military and other agencies/bodies/committees;
- use of satellites in providing information pertaining to meteorology, communication, remote sensing, etc;
- applications in education using computer as an educational tool; simulations in science, mathematics, etc;
- other emerging areas in information and communication technology.

## 4. Energy- Resources and Conservation

This area is expected to make children think of various ways and means for making efficient use of available energy resources and also new

techniques/methods of using and conserving energy from both conventional and non-conventional sources. The exhibits/models in this area may pertain to:

- various ways of harnessing geothermal energy such as energy from hot springs/geothermal desalinisation/geothermal heating – controlling heating and cooling of a building using underground heat by vertical/horizontal loops/geothermal power/electricity generated from naturally occurring geological heat sources;
- design of green building/environment building which harvest energy, water and materials;
- green roof technologies/roof mounted solar technologies such as solar water heater, solar lighting system;
- innovative designs of domestic hydroelectric generator;
- methods of heat retention in materials/heat control in the design of house;
- solar cooker/solar distiller/solar dryer for food processing/solar heated houses;
- studies of variation in sunshine intensity at a given place for developing indigenous method of its usage etc;
- projects for measuring availability of solar/wind energy in a given area;
- wind mill/water mill for grinding grains/drawing water from the well and to generate electricity;
- water sensitive urban design to mitigate water shortage;
- water crisis management;
- use of tidal waves/ocean currents/salinity gradient for generating electricity;
- energy from biomass such as seaweeds, human/animal wastes, keeping in view environmental concerns;
- improvised technologies for effective usage of bio-fuels;
- innovative designs of bio gas/bio mass plant;
- low cost liquid fuel (bio-ethanol, bio-methanol from cellulose biomass by improvising conversion techniques);
- bio energy for poverty alleviation;

- impact of bio-energy on food security;
- designs of fuel-efficient automobiles/machines;
- innovative designs of internal combustion engine which can function on various bio fuels;
- production of electrical energy from mechanical energy/chemical/biological/nuclear resources;
- mechanism of extraction, storage and processing of fossil fuels;
- effects of landscaping and architecture on energy consumption etc.

## 5. Transport

The main objective of this area is to make general public and children in particular aware about the issues and concerns of the present transportation system and to promote innovations for an efficient transport system. The exhibits/models in this area may pertain to:

- improvised/indigenous technique for efficient transport in rural/urban areas;
- fuel efficient/pollution-free designs of automobiles/other vehicles;
- use of innovative/inexpensive/locally available materials/designs for construction/maintenance of roads/railway tracks;
- innovative ideas for efficient management of road, rail, water and air transport systems;
- preparedness for disaster management-both natural and man-made ;
- GPRS and satellites enabled vehicular movement and transportation;
- design and functioning of modern devices of transportation;
- designs for making existing operation of transportation more efficient;
- exploring uses/applications of transport in generating employment/eradicating illiteracy;
- improvised/improved devices for effective transport between various emergency services, namely medical, police, military and other administrative bodies/committees;

## 6. Waste Management

The main aim of this area is to make our school children and teachers realise the need for managing the unsustainable disposal system of waste material generated from industry and domestic household and also new technique/methods for waste disposal. The exhibits/models in this area may pertain to;

- various ways of waste disposal such as landfill, incineration etc;
- 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 nanotechnology (nanotoxicology 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;
- technique and processes for reducing waste generation;
- efficient and effective methods/technique of waste handling and transportation;

**Note:-** The exemplar points listed so far are to trigger ideas and give directions for preparing exhibits and are not exhaustive. Further we would once again reiterate that, students and teachers are free to choose any area, even areas not listed in this guidelines. However the chosen area and the exhibits/models developed should be in the context of the theme: Science and Mathematics for a Sustainable World. Examples of write-ups of exhibits from the previous JNNSMEE are also given at the end of this booklet for facilitating the preparation of exhibits and models for students and teachers.

## 2 GUIDELINES FOR ORGANISING ONE-DAY SEMINAR

### Topic: Indigenous Technology for Inclusive Growth

**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.

The importance of Indigenous Technology has been realised since ancient time. In day to day human endeavours, indigenous technology encompasses all spheres of activities, right from agriculture to transport and from simple tools to sophisticated machines. Indigenous technology holds the key to a nation's development objectives. It is also seen as the driver for inclusive growth for a country.

