NOTICE

DIET, Nalbari is going to organize One-day District Level Bal Vaigyanik Pradarshani (DLBVP), 2026 on 9th June 2026 in Nalbari District and 10th June 2026 in Tamulpur District. The exhibition will be organized in offline mode and students studying in Class 6 to Class 12 of the following category of Institutions can participate:

▪ State Govt./State Govt. Provincialized Schools of Nalbari & Tamulpur District ▪ Adarsha Vidyalaya ▪ KGBV	▪ Govt. /Govt. Provincialized Colleges affiliated to ASSEB (Class 11 & Class 12) ▪ Private Schools affiliated to Assam State School Education Board (ASSEB)

5 (Five) best exhibits will be nominated to participate in the forthcoming State Level Bal Vagyanik Pradarshani (SLBVP), 2026. The said exhibition will follow the same guidelines provided by the SCERT, Assam for SLBVP,2026. Following are a few important points of the regarding the exhibition:

- **For Nalbari District-**
  Date of exhibition: 9th June, 2026, **Venue:** DIET, Nalbari, **Time:** 11:00 am onwards
- **For Tamulpur District-**
  Date of exhibition: 10th June, 2026, **Venue:** Tamulpur, HS School, **Time:** 11:00 am onwards
- **Theme for DLBVP-2026:**'STEM for Vikasit and Atmanirbhar Bharat.'
- **Sub-themes:** Sustainable Agriculture, Waste Management and alternatives to plastics, Green Energy, Emerging Technologies, Recreational Mathematical Models, Health & Hygiene, Water Conservation and Management.
- Each participating school should strictly consist of **3 members (Two students and a Guide teacher)**
- **Annexure-V (Information and write-up of the exhibit/model)** has to be filled up by the participating school and need to submit it on the day of the exhibition **(Copy enclosed)**
- **For further information contact-** Rakesh Nath (Mobile: 8638308722), Kulendra Malakar (Mobile: 9707331329) & Jul Dutta (Mobile: 9706341553)

All the participating schools need to confirm their participation through the following Google link on or before 05/06/2026: https://forms.gle/SW8FcfEhHTHih6vf6

Sd/-
Principal,
DIET, Nalbari

GOVT OF ASSAM
OFFICE OF THE DIRECTOR
STATE COUNCIL OF EDUCAIONAL RESEARCH AND TRAINING (SCERT), ASSAM
KAHILIPARA, GUWAHATI-781019
Email ID: director@scertassam.in

No. SCERT/ACA/Exhibition/394/2018/Pt-I/340 **Dated Guwahati, the May, 2026**

From : Dr. Nirada Devi
Director, SCERT, Assam
Kahilipara, Guwahati-781019

To : The Principal
DIET (All)

Sub : **Regarding organization of District Level Bal Vaigyanik Pradashani (DLBVP) 2026**

Sir/Madam,

With reference to the subject cited above, it is to inform you that like previous years SCERT, Assam is going to organize the 36th State Level Bal Vaigyanik Pradashani (SLBVP) 2026 tentatively on 7th & 8th August, 2026 under the guidance of NCERT, New Delhi.

The exhibition will be organized in offline mode. The students from class VI-XII are entitled for participation in the exhibition covering those who are studying XI-XII in the Govt./Govt. provincialized colleges. Also, students from State board affiliated private schools and colleges can participate in the exhibition. All DIETs will organize 2 days' District Level Bal Vaigyanik Pradarshani (DLBVP), 2026 preferably on or before 6th June, 2026. A detailed guideline is enclosed herewith for organizing the DLBVP for your convenience at ***Annexure I.***

Moreover, the DIETs will collaborate with the Inspector of Schools, DEEO, DMC, BEEO, BMC, Normal Schools, BTCs, and other relevant stakeholders for the effective organization of the programme. The DIETs will also involve district-level organizations such as the Aryabhatta Science Centre, Assam Science Society, and Children's Science Congress, and maintain coordination with the Principals of Government and Provincialized Colleges of the concerned districts. For wider outreach and publicity of the exhibition, each DIET will publish advertisements through local news channels and newspapers to ensure greater awareness and enhanced participation of students. For organizing the 2 days' DLBVP, each DIET will utilize the fund from the programme and activity head as per the financial guideline enclosed at ***Annexure IV***.

Each DIET will be documented the District level exhibition properly and submitted the report along with participant's details, attendance sheet, proforma of nominated exhibits, proforma for panel judges (Copy enclosed at **Annexure II, III & V)** along with photographs and expenditure details to the undersigned **on or before 10th June, 2026.**

Therefore, you are requested to nominate one district coordinator and one assistant district coordinator for organization of district level exhibition from your institute and NS or BTC as per your convenience by **20th May, 2026** through the following link-
https://docs.google.com/forms/d/e/1FAIpQLSe_D3FeCb3w4tzs8IIFC_Tztziq6kZlQQzQ1o_L7ahsidh7NQ/viewform?usp=sharing&ouid=104825186624796103390

This is for your kind information and necessary actions.

Yours faithfully,

18/5/26
Director,
SCERT, Assam, Guwahati-19

Memo No. SCERT/ACA/Exhibition/394/2018/Pt-I/340-A **Dated Guwahati, the May, 2026**

Copy for kind information to:

1) The Mission Director, Samagra Shiksha, Assam, Kahilipara, Guwahati-19
2) The Inspector of Schools (All district) with a request for wide publicity of the said event.
3) The DEEO/DMC (All district) with a request for wide publicity of the said event.
4) Guard file

Director
SCERT, Assam, Guwahati- 781019

Annexure V

36th State Level Bal Vaigyanik Pradarshani (SLBVP) - 2026

Theme: 'STEM for Vikasit and Atmanirbhar Bharat'

Proforma III

Information about the Exhibit/Model

1. Title of the Exhibit/model _____

(in BLOCK letters)

2. Sub-theme (mark ✓):

1. Sustainable agriculture	
2. Waste management and alternatives to plastics	
3. Green energy	
4. Emerging technologies	
5. Recreational mathematical modelling	
6. Health and hygiene	
7. Water conservation and management	

3. Name(s) of Contributing Student(s) (in BLOCK letters)

i. _____(M/F); Class _____

Mobile No. _____Email _____

ii. _____(M/F); Class _____

Mobile No. _____Email _____

4. Name(s) of Guiding Teacher (s)

i. _____(M/F); Class _____

Mobile No. _____Email _____

ii. _____(M/F); Class _____

Mobile No. _____Email _____

5. Name of the school/ college with complete postal address (in BLOCK letters):

Village/ ward _____ PO _____ District _____

Pin _____ State _____

Mobile No. _____ Email _____

6. Locality of School/ college (Rural/ Urban): _____

7. Types of School/ College (Govt./ Provincialized/ Govt. aided)

8. Nature of the Exhibit/Model: (A) Innovative/Improvised Apparatus

(B) Working/Static Model/Study Report

Any Other (Please Specify) _____

9. Brief Summary (Please explain the purpose (or aim) and the scientific principle involved in the exhibit/model).

10. Write-up of the Exhibit/Model (not more than 1,000 words) in the following format.

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 lines and labelled diagram of the model, illustrating the working of the exhibit/model.

(ii) Close-up photographs of the exhibit/model.

11. Five minutes video presentation 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.

CERTIFICATE OF ORIGINALITY

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

Signatures of students

Signatures of teachers

Rajya Stariya Bal Vaigyanik Pradarshani
2025 — 26

and

53rd Rashtriya Bal Vaigyanik Pradarshani
2026

For the Preparation of Exhibits and Models and Organising Exhibition

GUIDELINES

Important

Besides the popularisation of science, mathematics and environmental conservation, the objective of organisation of this exhibition at different levels is also to identify and nurture inventive and creative talent among students. Children must be encouraged to explore every resource to enable them to express and handle objects. They must be given all freedom to express their own creativity and imagination. The role of parents, teachers, and peer groups may be in the form of financial support and discussions. **The tendency of procuring the ready- made exhibits or models must be ruled out.** An exhibit must be able to bring out the scientific and mathematical ability of the children, whether the model is traditional or an improvement over the traditional model or innovation. Skills involved in constructing the exhibit or model, the degree of neatness and craftsmanship involved must also be taken into account.

Rajya Stariya Bal Vaigyanik Pradarshani 2025–26

and

53rd Rashtriya Bal Vaigyanik Pradarshani 2026

Guidelines

For the Preparation of Exhibits and Models and Organising Exhibition

विद्यया ऽमृतमश्नुते

एन सी ई आर टी
NCERT

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

Contents

Guidelines Development Committee

A.K. Srivastava
A.K. Wazalwar
Anjni Koul
Arun Pratap Sikarwar
C.V. Shimray
Dinesh Kumar
Gagan Gupta
Jubilee Padmanabhan
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Ramavatar Meena
Rishikesh Kumar
Ruchi Verma
S.V. Sharma
Sudesh Kumar
Sunita Farkya

Member Coordinator

T.P. Sarma
Munindra Ruwali

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 activity. Children learn through interaction with people and the environment around them. They construct knowledge by connecting new ideas to their existing ideas.

To stimulate creativity, inventiveness and the attitude toward innovation in science and mathematics, NCERT emphasizes on activities, experiments, technological modules, etc. It also encourages the implementation of various activities through a massive expansion of channels such as the 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 National Science, Mathematics and Environment Exhibition for Children every year to popularise science, mathematics and environmental education amongst children, teachers and the public in general.

In the year 2022, the advisory committee which advised about the science exhibition, in the light of NEP 2020, approved the name of this National Science Exhibition as Rashtriya Bal Vaigyanik Pradarshani (RBVP). This exhibition is a culmination of various exhibitions organised in the previous year by the States, UTs and other organisations at the 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, the Department of Atomic Energy Central Schools, Central Board of Secondary Education affiliated Public (independent) Schools, Central Tibetan Administration, Demonstration Multipurpose Schools of Regional Institutes of Education and National Education Society for Tribal Student participate in this national-level exhibition. Like in the past several years, such exhibitions are to be organised from the district to state level during 2025- 26 too. These would form the first phase of preparation for the RBVP to be organised in November 2026.

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 emphasize 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 has developed and are affected by many diverse individuals, cultures, societies and environments;
- 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, fertilizer, 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 innovative in response to a variety of problems confronting the society and the world. If today‘s children get engaged in tackling problems, solving issues, and creating new ideas, we can make our children better prepared for tomorrow‘s challenges. There is a need to continuously innovate to meet the challenges before us. The rising aspirations of the human community for the desire for more comfort and security have put tremendous pressure on the limited resources of the world leading to unequal access and unsustainable use of resources.

According to United Nations Global Resources Outlook 2019‘, resource extraction has more than tripled since 1970 in the world, including a five- fold increase in the use of non-metallic minerals and a 45 per cent increase in fossil fuel use. Similarly, a very important resource, fresh water is also experiencing acute stress worldwide. According to United Nations World Water Development Report 2019, over 2 billion people live in countries experiencing high water stress, and about 4 billion people experience severe water scarcity during at least one month of the year. Water has to be treated as a limited resource, with a far stronger focus on managing demand. Climate change and bio-energy demands are also expected to amplify the already complex relationship between world development and water demand. It is true that ―Jal hi Jeevan Hai, therefore it is the responsibility of everyone to conserve and manage this very important resource. Keeping in view the importance of water and sanitation the Government of India is increasing the level of investment in this area.

We all are aware that the problems faced by the world today are not confined to a particular city, state or country. Rather, these are global problems and for solving these problems, all the countries of the world need to work in unison. To solve the problems of the world and to bring peace and prosperity to people and the planet, now and in the future, all the member states of the United Nations adopted The 2030 Agenda for Sustainable Development' which includes 17 different Sustainable Development Goals (SDGs) along with 16 associated targets. Sustainable development is defined as the development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

This means we cannot continue using the resources at the current level as this will not leave enough for future generations. The flagship programmes of the Governmentof India such as the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), Pradhan Mantri Jan Dhan Yojana (PMJ DY), Pradhan Mantri Jan Arogya Yojana (Ayushman Bharat), Skill Development, the Swachh Bharat Abhiyaan (Clean India Campaign), Pradhan Mantri Ujjwala Yojana, Beti Bachao Beti Padhao (Save the Girl Child,Educate the Girl Child) are some of the steps to achieve these sustainable goal. Science and Mathematics act as powerful tools for investigating and understanding nature and the world. They also play a crucial role in solving problems confronting society and act as a major instrument for achieving goal of self-reliance and socioeconomic development sustainably. To recognize and encourage these powerful tools so that the problems confronting society can beovercome and a better sustainable future can be built through science and technology-led solutions, **the theme for the Rajya Stariya Bal Vaigyanik Pradarshani 2025–26 has been chosen as “STEM for Vikasit and Atmanirbhar Bharat”**. **The theme and sub-themes identified for RBVP 2025-26 are directly or indirectly focused on achieving the sustainable development goals**

enunciated by the United Nations. In this context, it is envisaged that children and teachers would try to analyse all aspects of the role of science and technology in the sustainable development of the world. This will enable students and teachers to generate scientific and mathematical ideas and prepare models/exhibits for addressing various problems. Scientific 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 the future. Often such ideas may not be possible to be presented in the form of a model/exhibit. Organizers of exhibitions at all levels may provide opportunities for students and teacher to present such ideas in the form of presentations and discussions.**

Children and teachers should identify where and how new processes, research, and developments in science, technology and mathematics can bring a better future for the world.

