

**STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT
EXHIBITION FOR CHILDREN — 2016-17**

AND

**44th JAWAHARLAL NEHRU NATIONAL SCIENCE, MATHEMATICS
AND ENVIRONMENT EXHIBITION FOR CHILDREN — 2017**

GUIDELINES

**FOR THE PREPARATION OF EXHIBITS AND MODELS AND
ORGANISING EXHIBITIONS**



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

GUIDELINES

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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 2016-17 too. These would form the first phase of preparation for the JNNSMEE to be organised in November 2017. 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 confronting the nation and the society. There is a need for us to continuously innovate to meet the challenges before us. 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. This may result in unsustainable use of resources and development. 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 instruments for achieving goals of self reliance, socio-economic and nation building. To recognize and encourage these powerful tools so that the problems confronting the society can be overcome and a better future for the Nation can be built through science and mathematics led solutions, the theme for the State Level Science, Mathematics and Environment Exhibition (SLSMEE) for Children – 2016-17 has been chosen as **Science, Technology and Mathematics for Nation Building**.

Growth with equity has been the focus of Indian Economic Policy since 1960s. Though significant outcomes have been achieved in various areas such as poverty reduction, health and education, more remains to be done. The country today face multiple challenges.

These challenges need to be addressed appropriately to build a better future for the Nation. **The Green India, Make in India, Smart City, Beti Bachao Beti Padhao, Pradhan Mantri Jan Dhan Yojana, Saansad Adarsh Gram Yojana, Digital India, Swachh Bharat are some of the recent initiatives taken by the government of India to build a better future for the country. The theme and sub-themes identified for SLSMEE-2016-17 are directly or indirectly focusing on the above mentioned initiatives of the government.** In this context, it is envisaged that children and teachers would try to analyze all aspects of the role of science and mathematics for nation building. This will enable students and teachers to generate scientific and mathematical ideas and prepare models/exhibits for addressing various problems. 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 processes, researches and developments in science, technology and mathematics can bring a better future for the nation.

The theme for **SLSMEE-2016-17 and JNNSMEE-2017, “Science, Technology and Mathematics for Nation Building”** aims to cover sub-themes such as-

1. Health;
2. Industry;
3. Transport and Communication;
4. Innovations in renewable resources for sustainable environment;
5. Innovations in food production and food security;
6. Mathematical solutions in everyday life

(Sub-themes listed above are suggestive. Students are free to choose any other sub-themes and develop exhibits involving Science, Technology and Mathematics for Nation Building)

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: SCIENCE, TECHNOLOGY AND MATHEMATICS FOR NATION BUILDING.

1. Health

The main objectives of this sub-theme are: to bring awareness among the children about the factors affecting our health and nutritional needs of the body; 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 requirement of human beings and innovative ideas for better management.

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 Yoga;
- role of biotechnology improved crops and nutrition;
- demonstration of models/ projects to show the effect of junk food items, adulterated food items on our body and its preventive measures;
- model to demonstrate importance of balanced diet and nutritional values of various food items;
- demonstration of models/ projects to create awareness among children about appropriate rules of safety in hazardous situations to avoid accidents and injuries;
- presenting medical assistance and facilities for rural/urban areas 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;
- 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 and advantages of inoculation and vaccination;
- need for appropriate measures for family planning and welfare;
- ideas for developing low-cost nutritious food;
- low cost medical diagnostic and therapeutic tools;

2. Industry

The objective of this sub-theme is to help children: to understand the importance of science and mathematics in various types of industries; to think of ways and means to increase its efficiency leading to production of different kinds of goods to meet the future needs of the growing population at affordable price.