Government of India has declared the decade 2010-2020 as the Decade of Innovations with a Focus on Indigenous Technology for achieving Inclusive growth. Having realised this, Science, Technology and Innovation Policy-2013 of the Department of Science and Technology, Government of India emphasises the importance of indigenous technology for the country's technological competence and self reliance. Indigenous technology in this context need not necessarily be on the technological invention through high input R&D but on indigenous innovation and other simple tools and processes that create new values for the development and participation of the lower pyramid of the population. The diversity of the country has served as a breeding ground for indigenous innovation for the country.

We intend to create awareness among teachers, teacher educators, researchers and students about looking for indigenous innovation in all possible situations that can bring inclusive growth of the nation. The general public and community may be motivated to appreciate and recognise the role played by indigenous technology for the development and progress of the nation.

Activities to be performed during this Seminar should be planned to (i) increase the public appreciation and understanding of Indigenous Technology; (ii) motivate people to think about using indigenous technology for solving challenging problems surrounding them; (iii) encourage out of the box thinking and lateral thinking among the

children; (iv) make people aware of the role of indigenous technology in achieving inclusive growth; and (v) make people aware about the need for collaborative arrangement among holders of indigenous knowledge.

As a part of this endeavour, to reach out to the public through children and teachers, a one day seminar may be organised in the SLSMEE for children. During this One-Day Seminar on '**Indigenous Technology for Inclusive Growth**', children, teachers, parents and all concerned may be invited to generate ideas. The activities in this seminar may include:

- Making people aware of contributions of Indigenous technology in the development of the nation;
- Publicising the usefulness of indigenous technology in the development process for achieving inclusive growth;
- Organising poster exhibition-cum-competitions highlighting usefulness of indigenous technology especially for inclusive growth and in solving the problems of the society;
- Organising invited talks by experts in Indigenous Technology, particularly motivating the audience to look for its role in creating inclusive growth
- Making students find solution to specific problems existing in their immediate environment.
- Arranging a Quiz competition in which questions may be based on the Indigenous innovation and technology;
- Arranging a group discussion among different groups, to create awareness about the usefulness of Indigenous Technology in different spheres of life.



**A. CALL FOR ENTRIES**

1. The theme for SLSMEE-2014-15 for Children and for the 42nd Jawaharlal Nehru National Science, Mathematics and Environment Exhibition (JNNMEE– 2015) for children would be '**Science and Mathematics for a Sustainable World**' pertaining to the areas such as -

- 1 Community Health and Environment;
- 2 Landmarks in Science and Mathematics;
- 3 Information and Communication Technology;
- 4 Energy; Resources and Conservation;
- 5 Transport;
- 6 Waste Management;

**(Areas listed above are suggestive. Students are free to choose any other areas and develop exhibit involving 'Science and Mathematics for a Sustainable World'.)**

In order to facilitate the preparation of exhibits and models for display in district to state level exhibitions during 2014-2015, *Guidelines for the Preparation of Exhibits and Models* are being communicated.

2. Wide publicity should be given for inviting entries. *SLSMEE-2014-15 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)).

3. 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, Central Tibetan Schools, 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;
- 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.

4. 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 area 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 area (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 area developed by students of classes IX-XII may be selected and forwarded to NCERT for consideration for participation in JNNSMEE-2015. However outstanding exhibits developed by upper primary

students and members of science clubs may also be considered provided the total entries from each area does not exceed three.

**In addition to this, two best exhibits developed by disabled students from any of the areas 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.**

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** (**two** outstation and **two** local) experts/scientists may be disbursed at the rate of Rs 1500.00 each.  
**Note** : The expert/scientist should be preferably from a research institute/laboratory/ university/SCERT/SIE.
- (iii) Travelling allowance to two outstation experts/scientists from a maximum distance of 500 km may be disbursed as per the state/central government rules.
- (iv) Daily allowance and incidental charges to **two** outstation experts/scientists for a maximum of three days may be disbursed as per state/central government rules.
- (v) Conveyance charges to **two** local experts/scientists may be disbursed as per state/central government rules.
- (vi) Contingency grant for tea/coffee with light snacks: typing/photocopying/cost of transparencies/pens/CDs etc: Rs. 3,000.00/-.