Development of the creative domain of a learner through the teaching- learning process of science is an area which needs to be addressed to make the experience of learning stimulating and exciting. For this, it is necessary to involve students in the acquisition of science topics in creative ways that may aid in their overall growth as learners. With this in view, the theme for the **Rajya Stariya Bal Vaigyanik Pradarshani — 2025 – 26 has been chosen as STEM for Vikasit and Atmanirbhar Bharat'.** One cannot fathom life in the present day without science and technology; it is an essential component of day-to-day existence. Science and technology play a wide range of important roles in contemporary society. It expands beyond research and development to play a crucial role in our work, communication, education, health, and other areas. The basis of all scientific discoveries is thought about natural phenomena and what causes them; science is a structured pursuit of knowledge that is motivated by curiosity. On the other hand, the practical use of scientific knowledge to produce useful systems and processes is known as technology. Together, science and technology help us better understand our surroundings and enable us to make more educated decisions based on facts and data. One cannot express enough gratitude for the scientific research and technologies that led to the discovery of the COVID- 19 vaccine and other life-saving medications; it was only made possible **by advanced medical imaging techniques and other scientific discoveries in this field that we have improved diagnosis, treatment, and patient care. Science and technology play a crucial role in shaping the development of various areas of our society.** It has helped us improve healthcare. Technology has paved the way for digitalization, the internet, and social media. It has also revolutionized communication and connectivity. As a result, sharing scientific knowledge is now simple and open to all. Science also helps to address environmental issues and promote sustainable development. Modern civilization, including every area of our life from healthcare to economics, nation-building, environmental preservation, communication, and automation, is

changing as a result of science and technology. It is intended that students and teachers will attempt to analyse all facets of science and technology's function in society from this perspective. This will make it possible for teachers and students to come up with solutions and create models and exhibitions for diverse issues. 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 a model/ exhibit. Organizers of exhibitions at all levels may provide opportunities for students and teachers to present such ideas in the form of presentations and discussions. The theme for RSBVP– 2025-26 and RBVP– 2026, is **'STEM for Vikasit and Atmanirbhar Bharat**', and it intends to cover sub-themes like-

1. Sustainable agriculture
2. Waste management and alternatives to plastics
3. Green energy
4. Emerging technologies
5. Recreational mathematical modelling
6. Health and hygiene
7. Water conservation and management

(Sub-themes listed above are suggestive. Students may choose any other sub-themes and develop exhibits involving Science and Technology for Sustainable Future).

About 'STEM for Vikasit and Atmanirbhar Bharat', can be discussed as follows:

India stands at a transformative juncture in its pursuit of becoming *Viksit Bharat* as a fully developed and self-reliant nation. STEM (Science, Technology, Engineering, and Mathematics) lies at the heart of this remarkable transformation. STEM is not just academic pursuits-this is the driving force behind India's economic resurgence, strategic autonomy, and global leadership in innovation. STEM-powered industries such as Information Technology (IT), biotechnology, renewable energy, and advanced manufacturing are reshaping India's economic landscape. The IT sector continues to be a global powerhouse, exporting software solutions and services to every corner of the world. Biotechnology is revolutionizing healthcare and agriculture, while renewable energy initiatives especially in solar and wind are helping our nations' transition to a low-carbon economy. Advanced and innovative manufacturing, supported by automation and robotics, is enhancing productivity and quality, making Indian products more competitive in global market scenario. These sectors are not only generating employment, but also fostering entrepreneurship, particularly among start-ups and micro, small, and medium enterprises (MSMEs). These smart players are leveraging emerging technologies to build smart cities, develop sustainable mobility solutions, and deliver efficient public amenities. India's innovation ecosystem is flourishing. Exponential developments in Artificial Intelligence (AI), Internet of Things (IoT), Internet of Medical Things (IoMT), and precision agriculture are transforming both urban and rural landscapes. Farmers now use drones, innovative sensors, and AI-driven analytics to monitor crop health, optimize irrigation, weather forecast, market trends predictions, which empower them to adapt to climate challenges and improve yields. Urban planners are using data-driven tools to design smarter cities with better traffic management, waste management, and energy efficiency. These innovations are not only restricted to laboratories. They are also being implemented on the ground, improving lives and livelihoods. India's achievements in indigenous defence technologies and space exploration boost up its growing strategic autonomy. Missions like *Chandrayaan* and *Gaganyaan* are not just scientific milestones but are symbols of national pride and technological ability. These initiatives demonstrate India's capability to innovate independently and contribute meaningfully to global scientific discourse. In defence sector, home grown technologies are reducing reliance on imports and strengthening national security. From drones and missile systems to cyber security frameworks, STEM is enabling India to

safeguard its sovereignty in an increasingly complex geopolitical environment.

STEM research is also transforming healthcare. India has emerged as a global hub for vaccine development and pharmaceutical exports, supplying affordable medicines to over 150 countries. Telemedicine platforms are bridging the urban-rural healthcare divide, while AI-powered diagnostics are improving accuracy and accessibility. During the COVID-19 pandemic, India's scientific community showcased its resilience and innovation by developing indigenous vaccines and deploying digital health solutions at scale. This momentum continues, with ongoing research in genomics, bioinformatics, surgical interventions, and personalized medicine.

National initiatives like *Digital India* and *Bharat Net* are laying the foundation for a digitally empowered society. These programmes rely greatly on skilled STEM professionals to build and maintain robust digital infrastructure. Cyber security, data analytics, and cloud computing are essential tools in protecting national interests and enabling e-governance. The digital revolution is also democratizing access to services from education and banking to healthcare and agriculture and ensuring that no citizen is left behind. The *National Education Policy 2020* marks a paradigm shift in India's approach to learning. It emphasizes experiential learning, coding, and interdisciplinary thinking, preparing learners for the demands of a tech-driven future. Initiatives like *Atal Tinkering Labs* and *PM SHRI Schools* are nurturing creativity and problem-solving skills among our young minds. Programmes such as *VIGYAN JYOTI* and *KIRAN* are promoting gender equity in STEM, encouraging more girls and women to pursue careers in science and technology. Meanwhile, *Skill India* is bridging the gap between academia and industry, equipping youth with practical, job-ready skills through vocational training and apprenticeships. Our country's STEM-driven progress is not limited to domestic achievements. The country is more and more recognised as a global leader in innovation, sustainability, and technology. From climate action, digital diplomacy, space collaboration and AI, country is shaping global conversations and offering scalable solutions to shared challenges. By investing in STEM education, research, and entrepreneurship, our country can completely harness its demographic dividend and realise the vision of a *Viksit* and *Atmanirbhar Bharat*. This journey is not just about economic growth; certainly, it's about building a resilient, inclusive, and future-ready nation.

For nation wise promotion of sustainable development, the United Nations (UN) has launched the 2030 Agenda for **Sustainable Development Goals (SDGs).** This is a global level agenda that aims to promote actions and policies that will end poverty and develop a sustainable future in the next 15 years. There are 17 goals and 169 specific targets to be achieved by 2030 which aims for ending poverty and hunger, promotion of good health, quality education, affordable and clean water and energy resources leading to increment in the global economy along with industrial innovation and infrastructure. For achieving the sustainable goals, the actions and its regulation should be done at each level such as - civil society, government commercial business, which requires equal contribution from the people.

Sustainable development is not only limited to environmental and climatic aspects, but it also demands the sustainability for rapid increase in food demands thatis agricultural sustainability, awareness and maintenance of health by consuming super food food like millets , natural farming, good sanitation practices and hygiene in an individual, advancements and innovation in transport and communication systems which are environment friendly, good waste management practices to prevent contamination of soil, planned management of resources which are available in the environment like water, sunlight, wind and fossil fuels. It also

includes prior prediction of natural disasters and its management as it requires mathematical modeling and computational thinking which can help in understanding of the complex economic, social, and environmental phenomena underlying sustainable development.

According to **"Sustainable Development Goals-National Indicator Framework Progress Report 2024"** documented by the Ministry of Statistics and Program Implementation the government has launched various welfare and reformation programs over the past ten years such as National Nutrition Mission (NNM), Pradhan Mantri Jan Dhan Yojana, Make in India, National Mission for a Green India, Pradhan Mantri Swasthya Suraksha Yojana, National Mission for Sustainable agriculture and driving significant advancements motto, **—Leaving No One Behind,** remains persistent, aligning with our national ethos of **Sabka Saath, Sabka Vikas, Sabka Vishwas, Sabka Prayas'.**

The **Department of Science and Technology** objectives to promote science and technology development in various fields which include materials, devices and processes. It launches and funds the Programme which supports activities aimed at developing technologies both in the advanced/emerging sectors/areas, and innovation of a useful technology/product. It promotes advanced waste, Biomedical device and technology development programs.

In order to prevent environmental crises and to make the process of sustainable development more feasible and operational, it is important to:

- Integrate science and technology at global level and develop awareness by education in science, geography, economics and at society level.
- Developed countries need a reformation of their production and consumption patterns, including by limiting the use of fossil fuels and plastics, and to encourage public and private investments that align with the SDG's.
- Environmental resources such as rain forest, oceans, lands must be safeguarded as crucial sources of ecosystem services and natural resources. Citizens must work in a planned and coordinated manner for conservation, restoration and sustainable utilization of natural resources.
- Decreasing the extraction of resources so that it can be replenished timely.
- The waste generated should remain within the absorption capacity of the environment.

The sustainable development can be attained by smaller actions in our day to day life such as:

- Restricting anthropologic activities such as by minimizing all kinds of pollution-air, water, land etc.
- Sustenance in agricultural practices such as use of bio-manure, bio- pesticides, bio-insecticides which are devoid of harmful chemicals.
- Crop rotation system and by using techniques such as drip irrigation systems that can efficiently minimize the water usage in agriculture.
- For renewable resources of energy, the rate of consumption should not be more than the rate of generation of renewable substitutes. Solar panels and the windmills can be efficiently used to generate electrical energy. These alternatives can prevent the exploitation of fossil fuels and are also helpful for saving the environment from pollution.
- Improvement in human capacity through better education and healthcare systems.

- Providing safe, clean drinking water and nutritious meal responsible use of information technology to plan smart infrastructure.

Therefore, the expenditure of resources should be done in a planned manner without compromising the needs for future generation and to sustain all the resources given by nature.

The integration of science and technology requires a more innovative and ambitious response in order to bring a change at an enormous level to achieve our 2030 goals and a sustainable future. To achieve this objective, NCERT organizes the National Science Exhibition every year i.e., Rashtriya Stariya Bal Vaigyanik Pradarshini (RSBVP- 2025-26) to reflect the essence of the National Education Policy 2020 and is being organized every year in collaboration with the state/UT on a rotation basis. The theme of RSBVP-2025-26 is STEM for Vikasit and Atmanirbhar Bharat 'in order to promote sustainable development through innovations in science among school students. RSBVP aims to create awareness and innovation in science for sustainable development among younger minds. It provides an opportunity to the school students/ learners/ researchers to pursue their natural creativity and innovation, reflecting their scientific temperament. This sub theme will develop an understanding amongst the school children towards the need for integration of science and technology for a sustainable future.

The students exhibit their innovative ideas in the form of presentations and working models which help the students to apply scientific knowledge to achieve a sustainable future by providing scientific solutions. It encourages the children to visualize the sustainable future of the nation and helps them become sensitive and responsible citizens along with the development of science and technology as a major instrument for achieving goals of self-reliance and socio-ecological development.

By such programs, students interact with participating children, teachers, parents, and exhibition organizers and they together give their valuable contribution to develop a sustainable future for the nation.

A few exemplar ideas pertaining to the sub-themes listed in the context of the theme development of exhibits are given below.

1. Sustainable Agriculture

Sustainable agriculture is an approach to farming that focuses on producing food, fiber, and other agricultural products in a way that is economically viable, socially just, and environmentally sound. It is meant to meet the agricultural needs of the present generation without compromising the ability of future generations to meet their own needs. This model contrasts sharply with conventional, intensive farming, which often relies on a heavy use of synthetic chemicals, monocultures, and resource-depleting practices. Sustainable agriculture is built on three interconnected pillars: environmental stewardship, economic viability, and social equity.

Environmental Stewardship involves protecting and enhancing natural resources. The key practices include:

a) Maintaining Soil Health: Using techniques like crop rotation to prevent nutrient depletion, cover cropping to prevent erosion, and composting to enrich the soil with organic matter.
b) Conserving Water: Implementing efficient irrigation methods such as drip irrigation and rainwater harvesting to minimize water usage and prevent waste.
c) Promoting Biodiversity: Cultivating a variety of crops and creating habitats for beneficial insects and wildlife to strengthen the ecosystem and provide natural pest control.
d) Minimizing Chemical Inputs: Reducing the reliance on synthetic pesticides and fertilizers by using integrated pest management (IPM), which prioritizes biological and cultural controls.

Economic Viability: Farming must be profitable for farmers to adopt and maintain sustainable practices. This pillar focuses on reducing input costs, diversifying

income sources, and creating stable markets for products. By reducing dependence on expensive synthetic inputs and increasing crop diversity, farmers can build economic resilience.

Social Equity: Sustainable agriculture is also about people. It emphasizes fair wages, safe working conditions, and the well-being of rural communities. It ensures that consumers have access to healthy, safe, and nutritious food.

Sustainable farming uses a variety of methods and technologies to achieve its goals.

- Agroforestry: Integrating trees and shrubs with crops or livestock on the same land. This practice can enhance biodiversity and provide additional income from timber or fruit.
- Crop Rotation: This can help in maintaining soil fertility especially when leguminous plants are planted which can improve the nitrogen in the soil.
- No-Till or Conservation Tillage: A method of farming that minimizes soil disturbance by not ploughing the land. This practice helps to reduce soil erosion, retain moisture in the soil.
- Precision Agriculture: Using modern technology like GPS, drones, and sensors to precisely apply water, fertilizers, and pesticides. This reduces waste and environmental impact while optimizing crop yield.
- Vertical Farming and Hydroponics: Growing crops in stacked layers or using a nutrient-rich water solution instead of soil. These methods are particularly useful in urban areas or places with limited arable land and can significantly conserve water.