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

- models showcasing improved versions of various types of machines and manufacturing plants;
- design and development of automatic devices for various applications in industries;
- schemes/designs to help reduce production cost and conservation of raw materials;
- roles and possibilities of the service industries like tourism, banking, Information and Communication Technology etc. for inclusive development;
- devices or methods that measure and control pollution;
- devices/methods to minimise the effects of chemical spills, solid waste, nuclear waste and radiations, etc from industries/ nuclear plants, etc;
- awareness about various aspects of environment and disposal of harmful effluents, solid waste, nuclear waste etc;
- use of innovations/improvements that may help in increasing production in various industries, such as textiles, engineering goods, machine tools, chemicals, drugs and pharmaceuticals including life-saving drugs, vaccines and devices and eco-friendly plastics, etc. to improve the quality of life;
- improved/ indigenous design/ working models of devices which may be used on small scale for production/manufacturing of utility items of daily life;
- indigenous/ innovative techniques for exploration/ conservation/ recycling/ processing of minerals and other natural resources;
- working models to demonstrate equipment/processes/devices/ technologies/ designs, which may help facilitate the domestic work.
- improved/improvised/innovative technologies associated with

weaving, pottery, metal work, dyeing, printing and other crafts practiced in cottage industry and suggestions for new designs;

3. Transport and Communication

The objectives of this sub-theme are:- to make general public and children understand different types of transport modes and communication as well as the importance of transport and communication for Nation Building; to make them aware about the issues and concerns of the present transport and communication system and to promote innovations for efficient transport and communication system. The exhibits/models in this sub-theme may pertain to:

- improvised/Indigenous models for efficient transport and fast communication especially mobile and internet for communication in rural areas;
- working models of fuel efficient/pollution-free designs of automobiles /other vehicles;
- innovative ideas for efficient management of road, rail, water and air transport systems, e.g. better safety measure, especially unmanned railway crossings checking/control of pollution, providing immediate relief to accident victims, managing traffic jams, etc;
- working models of printing technology - communication with graphics and multi-media and low-cost methods;
- working model of efficient transport system in metropolitan/urban and rural areas;
- demonstrating the principle and functioning of modern devices of communication;

- designs for making existing operation of communication more efficient;
- demonstrating the use of information technology in developing improved designs/indigenous designs/devices, which may be used on a small scale for production/manufacturing of utility items of daily use;
- developing innovative designs/models of multimedia equipments/materials and packages for the children with special needs, especially with visual and audio impairment;
- technologies of emerging web designs/effective use of ICT for knowledge retrieval & sharing;
- 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;
- emergency mechanisms and mobilization technologies in communication and transportation systems etc;
- Innovative methods to reach online communication facility to the remote areas;
- Importance of safe and secure communication in digital world.

4. Innovations in renewable resources for sustainable environment

This area 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 for sustainable environment.

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

- plans for proper management of resources and its monitoring;
- restoration of degraded areas and habitat of natural biodiversity;
- ecological studies of plants and animals;
- efficient methods of harvesting and preserving marine resources;
- schemes/designs to help reduce production cost and conservation of various raw materials;
- sustainable land use practices/ecologically sustainable farming methods;
- 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;
- participatory watershed development and management;
- development of low cost technology for producing potable water;
- sea water use along the coastal area for raising mangrove and *salicornia* plantation together with

agriculture;

- 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.

5. Innovations in Food Production and Food Security

The main objectives of this sub-theme are:-to make children and teachers aware of various techniques/methods to enhance agricultural production to achieve food security; to make children and teachers think of various ways and means to enhance knowledge on food production and food security.

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;
- conventional biotechnology practices e.g., application of biotechnology, microbiology and genetic engineering to agriculture for improved yield.
- organic farming/organic fertilisers versus chemical fertilisers;
- planning and managing energy crops (*Salix*, Poplar, *Jatropha*, *Jajoba*, etc.);
- use of biotechnology for economically and ecologically

- sustainable biofuels;
- various pestcontrol and management measures;
- application of biotechnology and genetic engineering in improving animal breeds and production of animal products that are used as food;
- 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;
- indigenous designs of farm machinery, agriculture implements and practices;
- impact of pollution on food and food safety and measures/methods for ensuring food safety;
- improved/improvised method of processing, preservation, storage and transport of food products;
- issues related with the animal health and food security;
- food production and demand of quality food and food security;
- nutrition education/healthy eating habits and food utilisation by body;

6. Mathematical solutions in everyday life

The main aim of this sub-theme is to make our school children and teachers aware and realise about various mathematical ideas and tools to solve problems confronting the society thereby leading to a quality life.