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

- (i) Honorarium to **four** (local) judges may be disbursed at the rate of Rs. 1500.00 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) Travelling allowance: actual second class sleeper rail/bus (non-AC) fare.
  - (iv) Incidental charges maximum upto Rs. 100.00 for to and fro journey may be provided for the 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: Rs.80.00 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 Rs.120.00 per person may be provided as daily allowance (DA).*
  - (vi) Local conveyance charges may be disbursed as per state/central government rules.
  - (vii) contingency grant for typing/ photocopying etc. Rs. 3,000.00/-

#### 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 Rs 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 of the Co-ordinator/Incharge.  
State Level Science, Mathematics and Environment  
Exhibition (SLSMEE) for Children - 2014-15

Seal

**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 area 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 42nd JNNSMEE - 2015 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.

### **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 :

**R.R.Koireng**  
**Coordinator**

**State Level Science, Mathematics and Environment  
Exhibition (SLSMEE) for Children - 2014-15**

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)

**F. CRITERIA FOR EVALUATION OF EXHIBITS FOR JAWAHARLAL NEHRU NATIONAL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION (JNNSMEE) 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 (JNNSMEE) for Children. JNNSMEE 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).

# 4 PROFORMAS

**42ND JAWAHARLAL NEHRU NATIONAL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION (JNNSMEE - 2015) FOR CHILDREN**

**Theme : SCIENCE AND MATHEMATICS FOR A SUSTAINABLE WORLD**

## Proforma I

### INFORMATION ABOUT THE EXHIBIT/MODEL

1. TITLE OF THE EXHIBIT/MODEL (IN BLOCK LETTERS) \_\_\_\_\_
  
  2. Area: *Tick only one and strike out all others*
    - (i) Community Health and Environment;
    - (ii) Landmarks in Science and Mathematics;
    - (iii) Information and Communication Technology;
    - (iv) Energy- Resources and Conservation;
    - (v) Transport;
    - (vi) Waste Management;
    - (vii) Others (Please specify area) .....
  
  3. NAME(S) OF CONTRIBUTING STUDENT(S) (IN BLOCK LETTERS) \_\_\_\_\_ (M/F); Class \_\_\_\_\_  
 \_\_\_\_\_ (M/F); Class \_\_\_\_\_  
 \_\_\_\_\_ (M/F); Class \_\_\_\_\_  
 \_\_\_\_\_ (M/F); Class \_\_\_\_\_
  
  4. NAME(S) OF GUIDING TEACHER(S) (IN BLOCK LETTERS) \_\_\_\_\_ (M/F)  
 \_\_\_\_\_ (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.....
- \* **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.

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

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(ii) From Parents

---

(iii) From Peer Group

---

(iv) Any other

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13. Brief Summary (Please explain the purpose (or aim) and the scientific principle involved in the exhibit/model in not more than three lines).

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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 42nd Jawaharlal Nehru National Science, Mathematics and Environment Exhibition (JNNSMEE-2015) for Children – 2015, it will be considered for publication in the booklet entitled: Structure and Working of Models. For convenience, examples of write-ups of exhibits are also given in this booklet.]

*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) area 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)

(Signatures of all students and teachers)



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

Duration \_\_\_\_\_

**STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION FOR CHILDREN - 2014-2015**  
**Proforma II**

**PANEL OF JUDGES - AREA WISE\***

VENUE .....

**THEME : SCIENCE AND MATHEMATICS FOR A SUSTAINABLE WORLD** PERTAINING TO THE AREAS OF

- (i) Community Health and Environment; (ii) Landmarks in Science and Mathematics;
- (iii) Information and Communication Technology; (iv) Energy- Resources and Conservation;
- (v) Transport; (vi) Waste Management.
- (vii) Any other area (please specify).....