2. Waste Management and Alternative to Plastic

Waste Management: Waste management is the management of different types of waste generated from different sources and involves the collection, transport, processing, recycling or disposal, and monitoring of waste materials. Different types of waste generated from different sources include solid municipal waste, industrial waste, hazardous waste, organic/biodegradable waste, etc. A huge amount of different types of waste is generated in our country. For example, municipal areas in the country generate 1, 33,760 metric tonnes per day of municipal solid waste (MSW), of which only 91,152 tonnes per day (TPD) waste is collected and 25,884 TPD treated (https://moef.gov.in/waste-management).

Why waste management is important?

- **Environmental protection**: Proper waste management is necessary to prevent soil, water, and air pollution. Indiscriminate disposal like open dumping, burning, etc. leads to toxic emissions, leaching of chemicals, micro plastics, etc. which are very detrimental to human health and environment.
- **Public health**: Accumulated and untreated waste can serve as a breeding ground for disease causing agents, contamination of drinking water, agricultural land, etc. leading to serious public health issues.
- **Resource conservation**: The process of recycling and reuse reduce the need for new raw materials. Metals, glass, paper, some plastics can be reprocessed. That helps save energy, water and raw materials.
- **Climate change mitigation**: One of the primary reasons for today‘s climate change is greenhouse gas emissions. A reduction of waste in landfills lowers methane emissions. Recycling saves energy used in manufacturing from scratch. Better waste management lowers greenhouse gas emissions.

Economic benefits: The economic benefits range from job creation (waste collection, recycling, composting, etc.), cost savings through efficient systems and potential revenue from recovered materials.

Alternatives to Plastic: India generates tonnes of plastic waste per year, which is a significant proportion of global plastic pollution. Of this plastic waste, a significant portion remains unmanaged: largely uncollected; much of the rest is either burned, dumped informally or leaks into the environment. Recycling rates are low: only about 30% of generated plastic waste is recycled in India. Using alternatives to traditional (petroleum-based, non-biodegradable) plastic is one strategy to reduce plastic waste. Some alternatives of plastic are Paper &

Cardboard, Glass & Metal, Beeswax Wraps, Plant-based packaging/Bio plastics, Edible packaging, Bamboo, Hemp, Natural Fibers, Bagasse (sugarcane waste), etc.

Key challenges in plastic waste management

- **Plastic waste persistence**: A lot of plastic (especially single-use) ends up in landfills or the environment, where it persists for a long time and harms ecosystems.
- **Inefficient recycling**: Not all plastics are recyclable due to several reasons like contamination, mixing plastic types, lack of infrastructure, etc.
- **Lack of awareness/behavior**: Public often don't segregate waste, mixing different types of waste in a single bin leading to problems in segregation, reuse, or reduce plastic use.
- **Insufficient infrastructure**: Many places lack composting, proper recycling facilities, or safe disposal of hazardous waste.
- **Cost and market issues**: Alternatives to plastics or advanced waste management may be more expensive. Investment, policy support, etc. may not be enough.

Strategies/Best Practices

To properly manage waste and shift to plastic alternatives, multiple strategies are needed:

1. **Reduce**: Using less plastic in the first place. E.g. avoiding single-use plastics, choosing products with less packaging.
2. **Reuse**: Buying reusable items (bags, bottles, containers), repair rather than discard.
3. **Recycle/Compost**: Setting up proper segregation at source (households, offices), ensuring infrastructure for recycling/composting, clean streams to avoid contamination.
4. **Policy & Regulation**: Incentives/subsidies for alternatives, bans or taxes on certain plastics, extending producer responsibility so manufacturers are responsible for post-consumer waste.
5. **Innovation & Research**: Developing new materials that are truly biodegradable/compostable in realistic settings; improving recycling technologies (e.g. better catalysts, sorting, chemical recycling). Also innovating in waste-to- energy or waste conversion.
6. **Public Awareness & Behavior Change**: Education campaigns, community involvement (e.g. composting at home, refusing plastic bags) and developing the social norms.
7. **Infrastructure Development**: Establishing more recycling plants, composting facilities, efficient waste collection, especially in cities and rural areas.

Some examples of waste management exhibits are as follows:

1. 3R Model (Reduce, Reuse, Recycle): A working model showing how waste is segregated into biodegradable, recyclable, and non-recyclable categories. Small bins with sensors to auto-segregate could be designed to facilitate separation of waste.
2. Vermicomposting Unit: A live demonstration of conversion of organic kitchen waste into nutrient-rich compost using earthworms.
3. Waste to Energy Model: Small biogas plant prototype showing how food waste generates biogas (methane) for cooking or electricity.
4. E-waste Management Demo: Exhibit highlighting methods to safely recycle e- waste and recover precious metals. Could show circuit boards and how components are reused.

Some examples of alternatives to plastic exhibits are as follows:

1. Bio plastics from Natural Sources: Hands-on demo of making bio plastic using starch, gelatin, or banana peels. Compare strength and decomposition with synthetic plastic.
2. Edible Cutlery and Packaging: Display spoons, cups, and plates made from rice flour, wheat bran, or millet.
3. Banana Leaf Packaging Innovation: Show how natural leaves can be treated (e.g., with beeswax or herbal coating) to increase durability as a food wrap alternative.
4. Mushroom-Based Packaging (Mycelium): Exhibit model packaging made from mycelium (fungus roots) as a biodegradable alternative to Styrofoam.

Some examples of projects/ models that can be prepared under this sub-theme are as follows:

1. Sustainable waste management methods/ processes/ practices
2. Improvement of the existing waste management mechanisms
3. Waste management for safe and healthy environment
4. Mechanisms or comprehensive plan for waste management in schools, societies, colonies, district, state, etc.
5. Innovative ways of collecting, reducing, recycling, disposal, repurposing, etc., of all types of wastes
6. Innovative and cost-effective ways for generating energy from wastes
7. Waste management using microbes
8. Practical and cost-effective alternative to plastics
9. Innovative ways of collecting, reducing, recycling, disposal, repurposing, etc., of plastic wastes
10. Zero-waste technologies

3. Green Energy

GREEN ENERGY means energy derived from the natural resources (e.g. sunlight, wind, water, tides, waves, and geothermal heat) that replenish themselves without depleting Earth‘s reserves. Unlike fossil fuels, these green energy resources produce minimal greenhouse gases or pollutants, which makes them environmental friendly alternatives for 21st century. Such types of energies can be harnessed with minimal environmental impact by reducing carbon footprint. It has already been shown in India and other countries that it is possible to reduce the energy consumption without compromising with the quality of required energy service. The most logical way to reduce energy consumption is to use available energy in the most resourceful manner and to abate energy wastage in the country. It is also a well-documented fact that the carbon emission per unit of electricity produced from renewable energy technologies and energy efficient cogeneration-based power plants are significantly lower compare to the fossil fuel power plants. Ever increasing greenhouse gas emission in the environment and related climate change is now recognized to be one of the major challenges for 21st century generation. In order to minimize the perils of climate change, it is therefore necessary to urgently take up measures to reduce carbon footprint at every stage. Worldwide, production of required energy and its uses for development contribute tons towards carbon emission. Subsequently, carbon emission can be reduced by increasing the use of green energy (obtained from renewable sources such as sun, wind, water, etc.) and enhancing energy efficiency of existing production technologies.

Remarkably, the global renewable energy market was valued at USD 1.21 trillion in 2023, and is projected to grow at a compound annual growth rate of 17.2% between 2024 and 2030. This rapid expansion reflects a worldwide shift toward green, sustainable energy resolutions. In addition, most of the developed and developing countries are embracing green energy solutions to meet climate commitments, enhance energy security, and capitalize on economic opportunities in green technology.

India has a large reserve of fossil fuels but because of its growing demand of energy for sustainable development, the country is now a net importer of energy in the form of fossil fuels. As mentioned on the website of Central Electricity Authority, the current installed power generating capacity in India is over 4,95,0000 MW. Among this, about 43 % installed power plants are based on renewable sources (e.g. sun, wind, hydro, biomass, etc.), and need to increase for sustainable future of our country.

In general, use of renewable energy may appear costlier than the conventional energy, but keeping in mind its benefits, which includes assured availability of power and its resources, and much lower contribution towards global warming, it is worthwhile that India has evolved an action plan to make judicious use of renewable energy resources. Therefore, some of the renewable energy resources has been discussed under the sub-theme ―Green Energy‖ as:

Solar Power:

The Sun has been worshiped as a life-giver to our planet since ancient times, but the industrial ages gave us the understanding of sunlight as an energy source. India is gifted with huge solar energy potential. According to the available data, about **3,287,240 sq. km** area of India receives solar radiation worth 4,300 quadrillion kcal (5,000 trillion kWh) every year. This is equivalent to 430 trillion kgs of oil equivalent. Subsequently, the quantity of daily average solar

energy incident over India differs from 14,000 to 25,000 kjoules/m^2/day. From an energy security perspective, solar is the most secure of all sources, since it is abundantly available in our country. Theoretically, a small fraction of the total incident solar energy can meet the entire country‘s power requirements in the future.

There are several visible impacts of solar energy in India. It has been benefited millions of people in Indian villages by meeting their cooking, lighting and other energy needs in an environment friendly manner. The social and economic benefits include reduction in drudgery among rural women and girls engaged in the collection of fuel wood from long distances and cooking in smoky kitchens, minimization of the risks of contracting lung and eye ailments, employment generation at village level, and ultimately, the improvement in the standard of living and creation of opportunity for economic activities at village level. Further, It supports the government agenda of sustainable growth. National Institute of Solar Energy (NISE) has assessed the country‘s solar potential of about 748 GW assuming 3% of the waste land area to be covered by Solar Photovoltaic modules. In this direction, National Solar Mission (NSM) is one of the major initiatives of Govt. of India and was launched on January 11, 2010. NSM is a major initiative of the Government of India. It will also constitute a major contribution by India to the global effort to meet the challenges of climate change. The Mission‘s objective is to establish India as a global leader in solar energy by creating the policy conditions and infrastructures. NSM is line with India‘s Nationally Determined Contributions (NDCs) target to achieve about 50 % cumulative electric power installed capacity from non-fossil fuel-based energy resources and to reduce the emission intensity of its GDP by 45 percent from 2005 level by 2030. In order to achieve the proposed target, Government of India launched various schemes to encourage generation of solar power in the country. Some of the schemes are Solar Park Scheme, Viability Gap Funding (VGF) scheme, Central Public Sector Undertaking (CPSU) Scheme, Defence Scheme, Canal bank & Canal top Scheme, Bundling Scheme, and Grid Connected Solar Rooftop Scheme. Now, India stands 5th in solar Photovoltaic deployment across the globe at the end of 2022, and solar power installed capacity has reached around 70.10 GW as on 30-06-2023.

As on 20th Jan 2025, India‘s total non-fossil fuel- based energy capacity has reached 217.62 GW. This surge was driven by government incentives, policy reforms, and increased investments in domestic solar and wind turbine manufacturing. Solar energy remained the dominant contributor to India‘s renewable energy growth, accounting for 47% of the total installed renewable energy capacity. Rajasthan, Gujarat, and Tamil Nadu emerged as the top-performing states, contributing 71% of India‘s total utility-scale solar installations. The rooftop solar sector also experienced significant growth in 2024, with 4.59 GW of new capacity installed, marking a 53% increase from the year 2023. The PM Surya Ghar: Muft Bijli Yojana, launched in 2024, played a crucial role in this expansion, facilitating 7 lakh rooftop solar installations within ten months. In addition, Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM-KUSUM) Scheme targeting 30.8 GW solar power in agricultural sector.

This tremendous potential of energy can be harnessed using a variety of devices. With recent development and technologies as well as suitable devices, the solar energy systems are easily available for industrial and domestic applications. In general, solar energy system required minimum maintainace cost. Due to this, most of the developed countries are switching over to solar energy as one of the prime renewable energy sources. The current architectural designs make provisions for photovoltaic cells and necessary flow of heat while making building plan. In this, solar energy harnesses the sun‘s radiation using photovoltaic panels on the designed buildings. The available technologies convert sunlight directly into electricity through the photovoltaic.

Wind Power:

The development work on the wind power in India began in December 1952 by Maneklal Sankalchand Thacker. He was a distinguished power engineer, and initiated a project with the Indian Council of Scientific and Industrial Research (CSIR) to explore the possibilities of harnessing wind power

in the country. Consequently, CSIR established a Wind Power Sub-Committee under P. Nilakantan to investigate the available resources that could be practically utilized for wind energy.

It is one of the most important and valuable resources of green energy. Globally use of wind energy is growing significantly due to its wider availability and sustainable technologies for its production. Several industries are now working on the production of wind turbines, and many more are also showing interest in this area. In recent, several industries are producing large wind turbines for efficient production of wind energy. In addition, the concept of wind farms has become very popular in India and other countries. Several projects are also under development to combine it with solar energy for efficient and eco- friendly production of such green energies. In brief, wind energy captures the kinetic energy of moving air using turbines. As wind flows over the blades, it causes the rotor to spin, driving a generator that produces electricity. Wind farms can be established on land or offshore.

According to the National Institute of Wind Energy (NIWE), India has a wind potential of 1,163.86 GW, and India ranks fourth globally for installed wind energy capacity. As of March 2025, India‘s total installed renewable energy capacity is approximately 237 GW, including solar, hydro and other. Among this value, Wind Power contributes to nearly 50 GW of installed renewable energy capacity in India. The main states known for wind energy production and installation capacity are Gujarat, Tamil Nadu, Karnataka, Maharashtra, Rajasthan, and Andhra Pradesh, which collectively account for over 93% of India‘s wind power capacity.