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

- policies, programmes and schemes in mathematics that have a significant impact on human life;
- 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 revolutionize mathematical ideas;
- cost effective demonstration of known facts and research in mathematics;
- impact of mathematical ideas on other subject areas such as science, medicine, psychology, social science etc;
- contribution of mathematics for economic growth, mass literacy, eradication of poverty and malnutrition, etc.
- mathematical ideas to solve various problems of our everyday life/environment related problems;
- mathematical models to predict orbital path of comets, meteors and other minor planets;
- mathematical models to show how disease might spread in human in the event of epidemics/bioterrorism;
- mathematical models to predict the devastating effects of wars/nuclear explosions;
- mathematical models to show spread of forest fire depending on the types of tree, weather and nature of the ground surface;
- mathematical models to demonstrate the action of medicines in human system;

- using mathematical tools and computer simulation to improve cancer therapy/wound healing/tissues formation/corneal wound healing;
- mathematical tools to describe traffic flow/stock market option;
- mathematical tools to show the effect of climate change/global warming;
- mathematical tools for predicting future population and knowing the impact of population;

(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 sub-theme, even a sub-theme not listed in this guidelines. However the chosen sub-theme and the exhibits/models developed should be in the context of the theme: Science, Technology and Mathematics for Nation Building. 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.)

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.

TOPIC: FOOD SECURITY

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.

Food is the first basic requirement of human. The term Food Security is often used to describe whether a country has access to enough food to meet the dietary energy requirements. As per Food and Agriculture Organisation (FAO) the term food security is defined as a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. A lot of progress has been made to ensure Food Security for all yet many people in this world still struggle to get two meals in a day.

The green revolution in India in 1960s increases the food production particularly in wheat and rice due to technological intervention such as the introduction of high yielding varieties. National Food Security Mission of India is one of the schemes of the central government to ensure Food Security in the country. Getting nutritious food is essential for the well being of the individual and society and basic enablers for the future of the nation.

The UN has declared 2016 as the International Year of Pulses (IYP-2016). The IYP-2016 aims to heighten public awareness of the nutritional benefits of pulses as part of sustainable food production aimed towards food security and nutrition. It provides an opportunity to encourage connections throughout the food chain that would better utilize

pulse-based proteins, further global production of pulses, better utilize crop rotations and address the challenges in production of pulses. It is also a unique opportunity to inspire and educate our young children, teachers and public about the role of pulses in meeting food security for all.

During the One Day Seminar we intend to create awareness among teachers, teacher educators, researchers and students about how innovations in technologies and supply chain management can promote Food Security and provide solution to many of the problems confronting the nation and the world.

Activities to be performed during this Seminar should be planned accordingly to (i) increase the public appreciation and understanding of the need to ensure Food Security; (ii) motivate people to think about various issues and challenges confronting the nation on Food Security and devise strategies for solving them; (iii) encourage out of the box thinking and lateral thinking among the children; (iv) make people aware of the role of Food Security in achieving sustainable development; and (v) make people aware about the need for collaborative and coordinated activities on national, regional and international policy makers and stakeholders.

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

- Making people aware of the need for Food Security to ensure development of the nation;
- Publicising the usefulness of Food Security in the development process for achieving inclusive development;
- Organising poster exhibition-cum-competitions highlighting usefulness of Food Security

especially for inclusive growth and development and in solving the problems of the society;

- Organising invited talks by experts on Food Security, particularly motivating the audience to look for its role in creating inclusive growth and development;
- Making students find solution to problems existing in their immediate environment;
- Arranging a Quiz competition in which questions may be based on Food Security;
- Arranging a group discussion among different groups, to create awareness about Food Security.

A. CALL FOR ENTRIES

1. The theme for SLSMEE-2016-17 for Children and for the 44th Jawaharlal Nehru National Science, Mathematics and Environment Exhibition (JNNMEE- 2017) for children would be **‘Science, Technology and Mathematics for Nation Building’** pertaining to the sub-themes such as -

1. Health;
2. Industry;
3. Transport and Communication;
4. Innovations in renewable resources for sustainable environment;
5. Innovations in food production and food security;
6. Mathematical solutions in everyday life;

(Sub-themes listed above are suggestive. Students are free to choose any other sub-themes and develop exhibits involving Science, Technology and Mathematics for Nation Building)

2. In order to facilitate the preparation of exhibits and models for display in district to state level exhibitions during 2016-2017, *Guidelines for the Preparation of Exhibits and Models* are being communicated.
3. Wide publicity should be given for inviting entries. *SLSMEE-2016-17 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).