**Areas:**

*(Please tick mark on the area being evaluated)*

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 - 2014-2015**

**Proforma III**

**INFORMATION ABOUT PARTICIPATING SCHOOLS**

State/Union Territory: \_\_\_\_\_

Dates of Exhibition: \_\_\_\_\_

Venue of Exhibition: \_\_\_\_\_

Type of School*	Tribal (T)/ Rural (R)/ Urban (U)	No. 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 - 2014-2015**

**Proforma IV**

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

**THEME: SCIENCE AND MATHEMATICS FOR A SUSTAINABLE WORLD**

State/Union Territory: \_\_\_\_\_

Dates of Exhibition: \_\_\_\_\_

Areas	Nature and Number of Exhibits Displayed				Total No. of Exhibits
	Innovative/Improved Apparatus/Working Model	Static Model	Study/Survey Report	Any other (please specify)	
Community Health and Environment					
Landmarks in Science and Mathematics					
Information and communication Technology					
Energy- Resources and Conservation					
Transport					
Waste Management.					
Any other area. (Please specify)					

**STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION FOR CHILDREN - 2014-2015**

**Proforma V**

**MAINTENANCE OF ACCOUNTS**

State/Union Territory: \_\_\_\_\_

Dates of Exhibition: \_\_\_\_\_

Voucher	Receipt			Expenditure				Signature of Coordinating
	Date of	Particulars	Amount	Voucher	Date of	Particulars (Head-	Amount	
		Draft No.						
		Other income, 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/UT \_\_\_\_\_

Duration \_\_\_\_\_

**STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION FOR CHILDREN - 2014-2015**

**Proforma VI**

**THEME: SCIENCE AND MATHEMATICS FOR A SUSTAINABLE WORLD**

VENUE: .....

**JUDGES' PROFORMA FOR EVALUATION OF PARTICIPATING ENTRIES-AREA WISE**

- Areas;** (i) Community Health and Environment (ii) Landmarks in Science and Mathematics;  
 (Please tick mark (iii) Information and Communication Technology; (iv) Energy: Resources and Conservation;  
 on the area (v) Transport; (vi) Waste Management  
 being evaluated) (vi) Any other area( please specify).....

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

## 5 EXAMPLES OF WRITE-UPS OF EXHIBITS

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) TWO-IN-ONE HONEY SQUEEZING MACHINE

**STUDENT**  
Sonia Thounaojam

Sacred Heart School,  
Porompat, Manipur

**TEACHER**  
Angom Geetarani

#### INTRODUCTION

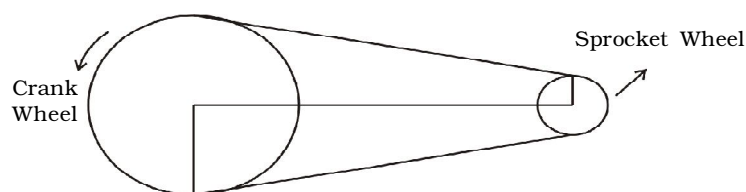
Honey is an edible natural fluid. It is a rich source of energy containing many vital nutrients. Though Manipur has nearly 10,000 bee-keepers but the honey is not appropriately produced.

In Manipur, honey is extracted from honey comb by squeezing or by rotating manually. This type of method could not extract all the honey from the honey comb. Instead it loses muscular power, contains impurities and is also a time consuming work. So, it is necessary to make a machine which can extract large quantity of honey that contains no impurities. Such type of machine is envisaged in this model. The present model is an attempt to solve the problems of using excessive muscular power while extracting honey.

#### SCIENTIFIC PRINCIPLE INVOLVED

The following scientific principle is involved

- (i) When a crank, connected to a sprocket wheel by a chain, is made to rotate, the linear speed ' $v$ ' is the same for both wheels.



Therefore,  $v = WR = wr$ , where  $R$  and  $r$  are radii of the crank and the sprocket respectively.

Hence,  $w = W \left( \frac{R}{r} \right)$ , ' $v$ ' is the speed and  $W$  and  $w$  are their angular speeds.

Since,  $R \gg r$ ,  $w \gg W$ .

Therefore, for one rotation of the crank, there will be a number of rotations (depending upon

$\frac{R}{r}$ ) of the sprocket wheel.

- (ii) Principle of experiencing a centrifugal force when an object is made to rotate in a direction away from the centre of the circular path.

## **MATERIALS REQUIRED**

Wood, Stainless steel, Honey comb, Chain, Sprocket wheel, Paddle, Handle, Pot etc.