Hydroelectric power:

Several hydroelectric power plants are working in India to produced energy for domestic and industrial usage. At present India ranks fifth in the world for potential hydropower capacity, which currently stands at more than 50 gigawatts (GW). In India it contributes about 11 % energy share for industrial and domestic applications. Hydropower is one of the oldest and most established green energy sources. India has a huge hydropower potential due to its geographical advancement.

The new hydro projects are facing serious resistance from environmentalists. Resettlement of displaced people with their lands is also one of the major issues. The dislocation of human settlements causes physical and physiological stress. In addition, to establish a hydro power plant it is required several processes such as identification of proper location, construction site and materials, their capacity and impact on surrounding environment. Hydropower utilizes energy from flowing water, typically using dams or diversion structures to channel water through turbines, producing electricity.

Geothermal Energy:

Geothermal Energy is the form of natural heat that is found inside the Earth‘s crust and stored in molten rocks called magma. The constant decay of naturally present radioactive materials inside the Earth is the main source of Earth Heat. This produces high amounts of energy that comes to the surface in the form of hot springs, geysers and steam vents. Most geothermal energy sources are present near tectonic plate boundaries and this heat is used both directly for heating and indirectly to generate electricity by passing steam through turbines.

According to reported data, geothermal energy accounted for only 0.1 % of the world's primary energy supply in 2008, but projections suggest that it might meet 3 % of global power demand in the future. Geological Survey of India has identified about 381 thermally anomalous sites in India, which are mainly spread over 10 provinces including Ladakh, Himachal, Gujarat, Andaman & Nicobar. The estimated potential of geothermal energy is about 10,600 MW, which is enough for one crore homes. In recent, the Ministry of New & Renewable Energy released India‘s first National Policy on Geothermal Energy on September 17, 2025. The main aim of this policy is to develop 10.6 GW potential through some pilot projects in Gulf of Cambay, Arunachal Pradesh and Uttarakhand. They have also specified that we work in this area with R&D support from other countries such as US, Iceland, Norway and Indonesia. At present, India is harnessing its geothermal energy potential through several key

projects, including pilot plants in Telangana and the first

geothermal power project in Ladakh at small scale. In addition, TATA Power is planning a 5 MW plant in Gujarat for geothermal energy. Importantly, National Thermal Power Corporation (NTPC) is also exploring a 300 MW geothermal power plant project in Chhattisgarh.

Biomass energy:

Mainly, biomass energy reduced the Indian dependency on the fossil fuel, and also contributes in climate change mitigation. But it is required sustainable technologies for thermo-chemical conversion of biomass. Biomass energy in India presents a sustainable solution to meet the growing energy demands while addressing environmental concerns. With ongoing government support and advancements in technology, the biomass sector is poised for growth, making it a crucial part of India's renewable energy landscape. Worldwide, biomass energy is derived from organic materials such as agricultural residues, forestry byproducts, and municipal solid waste. In India, biomass accounts for approximately 32% of the total primary energy consumption, making it a significant energy source for rural and urban populations alike. The country generates around 450 to 500 million tonnes of biomass annually, with a surplus availability of about 230 million tonnes. This revealed that we can further develop sustainable technologies for the production of biomass-based energy for domestic and industrial uses.

Due to its vast potential in our country, the Indian government has implemented several programs to promote biomass energy. The one of the important government initiatives is the National Bioenergy Programme, which aims to utilize cattle dung, biomass, and urban waste for energy retrieval. Under this programmme government has approved a budget of INR 858 crore for the period until 2025-2026. Electrification of villages using biogas is one of the prestigious programmes of government of India.

Waste to energy:

Most of the countries facing lot of challenges for proper waste management. India is also facing a growing waste management challenge, with an estimated 150,000 tonnes of municipal solid waste (MSW) generated daily. To address this, the Indian government had started several programmes. These initiatives of government will definitely be reducing reliance on landfills and providing renewable energy. India had about 12 operational waste -to-energy (WTE) plants and 8 non-operational plants across 10 states up to November 2022. India is working on the proper waste management and conversion of waste in to energy is also one of the main programmes of the Indian government. WTE or energy-from-waste, involves generating energy from waste materials. There are several processes available for conversion of waste into energy such as incineration, in which waste is burned at high temperatures to produce steam that drives turbines for electricity generation. Other approaches include anaerobic digestion, which breaks down organic waste to produce biogas, and gasification, which converts waste into synthetic gas.

The Indian government has launched the National Bioenergy Programme, which aims to promote biomass and biogas projects. The programme received a budget allocation of Rs 1715 crore, with an additional Rs 857 crore earmarked for its second phase to enhance the waste-to-energy ecosystem. This initiative focuses on converting agricultural and municipal waste into energy, thereby promoting a circular economy.

Microgeneration:

The traditional ―mega-power‖ production of electricity is insufficient today because of exponential industrial growth and high living standards. Microgeneration is also called

―micro-power‖ is a very famous term in the areas of power generation at small scale for individual uses. This term typically used to describe a type of generator that harnesses energy from green sources at small scale used for a home or small business or communities. This is also depending on a user's location and government laws in those states/areas. In other way it is the generation of zero or low carbon electrical power by individuals, small businesses and communities to meet their own needs and can act as a catalyst for cultural changes in consumer attitude. It is both a

serous form of

green energy production and also a cultural movement that is gaining momentum worldwide. These technologies include micro or small wind turbine, biomass gasifiers, solar power, micro- hydro or combination of these technologies. Similarly, advanced photovoltaic cell, biomass gasifiers, and wind turbines systems for domestic and industrial power generation are results of technological advances.

The main purpose of this subtheme is to make children feel the need to study and analyses various aspect of green energy. These include its generation, transmission, distribution and management besides realising its cost effectiveness and positive impact on environment and society.

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

- Proof of concept for green energy technologies/devices with scientific justifications and demonstration;
- Innovative technologies for reducing energy wastage;
- Energy from biomass such as seaweed/algae/wastes, keeping in view environmental concerns;
- Improvised designs of biogas/biomass plant/improvised technologies for effective usage of biofuels;
- Fuel farming/bio-diesel from plant oils such as palm oil; seaweed/algae oil, waste cooking oils, non-edible oils, etc.
- Low-cost liquid fuels such as bio-ethanol from cellulosic biomass and sustainable technologies for biofuels;
- Green roof technologies/roof mounted solar technologies such as solar water heater/solar lighting system/heating system of a building by a solar device/heater;
- Novel designs for installation of solar tower/mounting solar panels for electrification in houses;
- Design hybrid energy system for efficient energy generation;
- Devices to make breeze funneling towards your home/natural cooling of the home;
- Designs of insulated bricks for cold/ hot place/methods of heat retention in materials/ heat control in the designs of house;
- Green bricks using waste materials/ different innovative materials for furniture/construction/road laying;
- Innovative designs of solar cooker/solar distiller/solar dryer for food processing;
- Solar thermal electricity/community solar plant;
- Studies of variation in sunshine intensity at a given place for developing indigenous method of its usage;
- Projects for measuring availability of solar/wind/ energy in a given area;
- Wind turbines for domestic use with vertical/horizontal axis;
- Design of low noise wind farm;
- Innovative/indigenous designs of domestic hydroelectric generator/wind/water mill for grinding grains/drawing water from the well and to generate electricity;
- Use of tidal waves/ocean currents/salinity gradient for generating electricity;
- Wave energy from oscillating water column/ocean thermal energy;
- Tidal barrage generator/conversion/ production of energy from tornadoes/floods/cyclones;
- Innovative designs of geothermal house/green building/eco-friendly building which harvest energy, water and other desired materials/ self-reliant smart and sustainable villages/cities/homes/office designs;
- Various ways of harnessing geothermal energy such as energy from hot springs/electricity generated from naturally occurring geological heat sources;
- Geothermal desalination/geothermal power/geothermal heating controlling heating and cooling of a building using underground heat by vertical/horizontal loops;
- Production of electrical energy from mechanical energy/nuclear resources;
- Impact of bio-energy on food security; Role of nanotechnology and superconductor in harnessing energy;
- Innovations in batteries/inverters/photovoltaic cells to reduce cost;
- Usages of technology for sustainable production, storage, transport for using

hydrogen/methane/CNG as fuel;
- Designs/models of fuel-efficient automobiles/machines;
- Innovative designs of internal combustion engine which can function on various biofuels;
- Innovations in mechanism of extraction, storage and processing of fossil fuels, etc.

4. Emerging Technologies

What Are "Emerging Technologies"?

Let's first break down the term.

- Emerging: This means "coming into view," "coming into existence," or "becoming important."
- Technologies: These are the applications of scientific knowledge for practical purposes.

So, Emerging Technologies are powerful new tools that are currently developing and have the potential to dramatically change our world—how we live, work, farm, and heal. They are the building blocks of the future, and you are the architects who will decide how to use them. The Core Idea for Your Project: Don't just showcase the technology; showcase its application. The best projects answer the question: "How can this technology solve a real-world problem or improve human life?"

Key Areas of Emerging Technologies to Explore

Here are some of the most exciting fields. Don't be afraid to mix and match them! The most innovative projects often happen at the intersection of two technologies.

I. Artificial Intelligence (AI) and Machine Learning (ML)

- **What it is** (Simple Analogy): Imagine you have a super-smart friend who learns from experience. If you show them 100 pictures of cats and 100 pictures of dogs, they eventually learn to tell the difference on their own. AI is the concept of creating that "smart friend" inside a computer. Machine Learning is how it learns from all that data, without being explicitly programmed for every single rule.

- **Why it's a Game-Changer:** AI can help us tackle big challenges where human effort alone isn't enough, like diagnosing diseases in remote areas or predicting crop yields for our farmers.

- **Project Ideas:**
  - AI for 'Swachh Bharat': Create a smart dustbin model that uses a camera and a simple AI (like Google's Teachable Machine) to sort waste into wet, dry, and hazardous categories, promoting better recycling.
  - 'Apni Bhasha' Voice Assistant: Develop a basic voice command system that works in your local language (e.g., Hindi, Tamil, Bengali) to control lights or fans, making technology accessible to everyone.
  - Crop Doctor App Model: Train a simple ML model to identify common diseases in staple Indian crops like wheat, rice, or mangoes from leaf images, helping farmers get early warnings.
  - Personalised Homework Helper: A software program that creates custom practice quizzes for a subject like Mathematics, based on which chapters a student finds difficult.

II. The Internet of Things (IoT)

- **What it is** (Simple Analogy): If the internet connects people, IoT connects "things." It's like giving everyday objects

  (a fan, a water pump, a watch) a voice and ears. They can now talk to each other and to you over the internet. Your fan can "hear" your smartphone command to turn on, and a soil sensor can "tell" a water pump to start.

- **Why it's a Game-Changer:** From managing precious water and electricity to improving safety and healthcare in our communities, IoT brings smart, automated solutions to age-old problems.

- **Project Ideas:**
  - Irrigation System: A model farm that uses a soil moisture sensor (connected to an Arduino/ESP32) to automatically water plants only when needed, saving every precious drop.
  - Weather Station: A low-cost, portable weather station that measures temperature, humidity, and rainfall, and sends alerts to farmers' phones about potential frost or heavy rain.
  - Wearable Belt: A wearable belt for the elderly that monitors falls or irregular heartbeats and immediately sends an SMS alert to family members.
  - Smart Ration Inventory System: A model of a PDS shop where weight sensors automatically update a central database when stock is low, reducing delays and ensuring transparency.

III. Robotics and Automation

- **What it is** (Simple Analogy): Robotics is about creating a physical body that can interact with the world. Automation is giving it a set of instructions so it can perform tasks on its own. Think of it as building a helper that never gets tired and can do dangerous or repetitive jobs with perfect precision.
- **Why it's a Game-Changer**: Robots can assist in disaster-prone areas, help in surgeries, automate small-scale industries (like packaging), and take over hazardous tasks, making workplaces safer.
- **Project Ideas:**
  - 'Safai Mitra' Robot: A small, autonomous robot that can sweep and clean a designated area, like a school corridor or a small community space.
  - Remote-Controlled Bridge Inspector: A simple robot that can navigate over a model bridge and use a sensor to identify "cracks" (simulated), reducing risk for human workers.
  - Medicine Delivery Cart: A line-following robot that can carry medicines and reports from one point to another in a model hospital, assisting overworked staff.
  - 'Chawkidar' Security Robot: A mobile robot that patrols a model area and sounds an alarm if it detects an intruder (using a PIR sensor).

IV. Biotechnology and Bioinformatics

- **What it is** (Simple Analogy): Biotechnology is using the "factories of life" (like bacteria, yeast, plants) to create useful products. Bioinformatics is like using a super- powered computer to read and understand the massive instruction manual of life (DNA) to find solutions to health and environmental problems.
- **Why it's a Game-Changer:** It can lead to better medicines, drought-resistant crops for Indian farmers, and natural ways to clean up our polluted rivers and lands.
- **Project Ideas:**
  - Clean Ganga Model: Demonstrate how certain aquatic plants like Water Hyacinth can absorb heavy metals and pollutants from contaminated water.
  - Bio-fertilizer: Create a simple compost bin showing how Kitchen waste can be turned into rich fertilizer using microorganisms, promoting organic farming.
  - Vaccine Cold Chain Monitor: A model box that uses a temperature sensor and an IoT module to send an alert if the temperature inside rises too high, simulating the safe transport of vaccines.
  - DNA Extraction from Indian Produce: A safe, hands-on experiment to extract the DNA from a papaya or a banana using household items, making genetics tangible.