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-2017. 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 Rs.20,000.00/-.

2. FOR ORGANISING THE SLSMEE

- (i) Honorarium to **ten** judges may be disbursed at the rate of Rs. 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 Rs. 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: Rs.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 Rs.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 Rs. 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 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 and Seal of the Co-ordinator/
Incharge. State Level Science,
Mathematics and Environment
Exhibition (SLSMEE) for
Children - 2016-17

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 44th JNNSEMEE-2017 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 :

R. R. Koireng

Coordinator

State Level Science, Mathematics and Environment

Exhibition (SLSMEE) for Children - 2016-17

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 • **Website:** www.ncert.nic.in



PROFORMAS

**44TH JAWAHARLAL NEHRU NATIONAL SCIENCE, MATHEMATICS AND ENVIRONMENT
EXHIBITION (JNNSMEE - 2017) FOR CHILDREN**

THEME : SCIENCE, TECHNOLOGY AND MATHEMATICS FOR NATION BUILDING

Proforma I

INFORMATION ABOUT THE EXHIBIT/MODEL

1. Title of the Exhibit/model
(in BLOCK letters)
2. Sub-theme: (Tick only one)
- 1. Health;
 - 2. Industry;
 - 3. Transport and Communication;
 - 4. Innovations in renewable resources for sustainable environment;
 - 5. Innovations in food production and food security;
 - 6. Mathematical solutions in everyday life;
 - 7. Others (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/Improved 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

-
- *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.

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 44th Jawaharlal Nehru National Science, Mathematics and Environment Exhibition (JNNSMEE-2017) for Children – 2017, 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.]

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)

(Signatures of all students and teachers)

State/UT _____

Duration _____

STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION FOR CHILDREN-2016-17

Proforma II

PANEL OF JUDGES - SUB-THEME WISE*

VENUE _____

THEME : SCIENCE, TECHNOLOGY AND MATHEMATICS FOR NATION BUILDING

PERTAINING TO THE SUB-THEMES OF

Sub-themes :
(Please tick marks
on the area being
evaluated)

- 1. Health;
- 2. Industry;
- 3. Transport and Communication;
- 4. Innovations in renewable resources for sustainable environment;
- 5. Innovations in food production and food security;
- 6. Mathematical solutions in everyday life;
- 7. Any other sub-theme (please specify).....

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-2016-17**

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										
Total											

-
- * **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 - 2016-17

Proforma IV

INFORMATION ABOUT NATURE AND NUMBER OF EXHIBITS DISPLAYED

THEME: SCIENCE, TECHNOLOGY AND MATHEMATICS FOR NATION BUILDING

State/Union Territory:

Dates of Exhibition:

Venue of Exhibition:

Sub-themes	Nature and Number of Exhibits Displayed				Total No. of Exhibits
	Innovative/Improved/ Apparatus/Working Model	Static Model	Study/Survey Report	Any other (please specify)	
Health					
Industry					
Transport and Communication					
Innovations in renewable resources for sustainable environment					
Innovations in food production and food security					
Mathematical solutions in everyday life					
Any other sub-theme. (Please specify)					

**STATE LEVEL SCIENCE, MATHEMATICS AND ENVIRONMENT EXHIBITION
FOR CHILDREN-2016-17**

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 income, if						
						Balance Refunded to NCERT, if any,		
		Total				Total		

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-2016-17
Proforma VI

THEME: SCIENCE, TECHNOLOGY AND MATHEMATICS FOR NATION BUILDING

VENUE.....

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

- Sub-theme:** 1. Health; 5. Innovations in food production and food security;
 2. Industry; 6. Mathematical solutions in everyday life;
 3. Transport and Communication; 7. Any other sub-theme (please specify).....
 4. Innovations in renewable resources for sustainable environment;
Please tick mark on the sub-theme being evaluated

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.