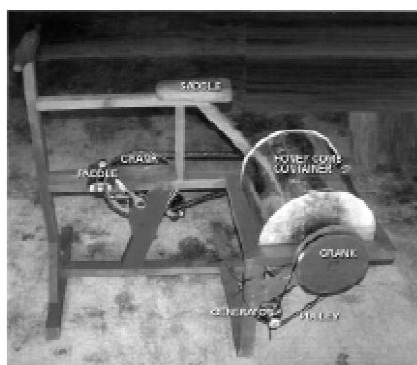
## **CONSTRUCTION AND WORKING**

### **Construction**

- (a) 1 honey comb keeping container.
- (b) 3 Sprocket wheels, different in size.
- (c) 1 iron rod in the middle of comb container to attach the comb.
- (d) 1 crank and 1 honey collector.

### **Working**

When the paddle connected to the crank is rotated by hand or by the foot of a person sitting on the saddle, the sprocket wheel whose radius is 5 times (say) smaller than the crank rotates 5 times faster. The honey comb frames, connected/attached to the axle of the sprocket wheel also rotates. Because of the centrifugal force experienced due to rotational motion, the honey get separated from the honey combs due to striking of the the curve surface of the hollow cylindrical drum whose axis is kept coinciding with axis of rotation. The honey is collected in a vessel placed below the drum through the holes provided. The other sprocket wheel close to the 1st one, allows the honey comb to rotate in the opposite direction. By rotating the crank in that direction, honey will come out from the other side of the honey comb also. This helps in extraction of honey more efficiently.



### **ADVANTAGES OF THE MODEL**

- (i) Physical exercise of the man by paddling the crank in both direction. (clockwise and anti-clockwise)
- (ii) Effective use of muscular energy in doing physical exercise.
- (iii) More production of honey from honey comb.
- (iv) Saving time both in doing physical exercise and extraction of honey.

### **APPLICATION**

It is used to extract honey. Besides this, machine has even the provision for generating power (electricity) if a generator (d.c.) is connected to the rear rotating system and can be used as a source of light for working in dark.

## (B) VEHICULAR EXHAUST FILTER

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### STUDENTS

Vaibhav Dhama  
Saransh Mathur

Demonstration School,  
RIE, Ajmer  
Rajasthan

### TEACHER

Amarendra Tripathy

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### 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 (1) 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.



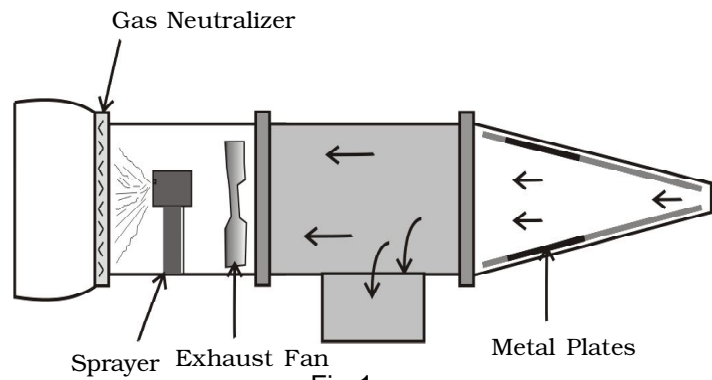


Fig.1

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 (2). Finally, cool and fresh air with very low air pollution comes out and spread out in the environment.

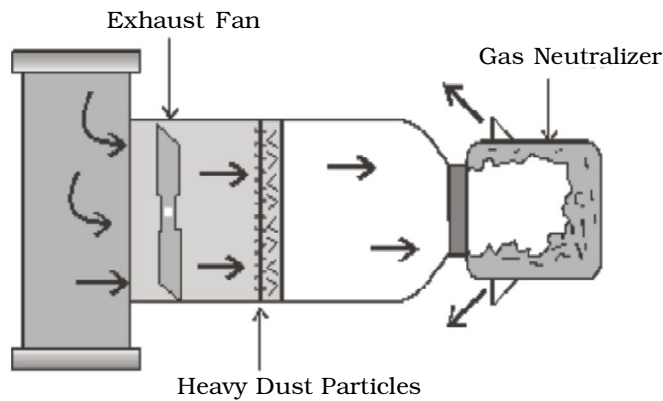


Fig.2

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.