V. Sustainable and Green Technologies

- **What it is** (Simple Analogy): These are

technologies that work *with* nature, not against it. They are like a savings account for our planet, ensuring we use resources today without stealing from future generations.

- **Why it's a Game-Changer**: With a growing population and climate challenges, technologies in solar energy, waste management, and water conservation are critical for India's sustainable future.
- **Project Ideas:**
    - From 'Kachra' to 'Kanchan': Build a safe, conceptual model to show how waste plastic can be converted into fuel (pyrolysis) or how coconut husk and newspaper can be recycled into handmade paper.
    - Smart Village Energy Model: A diorama of a village that powers its homes, streetlights, and a water pump using a combination of solar panels and a small wind turbine, with LEDs showing the flow of power.
    - Vertical Farming for Urban India: A multi-tiered model farm using LED lights, showing how vegetables can be grown in balconies or terraces in crowded cities, reducing "food miles."
    - Air Purifying Green Wall: A small vertical garden using specific air-purifying plants like Spider Plants and Aloe Vera, testing their effectiveness in reducing smoke/particulates in a closed chamber.

5. Recreational Mathematical Modelling

Have you ever calculated the perfect angle to throw a paper airplane? Or wondered how many moves it would take a knight to tour a chessboard? All such activities require the use of mathematical concepts. This art of using mathematics to explore, model situations, and solving imaginative questions for the sheer joy of it is **Recreational Mathematical Modelling.**

Let's break down this phrase:

- **Recreational:** Related to fun, leisure, and curiosity-driven activities.
- **Mathematical:** Involving numbers, patterns, logic, and quantitative reasoning.
- **Modelling:** The process of building a simplified representation of a system to understand or explore it.

Put it all together **Recreational Mathematical Modelling** is the creative use of mathematics to build models of playful, fictional, or intriguing situations. The goal is not to solve a critical real- world problem but to satisfy curiosity, enjoy a mental challenge, and discover the beauty hidden in patterns.

The broader field of recreational mathematics, includes puzzles, games, and playful problem-solving that reveal the exciting and creative side of mathematical thinking. Anyone can enjoy it, this isn't just for amateurs, even professional mathematicians engage in recreational modelling to explore new ideas in a relaxed and imaginative way.

How it Differs from Traditional Mathematical Modelling

The core process is identical; define a problem, make assumptions, formulate equations, solve, and interpret the results. The difference lies in the context and goal.

Think of it like the difference between a professional architect designing a hospital (**traditional modelling**) and an artist designing a fantastical treehouse (**recreational modelling**). Both require skill, structure, and creativity, but their primary goals-critical function versus playful exploration are different. Traditional modelling tackles epidemics, financial markets, and engineering projects. Recreational modelling focuses on puzzles, games, and whimsical "what- if" scenarios.

A Universe of Playful Examples

Recreational mathematical modelling covers a vast spectrum of activities. Here are a few that show its diversity and appeal:

a) **The Puzzles that Built New Mathematics**

In the 1700s, the citizens of Königsberg wondered if they could walk across all seven of their city‘s bridges just once. By modelling the city as a simple network of points and lines, Leonhard Euler didn't just solve the puzzle, he invented **graph theory**, a whole new branch of mathematics. This shows how a simple recreational problem can lead to a profound discovery.

b) **The Games of Strategy and Chance**

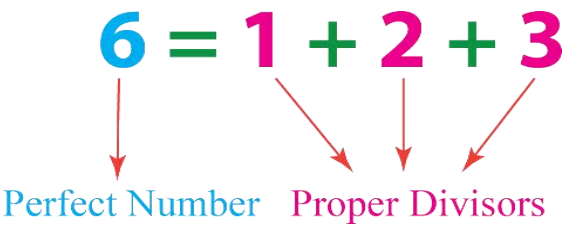
Games like Nim, Poker, or Sudoku are perfect for modelling. By applying combinatorial game theory and probability, we can study strategies, determine winning moves, and calculate odds. Modelling these games sharpens logical thinking and strategic planning, turning play into a deep mathematical exercise.

c) **The Magic of Numbers and Patterns**

This involves investigating fascinating numerical properties like:

- **Prime numbers:** The building blocks of all numbers.
- **Perfect numbers:** Numbers equal to the sum of their proper divisors.
- **Magic Squares:** Grids where every row, column, and diagonal add up to the same magical number. Modelling these patterns reveal deep and

beautiful relationships within the universe of numbers.



d) **The Art of Infinite Complexity** How long is the coastline of Britain? Surprisingly, the answer depends on the length of your ruler. Model this paradox

with **fractals**—infinitely complex patterns that look similar at any scale. A simple recursive equation can generate a stunningly detailed digital forest, blurring the line between mathematics and art.

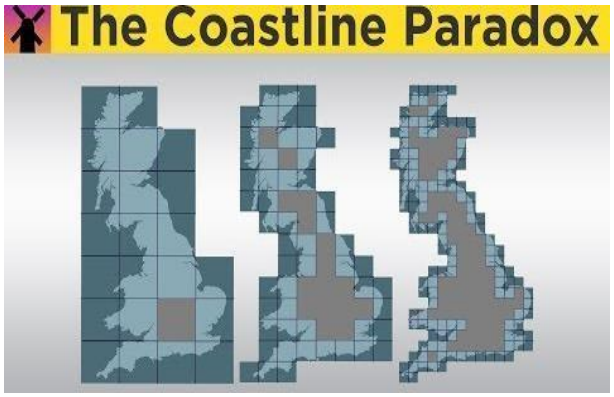
e) **Modelling the Everyday Event**

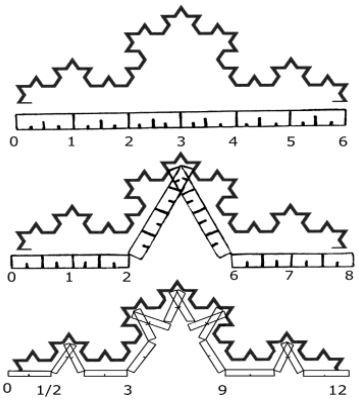
We can even model recreation itself. Economists use models to determine the optimal layout of a theme park, analyse the demand for streaming services, or understand how people allocate their free time and budget. Exploring these models offer a fascinating, practical glimpse into how math shapes our leisure choices.

The Benefits

Recreational modelling is more than just fun. It‘s a powerful way to learn and grow.

- **Sparks Curiosity & Motivation:** It captures interest and shows that mathematics is an exciting adventure, not just a required subject.
- **Builds Critical Skills:** It‘s a gym for your brain, fostering logical reasoning, strategic thinking, and creative problem- solving.
- **Encourages Discovery:** It provides a platform to explore and create new mathematical ideas outside a formal curriculum.
- **Builds Confidence:** Exploring math in a low-pressure, fun environment encourages experimentation and learning from mistakes.





Conclusion:

Recreational Mathematical Modelling reveals a simple truth. Mathematics is not a static set of rules, but a dynamic playground for the mind. It‘s about curiosity, imagination, and the thrill of discovery.

The world is full of fascinating puzzles waiting to be explored. So, the next time you see a curious pattern, play a board game, or simply wonder "what if?", we invite you to become a modeller. Make a few assumptions, sketch it out, and let your curiosity run wild. You might just find that the lines between work, play, and genius are beautifully, and recreationally blurred.

6. Health and Hygiene

Health is an overall state of body, mind and social wellbeing that implies to an individual and people. When people are healthy, they are more efficient at work. This increases productivity and bring economic prosperity. Health also increases 'longevity of the people and reduces infant and maternal mortality. Health is affected by diseases which may be genetically transmitted or contagious in nature. In case are deficiencies/ defects are inherited from of genetic disorders, parents and the best examples haemophilia and colour blindness, however, diseases like cancer and diabetes mellitus are also known to have genetic basis, which are non-infectious. Further, many diseases last for a short period of time called acute diseases like common cold but many other ailments last for longer duration and even as much as life time like tuberculosis, which are chronic diseases To address tuberculosis, the Government of India launched the Pradhan Mantri TB Mukt Bharat Abhiyaan on 9 September 2022, with the vision of eliminating TB by 2025. The initiative provides free diagnosis and treatment, nutritional assistance under the Nikshay Poshan Yojana, and community participation through Nikshay Mitras, encouraging voluntary adoption of TB patients to support their recovery and overall well-being. Cancer is one of the most deadly chronic diseases of human beings which is a major cause of death all over the globe. Proper nutrition which includes a balanced diet is required for having a healthy body long with proper exercise. The problem of obesity and life style diseases are a threat to the human health. Some of the other areas of concern pertaining to health includes the unavailability of pure water, usage of genetically modified food, depletion of soil quality, pollution, climatic change etc. The human health is also affected due to the increase in the usage of alcohol, smoking and drug abuse. The post COVID health issues are also adding to the problems on human health. Increasing level of obesity, early detection of hyperglycemia and hypertension is a great cause of worry from the health point of view. Continuous efforts Scientists, Technologists, Doctors and Naturalist are finding many new ways of addressing the health issues. Major inventions in bio-medical diagnostics, new vaccines and antibiotics, surgical methods and genetic engineering have given relief to the mankind. These efforts are responsible for raising the standard of the personal health and hygiene and in providing both preventive and curative facilities to the community which include the mortality age that has gone up, infant and maternal mortality gone down and epidemics are much under control. Towards meditation awareness traditional knowledge of herbal medicines has influenced community health. In the Sustainable Development Goals, Goal 3 focuses on Good Health and Well-being, which aims to ensure healthy lives and promote well-being for all at all ages. Similarly, Goal 6 emphasizes clean water and sanitation, both of which are essential for hygiene, healthier living, and improving overall human well-being.

Personal hygiene and cleanliness play an important role in maintaining a healthy environment. Personal hygiene such as washing hands was an important aspect of personal hygiene which we have been practicing as a protocol during COVID 19. We must keep our surroundings clean by not allowing any water logging which result in breeding of mosquitoes and causing contagious diseases. Personal hygiene and cleanliness are vital for maintaining a healthy environment. Simple practices like washing hands, keeping surroundings clean, and proper waste disposal prevent the spread of diseases. During the COVID-19 pandemic,

handwashing became an essential protocol, highlighting its importance in daily life. The WASH programme promotes sanitation, clean water, and hygiene awareness to prevent waterborne and mosquito-borne diseases. Its benefits include improved community health, reduced disease outbreaks, safer water, better school attendance, and long-term public health and environmental sustainability.

The main objectives of this sub-theme is 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 like Coronavirus; to explore various scientific and technological interventions for meeting nutritional requirement of human beings and innovative ideas for better management of the crisis created during COVID-19 pandemic. In addition, a healthy person has a positive interpretation of life, and emotional state and is also capable of stress management. One should always take care of his/her health, prioritizing their health through balanced lifestyle choices, doing regular exercise, taking a balanced and nutritious diet avoiding the consumption of junk food and abusive substances like tobacco and alcohol, keeping their surroundings clean and building strong and positive interpersonal connections within their society, which are all important aspects of leading a healthy life.

- The exhibits/models in this sub-theme may pertain to:
- Factors affecting the health and resulting ailments in the body,
- To study how cleanliness influences health;
- Foods that improve our immunity to fight against diseases;
- Improved methods and innovative ways of sanitation and appropriate technology for disposal of medical wastes, other biodegradable and non-biodegradable wastes
- Innovative ideas for effective implementation of policies/programmes/schemes related to food, health and hygiene of Government of India
- Innovative ideas for effective implementation of policies/programmes/schemes such as Namami Gange and the National Clean Air programme
- Ways to raise awareness about disposing of garbage properly
- Mechanisms/ways to control the spread of Coronavirus, Lung infections, Dengue, Malaria, Chikungunya, and other tropical diseases.
- Demonstration and use of traditional methods of medication.
- Demonstration of known facts and findings, and health benefits of physical exercise and yoga.
- Demonstrate the importance of a balanced diet and the nutritional values of various food items
- Ways to raise awareness and sensitize people about the role of social distancing and measures/innovative techniques to overcome issues in its implementation
- Demonstration of models/projects to show the effect of junk food items and adulterated food items on our body and its preventive measures.
- 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 all geographically and socially disadvantaged group.

- Development of knowledge-base and technological aids in biomedical understanding of new scientific, and areas.
- Presentation of known facts and research findings in different medical systems like Traditional, Modern, Homeopathy, Ayurveda, etc.
- Lifestyle and its relationship with health based on known facts and research.
- Common prophylactic measures available for different diseases and advantages of inoculation and vaccination; appropriate measures for family planning and welfare.
- Low-cost medical diagnostic and therapeutic tools;
- Ways to raise awareness and promote mental health and well-being
- Innovative ideas to strengthen the prevention and treatment of substance abuse including harmful use of alcohol.
- Ways to reduce pollution that causes illness from air, water and soil contamination.
- Models to demonstrate the impact of chemical residues from fertilizers, pesticides, hormones, and food dyes etc. on health.
- New medical diagnostic and therapeutic tools/aids for physically handicapped persons for prevention from coronavirus
- Innovative and ecofriendly methods of Pollution control
- Innovative ideas for addressing alcoholism, smoking and drug abuse
- Demonstration of innovative and low-cost techniques for purification of drinking water.
- Models/projects to show the effects of stress, inadequate sleep, and overuse of
- Development of portable and ecofriendly handwashing and sanitization devices for rural and remote communities.
- Exhibits/models to highlight the importance of safe drinking water in prevention of waterborne diseases.
- Models/projects to show the harmful impact of noise pollution on human health and ways to reduce it.
- Demonstration of innovative methods to promote personal hygiene practices such as handwashing, oral care, and nail hygiene.
- Models to demonstrate the role of probiotics, millets, and traditional foods in maintaining immunity and gut health.
- Demonstration of the relationship between climate change and the spread of infectious diseases with preventive strategies.
- Innovative ideas/models to reduce the use of plastics in food and medical packaging for better health outcomes.
- Demonstration of digital and wearable devices for cost-effective monitoring of parameters. vital health.
- Models/projects to show the role of vaccination and herd immunity in controlling epidemics.
- Demonstration of low-cost and simple techniques for detection of adulteration in food items.
- Innovative ideas/models to promote awareness on menstrual hygiene and safe disposal of sanitary products.

digital devices on health and preventive measures.