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.

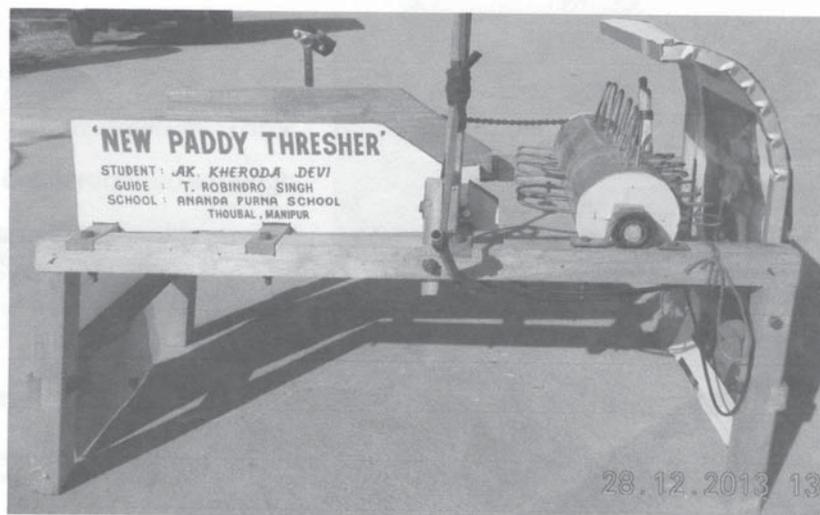


Figure 1: New Paddy Thresher

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.

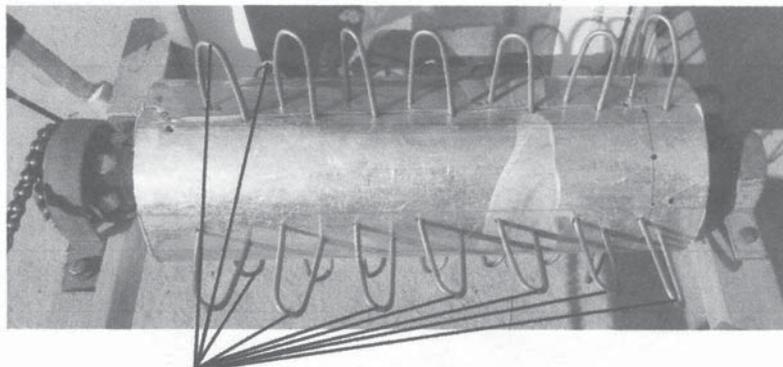


Figure 2: U-Shape Beating Rods

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 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.

In the vertical chamber the remaining dust particles are separated by exhaust fan which

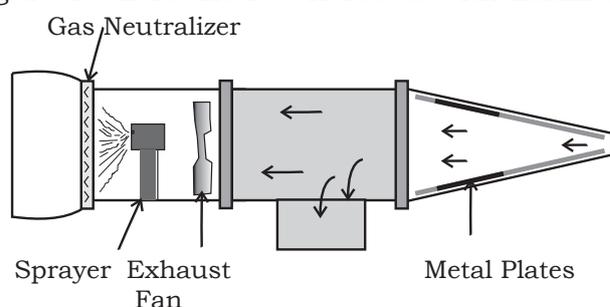


Figure 1

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.

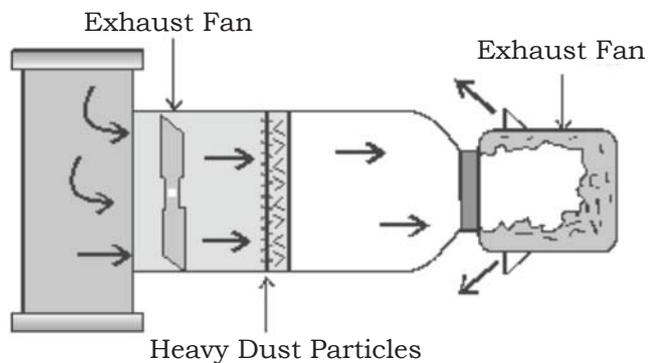


Figure 2

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.