- Models/projects to demonstrate the use of ecofriendly alternatives to chemical pesticides and their benefits for health.

7. Water Conservation and Management

Water is essential for life; its scarcity poses a significant challenge today. Although it's called the "blue planet," less than one percent of the Earth's water is freshwater suitable for human use. Factors like population growth, industrial expansion, and climate change strain this limited resource, leading to food insecurity and public health crises. Conservation and management are vital; effective strategies include drip irrigation, rainwater harvesting, and community engagement in sustainable practices. Integrated Water Resources Management (IWRM) balances competing demands and emphasizes local participation through National initiatives such as Jal Jeevan Mission, Amrut 2.0 Scheme, PM Krishi Sinchayee Yojna, Bureau of Water Use Efficiency, Sahi Fasal, Mission Amrit Sarovar, Jal Shakti Abhiyan- catch the rain, Awareness Generation Campaign, Public Interaction Programme, National Water Award and Water Heroes. Addressing the water crisis requires innovative solutions, strong policies, and respect for traditional knowledge, making water conservation a shared responsibility for all.

The exhibit/ Models in this area may pertain to: Innovative techniques for waste disposal.

- Cost-effective and sustainable waste management solutions.
- Different approaches to recycling waste materials.
- Methods for extracting valuable resources from waste.

- Affordable waste management systems.
- Enhanced devices for efficient waste management.
- Challenges in managing nuclear, biological, medical, and chemical waste.

- Issues related to marine pollution, including ocean dumping, eutrophication, marine debris, thermal pollution, algal blooms, and microplastics.
- Implications of nanotechnology, including nanotoxicology and nano- pollutants.
- Innovative methods for generating energy from waste materials.
- Techniques for isolating harmful biological, chemical, and nuclear waste for safe use.
- Processes aimed at reducing waste generation.
- Effective methods for waste handling and transportation.
- Traditionalpractices for water conservation.
- New methods/technology for conserving water bodies.
- Eco-friendly and cost-effective management of water bodies.
- Strategies to raise awareness about water conservation.
- Research and studies on national initiatives related to these issues

2

Guidelines For Organising One–Day Seminar

Topic: Reducing Plastic Pollution

Note: One Day Seminar should preferably be organised one day before the organisation of Rajya Stariya Bal Vaigyanik Pradarshani (RSBVP) for Children.

Reducing Plastic Pollution

In the present world, one of the most significant concerns faced by mankind is the rapid degradation of the environment. While technological advancements and industrial growth have contributed greatly to human progress, they have also accelerated environmental degradation. One of the contributors to this problem is the excessive use of plastics—in manufacturing, packaging, industrial applications, and even in our daily lives. Its strength, lightweight nature, and low production cost have made it a commonly used material. However, these come at a cost due to the non-biodegradable nature of plastics. Most plastics do not decompose naturally and can remain in the environment for hundreds of years. Single-use plastics, such as straws, carry bags, bottles, and packaging materials are particularly harmful, as they are discarded quickly and accumulate rapidly.

Plastic pollution has emerged as a major environmental threat. Its impact is visible across the globe, from the ocean floor to mountain peaks, plastic waste is found in every ecosystem. This widespread presence of plastic is not only harmful to the environment but also to all living organisms, including humans. Plastic waste disrupts natural habitats by the contamination of water bodies and soil. Marine animals often ingest or gets entangled in plastic debris, resulting in injuries or deaths. In addition, microplastics, which are tiny pieces of plastic formed from the breakdown of larger plastic items, have been found in water and food, posing serious health risks to both humans and animals.

To address this crisis, a shift towards sustainable practices is essential. The use of eco- friendly or biodegradable materials in place of conventional plastics can significantly reduce plastic pollution. To spread awareness about this issue, students and educators can play a vital role by creating educational exhibits and models on Reducing Plastic Pollution'. Some examples of exhibits/models in this sub-theme may pertain to:

- Demonstration of known facts and findings of harmful effects of plastic pollution
- Spreading awareness about health hazards of single use plastic and providing a slogan like- Say No to Single Use Plastic
- Innovative ways to clean water bodies
- Management of plastic waste at coastal areas
- Improved methods of sorting garbage into recyclable and non-recyclable waste
- A model on responsible recycling of used plastic products
- Demonstration of creative ways of reuse of plastic waste into useful products
- Alternative for plastics by using bio-degradable and compostable materials
- Comparisons between traditional plastic and bio-based alternatives in terms of degradation and environmental impact
- Application of microbes, insects, enzymes and other nature-based solutions to breakdown plastics into an environment-friendly form.

3

Guidelines For organising Rajya Stariya Bal Vaigyanik Pradarshani

2025-26

A. Call For Entries

1. The theme for Rajya Stariya Bal Vaigyanik Pradarshani (RSBVP) 2025-26 for Children and for the 53rd Rashtriya Bal Vaigyanik Pradarshani (RBVP– 2026) for children would be **—STEM for Vikasit and Atmanirbhar Bharat** pertaining to the sub-themes such as –
   1. Sustainable Agriculture
   2. Waste management and Alternatives to Plastic
   3. Green Energy
   4. Emerging Technologies
   5. Recreational Mathematical Modelling
   6. Health and Hygiene
   7. Water Conservation and Management

   (Sub–themes listed above are suggestive. Students are free to choose any other sub – themes and develop exhibits involving innovations in Science and Technology for Society).

2. In order to facilitate the preparation of exhibits and models for display in district to state-level exhibitions during 2025–2026 *Guidelines for the Preparation of Exhibits and Models* are being communicated.

3. Wide publicity should be given for inviting entries. *RSBVP 2025–26 Guidelines for the Preparation of Exhibits and Models should be provided toall schools.* These guidelines may also be translated into 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 the 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 Administration;
- CBSE affiliated Public Schools (independent schools); and
- Demonstration Multipurpose Schools of Regional Institutes of Education.
- National Education Society for Tribal Students

These organisations send their selected entries for consideration for participation in Rashtriya Bal Vaigyanik Pradarshani (RBVP) 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–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 RSBVP

1. In case Districts/Regional Level Exhibitions are not being organised by the State/UT, a Screening
2. Committee should be set up to finalise the selection of entries from various institutions for participation in the Rajya Stariya Bal Vaigyanik Pradarshani (RSBVP) for Children.
3. 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 a good finish and are presentable.
4. The above-mentioned Screening Committee or a separate panel of judges should evaluate the exhibits according to the criteria of evaluation as mentioned for RSBVP. 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.
5. 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), the name of the school and a piece of brief information about the exhibit (maybe in two sentences only).

Such a list may be prepared in accordance with the NCERT‘s unpriced 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 RSBVP

In order to keep 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 are suggested (the percentages given in bracket are suggestive weight-ages):

- Involvement of children‘s own creativity and imagination (20 per cent);
- Originality and scientific and mathematical innovations in the exhibit/model (15 per cent);
- Scientific thought/principle/approach (15 per cent);
- Technical skill, workmanship and craftsmanship (15 per cent);
- Utility for Society, scalability (15 per cent);
- Economic (low cost), portability, durability, etc. (10 per cent); and
- Presentation–aspects like demonstration, explanation and display (10 per cent).

(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 RBVP–2026. 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 disabled students. Further, the entries forwarded should be accompanied by a 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 a 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. RSBVP Coordinators may forward two such innovative ideas written in a few paragraphs to NCERT; or 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 an innovation as per proforma IV.

Various skills are 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 ready-made exhibits/models. The 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 a 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 forms of payment may be followed.

1. For Organising One–Day Seminar

(i) The seminar should be organised one day before the organisation of RSBVP or during the days of the exhibition in the morning/evening hours

(ii) Honorarium to four experts/ scientists may be disbursed at the rate of `3000.00/– 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.: up to `20,000.00/–

2. For Organising the RSBVP

(i) Honorarium to ten **judges** may be disbursed at the rate of 3000.00/– each. **NCERT faculty members should not be provided with 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 in 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) Participants may be provided incidental charges maximum up to Rs 400.00/-for to and fro journeys 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*

(vi) *facilities are not provided by the organisers, a sum of* `Rs *300.00 per person per day may be provided.*

(vii) Local conveyance charges may be disbursed as per state/central government rules.

(viii) Contingency grant for typing/ photocopying the printing of publicity materials, exhibition material, banners, stationery etc. up to 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 the regional language should accompany a translated copy in English certified by the Coordinator/In–charge of the State Level Exhibition to facilitate the audit and settlement of accounts. All payments exceeding `Rs 5000.00/– should be supported by the 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 Coordinator/ In charge. Rajya Stariya Bal Vaigyanik Pradarshani for children-2025-26

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 RSBVP to be sent to NCERT

A formal report of the Rajya Stariya Bal Vaigyanik Pradarshani for children-2025-26 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 the 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. The number of exhibits displayed under each sub- theme should also be mentioned separately.Highlights of the exhibition include other activities such as lectures, film shows, book exhibitions 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 53rd RBVP– 2025-26 bearing the name of the student, teacher, school. Complete write–up of exhibits, 5 minutes video presentation in CD about the exhibit by the student, etc. If the video is in the regional language, it is expected to make it, in Hindi/English also for wider publicity among the students and teachers. (A proforma for information about the exhibit/model is also attached for this purpose Proforma I).

ix. Number of visitors to the exhibition.

F. Criteria for Evaluation of Exhibits for Rashtriya Bal Vaigyanik Pradarshanin (RBVP)

Selected entries from all Rajya Stariya Bal Vaigyanik Pradarshani, (RSBVP) for children organised in different states, union territories and other organisations are forwarded to NCERT for consideration for participation in Rashtriya Bal Vaigyanik Pradarshani, (RBVP) for Children. RBVP is organised every year by NCERT in a state/union territory on a rotation basis. These entries are forwarded to NCERT as per Proforma I (given in this booklet). At NCERT, these entries are screened and shortlisted on the basisof their write–ups and a 5 minutes video presentation on CD by the student. For this purpose, the following criteria for evaluating exhibits are adopted (the percentages given in the bracket are weightages). NCERT reserves the right to alter the criteria to include adequate the number of exhibits from rural/backward regions and exhibits developed by disabled students.

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

G. Suggestion on conducting an online Exhibition

In unavoidable circumstances such as in the case of a global pandemic or regional endemic or occurrence of a natural/man-made disaster (fire breakdown, flood, earthquake etc.) the State officials are suggested to start the organisation of science exhibitions in an online mode beginning from block level to State level. It is suggested to encourage a maximum number of students to participate in these exhibitions and display their models in online mode wherever possible. Wherever these exhibitions are conducted in an online mode the programme may be conducted using the following Guidelines

Development of a Portal: A portal may be designed where all types of information related to the science exhibition may be displayed so that everyone will have access to all the information related to the exhibition.

1. **Using an Online Platform:** To conduct the programme in online mode several available resources such as various online platforms may be used.
2. The meeting may be conducted for five days for a given time slot from 9:30 AM to 6:00 PM. All participating students must log in to this common platform and showcase their exhibits. Participating students must remain present online for further interaction with the visiting students/persons.
3. **Interaction of Students:** There must be scope for children/persons to visit various exhibits under various sub-themes and interact with the participating students regarding their queries about the exhibits.
4. **Uploading the Selected Videos:** All the selected exhibits may be displayed through pre-developed videos provided by participating students and teachers. There must be a scope on the portal for displaying the event as a live telecast and video may remain uploaded even after the given time slot.
5. **Other Activities of the Event:** Popular lecture is one of the key features of the exhibition and may be conducted through a webinar using the live platform in the given time slot during the event.
6. **Network Issues:** In the situation of network issues in Rural and interior areas, students may be allowed to send the recorded videos in the form of CD/DVD to respective coordinators/in charge at the district level, from where it can be uploaded by the district coordinators on the platform if required. It is suggested that the participating students along with their teachers may participate in the event from block/district level city where there is no network issue
7. The catalytic grant given to the state if required can be used for **website creation/technical support for the conduct of 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:

Prof. T.P. Sarma, Dr. Munindra Ruwali
Coordinator
Rajya Starlya Bal Valgyanlk Pradarshanl, (RSBVP) for
Children - 2025-26

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-mall: slsmee.ncert@gmall.com • Website: www.ncert.nic.in

4

Proformas
53rd Rashtriya Bal Vaigyanik Pradarshani (RBVP) 2025-26
For Children

Theme: Science and Technology for Sustainable Future

Proforma I

Information about The Exhibit/Model

1. Title of the Exhibit/model ..... (in BLOCK letters)
2. Sub-theme:
    1. Sustainable Agriculture ☐
    2. Waste Management and Alternative to Plastic ☐
    3. Green Energy ☐
    4. Emerging Technologies ☐
    5. Recreational Mathematical Modelling ☐
    6. Health and Hygiene ☐
    7. Water Conservation and Management ☐
3. Name(s) of Contributing Student(s)..... (M/F);

   Class ..... (in BLOCK letters)

   Mobile No.....

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

   Mobile No .....

   Email .....
5. Name of the school with complete postal address (in BLOCK letters):

   .....

   .....

   .....State/UT..... Pin.....

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

   Mobile No. .....

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

7. Affiliation of the School State Board/ICSE/CBSE, any Other (Please Specify)
……

8. Location of the School Tribal/Rural/Backward/Semi-Urban/Urban
……

9. Nature of the Exhibit/Model (A) Innovative/Improvised Apparatus
(B) Working/Static Model/Study Report
Any Other (Please Specify)
……

10. Whether Dark Room Space is needed for the display of Exhibit: Yes/No
11. Approximate space required for the display of Exhibit ……
12. Source of inspiration/help for preparing the exhibit/model:
(Please explain briefly about the nature and form of help received from the following):

(i) From Teachers/School

……

……

(ii) From Parents.

……

(iii) From Peer Group

……

……

(iv) Any other

……

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

……

……

……

……

14. Write–up of the Exhibit/Model (not more than 1,000 words) in the following format. *[**Note:** Proper submission of the write–up will ensure that if selected for participation in the 53rd Rastriya Bal Vaigyanik Pradarshani (RBVP) for Children – 2026, 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 lines 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. A description of the photograph may be written on its back.
ii. Please do not enclose the photographs of participating student(s) and their guide teacher(s)
iii. Please do not send the scanned/soft copies of write–ups instead of the video presentation.

CERTIFICATE OF ORIGINALITY

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

(Signatures of all students and teachers)

State/UT _____ Duration _____

Rajya Stariya Bal Vaigyanik Pradarshini for Children 2025-26

Proforma II

Panel of Judges -Sub-Theme wise* Venue

_____

Theme: STEM for Vikasit and Atmanirbhar Bharat

PERTAINING TO THE SUB-THEME OF

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

1. Sustainable Agriculture
2. Waste Management and Alternative to Plastic
3. Green Energy
4. Emerging Technologies
5. Recreational Mathematical Modelling
6. Health and Hygiene
7. Water Conservation and Management

S.No	Name(s) ofthe 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.

Rajya Stariya Bal Vaigyanik Pradarshani for Children 2025-26

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 Exhibit/Models	Participants from the School											
				Teachers				Students				Students From CWSN Category			
				Male	Female	Other	Total	Boys	Girls	Total	SC/ST	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.

Rajya Stariya Bal Viagyanik Pradarshani for Children 2025-26

Proforma IV

Information About Nature and the Number of Exhibits Displayed

Theme: STEM for Vikasit and Atmanirbhar Bharat

State/Union Territory : .....

Dates of Exhibition : .....

Venue of Exhibition : .....

Subtheme	Nature and Number of Exhibit Displayed				Total no. of exhibits
	Innovative/Improvised/Apparatus/Working Model	Static Model	Study/Survey Report	Any other(Please specify)	
Sustainable Agriculture					
Waste Management and Alternative to Plastic					
Green Energy					
Emerging Technologies					
Recreational Mathematical Modelling					
Health and Hygiene					
Water Conservation and Management					

Rajya Stariya Bal Viagyanik Pradarshani for Children 2025-26

Proforma V

Maintenance of Accounts

GFR 12 – C
[(See Rule 239)]
FORM OF UTILIZATION CERTIFICATE (FOR STATE GOVERNMENTS)
(Where expenditure incurred by Govt. bodies only)

Sl. No.	Letter No. and date	Amount	Certified that out of Rs.....Of grants sanctioned during the year.....in favour of .....under the Ministry/Department Letter No. given in the margin and Rs.....on account of unspent balance of the previous year, a sum of Rs.....has been utilized for the propose of .....for which it was sanctioned and that the balance of Rs.....remaining unutilized at the end of the year has been surrendered to Government (vide No. .....dated.....)/will be adjusted towards the grants payable during the next year.....
	Total		

2. Certified that I have satisfied myself that the conditions on which the grants-in-aid was sanctioned have been duly fulfilled/ are being fulfilled and that I have exercised the following checks to see that the money was actually utilized for the propose for which it was sanctioned.
Kinds of checks exercised
1.
2.
3.
4.
5.

Signature.....
Designation.....
Date.....

PS: The UC shall disclose separately the actual expenditure incurred and loans and advances given to suppliers of stores and assets, to construction agencies and like in accordance with scheme guidelines and in furtherance to the scheme objectives, which do not constitute expenditure at the stage. These shall be treated as utilized grants but allowed to be carried forward.

State/UT _____ Duration _____

Rajya Stariya Bal Vaigyanik Pradarshini for Children 2025-26

Proforma VI

Theme: STEM for Vikasit and Atmanirbhar Bharat

Venue _____

JUDGES' PROFORMA FOR EVALUATION OF PARTICIPATING ENTRIES, SUB-THEMES WISE

Sub-themes:

(Please tick marks on the area being evaluated):

1. Sustainable Agriculture
2. Waste Management and Alternative to Plastic
3. Green Energy
4. Emerging Technologies
5. Recreational Mathematical Modelling
6. Health and Hygiene
7. Water Conservation and Management

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

Date _____

Signature _____

Name. _____

Designation and Affiliation _____

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

5

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

First Example of the Write-up

JAWAHAR NAVODAYA VIDYALAYA

IT Exhibit

NAME OF THEME: **TECHNOLOGY AND TOYS**

NAME OF SUB-THEME: **ADVANCEMENT IN INFORMATION AND COMMUNICATION TECHNOLOGY**

NAME OF EXHIBIT: **TINYML IN ROBOTICS**

NAME OF PARTICIPANT: **AYAZ AKBAR, (CLASS XII)**

NAME OF THE GUIDE: **SREENIVASAN T A, PGT PHYSICS**

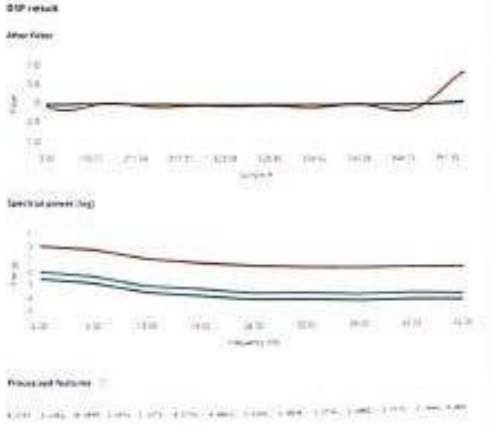
I. INTRODUCTION:

Demonstrating the use of TinyML in the area of robotics, particularly in enhancing the user experience. TinyML is a compact form of machine learning, used to provide microcontrollers the tool of artificial intelligence. Embedded machine learning with the help of online platforms like Edge Impulse and allows creators to devise their own application with just a little or no knowledge on Machine learning.

I have created a basic gesture recognition device using an MPU6050 accelerometer sensor and a Pi Pico RP2040. The model is trained to recognize left-right, up-down and idle motion and can be enhanced further by adding more gestures to it. The whole application is developed on the Pico's C/C++ sdk on VScode with MicroPython and the edge impulse platform for training the model.

II. SCIENTIFIC PRINCIPLES INVOLVED:

To develop this exhibit, C/C++ was used to implement the program into the AI using Edge Impulse. Game programs were created for a better understanding of the gesture recognition device using Python.



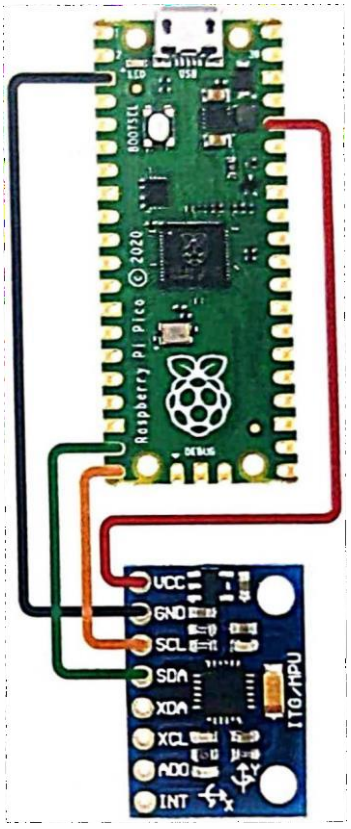
RP2040 is a MCU which has 133MHz dual ARM Cortex-M0+ cores / 264KB SRAM / 30 GPIOs / Extension programmable interfaces / 4 Channel ADC.

The MPU6050 is a MEMS accelerometer used for the Raspberry Pi and Arduino. It has a 6-axis sense with a temperature sensor on board. It is valued for its low power, simplicity, and surprising accuracy for such a low-cost sensor.

III. MATERIAL USED

- Raspberry Pi Pico RP2040 microcontroller
  MPU6050 Accelerometer and Gyroscope
- HC-05 Bluetooth Module
- Visual Studio Code
- Python 3.11
- Edge Impulse

IV. CONSTRUCTION AND WORKING OF THE EXHIBIT:



The 6-axis accelerometer gyroscope module senses orientation and angular rotation data through a complicated MEMS (micro electromagnetic systems) arrangement. It sends this data to the Raspberry Pi Pico through the bus using l2C communication protocol. The Raspbeny Pi Pico inputs this information into a Machine Learning model that decides what gesture is being shown using a Tiny ML implementation by Edge Impulse.

This is the most technical part of the project. After deciding what the gesture is, the Pico sends the message through the serial USB cable, and also broadcasts it through Bluetooth using the HC-05 Bluetooth module.

The most challenging part of this project was deploying Tiny ML in Pico. C++ was used to interface Edge Impulse with the Pico and thus collect Training data. Each gesture was then incorporated into the AI with a training time of 10 min each. The model was then built selecting the options for Neural Network classifiers, Anomaly detection and Spectral analysis. The finished model was downloaded, and then deployed into the Pico as a finished program.

The software part of our project integrates this message received into various games like Dino, Snake and Flappy, letting people have an increased user-machine interaction.

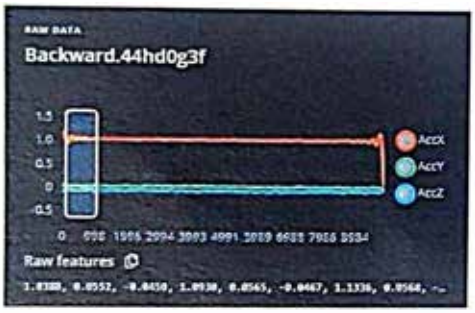
V. APPLICATIONS:

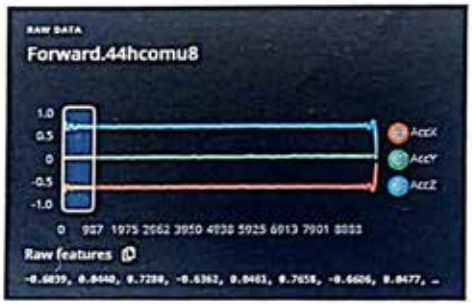
- Program that can run traffic signal by checking traffic in each lane of the road.
- By implementing ML we can make robots that can design what to do next when lost from its controlling range.
- Robots can be deployed to reach certain places to where humans cannot access.
  E.g.: Earthquake sites, flooded area, etc.
- A wheelchair controller by gesture recognition

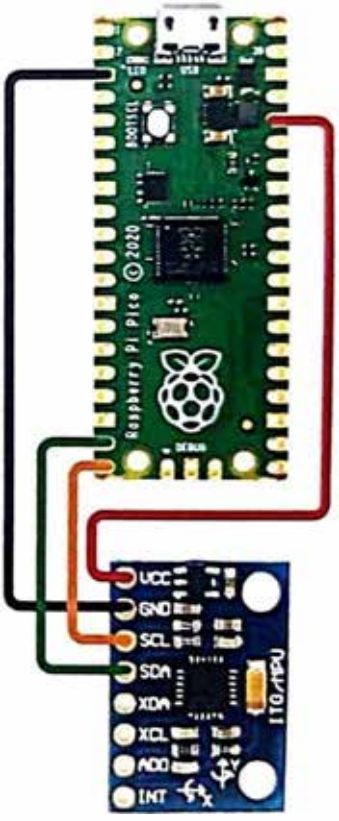
Air conditioners that can check temperature and at rise or fall of temperature gets adjusted to the fixed temperature.

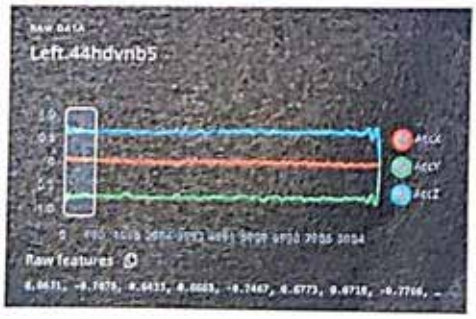
- Program that can order any grocery or items whenever required.
- Self-Driving cars that can detect a face expression of people nearby and predict next outcome.
- A virtual personal assistant
- Face Recognition to find people who is ringing the doorbell.

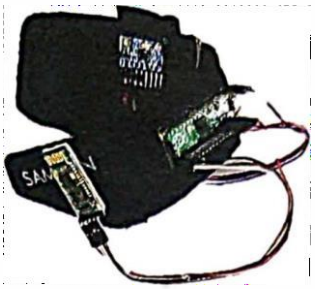
VI. ILLUSTRATIONS:

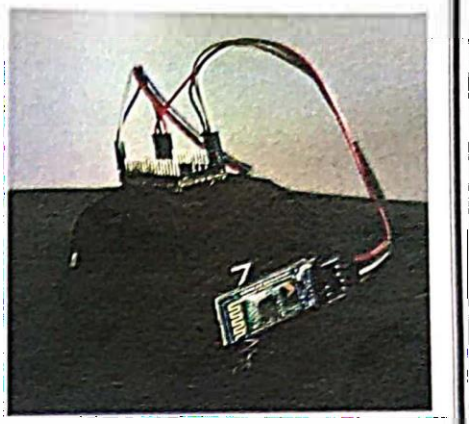












VII. RESULTS:

I have reached the conclusion that deploying TinyML to enhance the human machine interface was more than successful. I strongly believe that the projects paves the way for the most top grossing revolutionary industrial project India has ever seen both in commerciality and research.

VIII. REFERENCES:

ARM GCC Compiler: https://developer.arm.com/tools-and-software/open-source-software/developer-tools/gnu- toolchain/gnu-rm/downloads

CMake: https://cmake.org/download/

Build Tools for Visual Studio: https://visualstudio.microsoft.com/downloads/#build-tools-for-visual-studio-2022 Python 3.11:

https://www.python.org/downloads/windows/

Git: https://git-scm.com/download/win

Visual Studio Code: https://code.visualstudio.com/download Raspberry Pi Pico

RP2040 microcontroller:
https://www.amazon.com/gp/search/ref=as Ii qf sp sr ii tl?ie=UTF8&tag=peppe8o0b-20&keywords=raspberry%20pi%20pico%20microcontroller&index=aps&camp=l789&creative-932S&linkCode-xm2&1inkld=32aa89b0bfb4dfd47bf3846aa938b5b3

MPU6050 Accelerometer and Gyroscope:
https://www.amazon.com/gp/search/ref=as Ii qf- sp sr tl?ie-UTF8&tag-peppe8o0b-20&keywords=MPU6050&index=aps&camp-1789&creative-9325&IinkCode-ur2&1inkld-4 d2a6047deSf0fb96b1b4d9b 1 04f6f3b

Edge Impulse Motion Recognition: https ://docs.edgeimpulse.com/docs/tutorials/continuous-motion-recognition

Second Example of the Write-up

Name of the theme: Technology and Toys
Name of the Sub theme: Health and Cleanliness **Name of the Exhibit:** Air Purifier
Name of the Participant: Tejas Verma
Name of the Guide/Teacher: Arushi Saini

AIM OF PROJECT

* To study uses, working, principle of a transformer and using a step up transformer to make working mode of particular chimney.
* Objectives to be studied.

1. Principles of a transformer
2. Working of a transformer
3. Types of transformer
4. Working of a precipitator chimney.
5. How to make precipitator chimney.
6. How to make precipitator chimney
7. Uses of precipitator chimney.

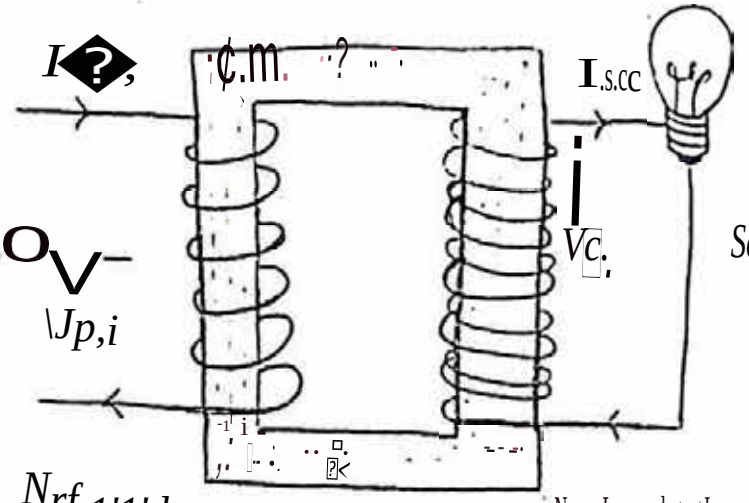
INTRODUCTION

* A transformer is an electrical device which is used to convert between high voltage current and low voltage current it can be a step up 'on' a step down.
* A transformer has many application like stepping voltage up for household grid.
* A precipitator chimney has a pass way fitted with a high voltage A>C supply (100-400kv) to ionize impuregasesand letspasspuregases.
* Precipitator chimneys can be used in factories, exhaust systems, or as domestic air purifies.

THEORY

* Principal of transformer: IT works faraday's law of mutual induction. Faradays's Law of E.M.I states that , when a change takes place in magnetic flux which is linked with a circuit, an electromotive current will be induced in the circuit.
* Working of transformer : A transformer is made from a core that has common input and output sides. Two inductive windings are embedded in this core which is electrically insulated from each other. The input coil in which electrical voltage is fed is known as primary winding. The output coil from which the electrical voltage is drawn is called the secondary winding.
* When an input alternating voltage Vl is applied across the v primary coil of the transformer, it generates an alternating electromotive force emfe is produced in the core. According to faraday's Law of E.M.I

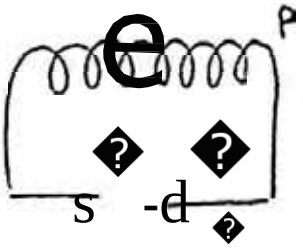
$$e_1 = -N_1 \frac{d\emptyset}{dt} V$$



Sec.end cir..,'if

N1- N2 Step. 1..1..p fo.n Jonre-1.

Ni> N2. ➔ c\.QxJ_)() ir0i'Yls\-orrn£.>1.



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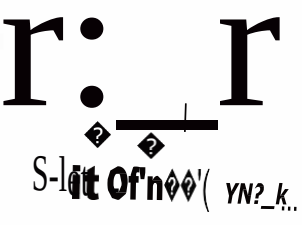


An emf runs throughthe primary coil. Where,

* EMF is 1st order time derivative of electromagnetic flux.
* el= electromotive force.
* Nl= Number of turns in primary coil.

The electromagnetic flux emf el is indirectly equal and opposite to the input alternating voltage (vl).
If we assume that the leakage flux is negligible and there are no losses in the transformer.
Due to faraday's Law electromagnetic induction,an electro motive force emfe2 is produced in secondary coil.
An electromotive fone emf e2 runs through the second
.dary coil.

$$e_2 = -N_2 \frac{d0}{dt} V$$

Where,

* EMF is 1st order time derivative of electromagnetic flux.
* e2=Electromotive force.
* N2=no. of coils turns in secondary coil.

TYPES OF TRANSFORMER

1. Step up transformer If
   $N_1 < N_2$
   $e_1 < e_2$
   A step up transformer is defined as a device that receives can electrical alternating voltage
   abnd converts it into a higher voltage. It is the transformer that has more turns in the secondary winding compared to primary coil.
8. Step-down transformer If
   $N_1 > N_2$
   $e_1 > e_z$
   A step down transformer is defined as a device that receives an electrical signal of A.C and
   converts it into a lower voltage. It is the transformer thatb has more turns into the primary winding as compared to secondary coil.

* Uses of transformer

Transformer have several day-to-day uses like:

*wall transformer(changers)
*power stations
*Automatic and industrial processing controls.
*Lightining systems.
*Small appliances.

*Precipitator chimneys

*grid transformer etc.

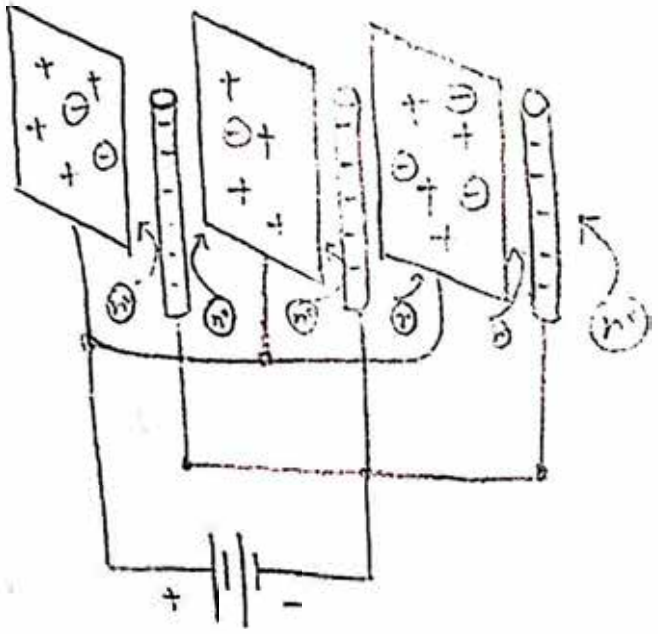
*

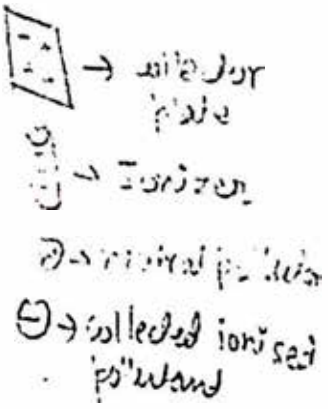
WORKING OF A PRECIPITATOR CHIMNEY

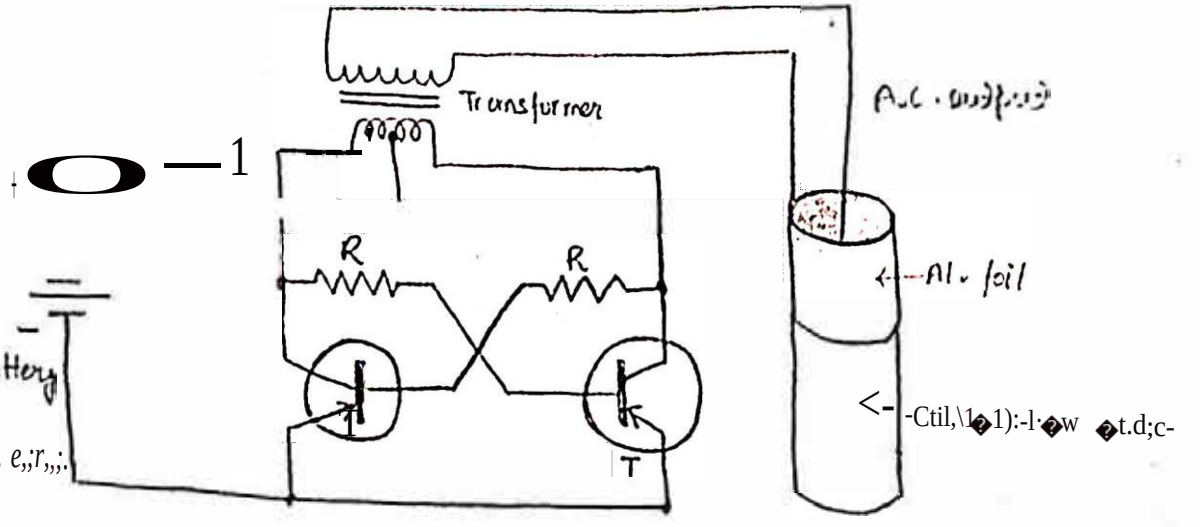
A precipitator chimney or electrostalic precipitator is a type of filter that uses of high voltage supply to ionize pollutants in air or exchaust and remove them from exchaust fumes.

Unburnt carbon particles of smoke are ionised when they get close to a high voltage pole,

:lnrl ctir-lr tn the ut::Jllc nf r-himnc\t







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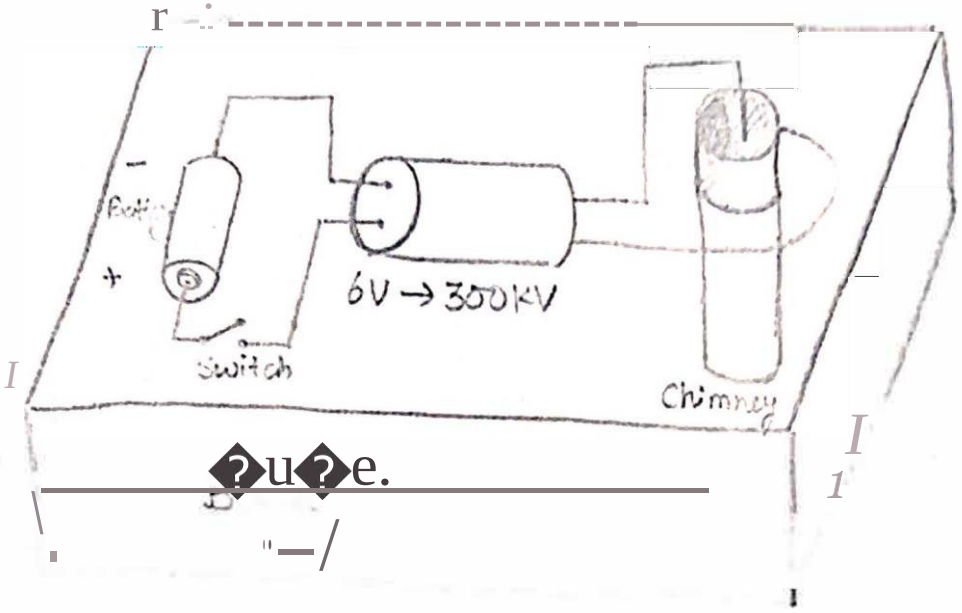

How to make a precipitator chimney.

Apparatus: A high voltage supply or a step uo transformer(100-300kv), A base, A cylindrical tube, A switch , battery , foil paper and connecting wire, a tranisitor.

Theory: When unburnt-C particles get in vicinity of high voltage pole they get ionize and stick to the other pole due columbic force of attraction.

Procedure: 1.Take one end of output of transformer and connective it to a strip of aluminium foil.

2. Suspended the other end of output in the cylinder tube.
3. Paste the aluminium foil connected to transformer on inside wall of cylinder tube.
4. Take a battery of sufficient power and connect it to tha transformer /power supply input nd also connect a switch in between to open and close the connection.
5. Fix everything on a base as shown in the figure.
6. Place a smoke source like incence stick on the base, put the chimney over it.
7. Observe that happens when you open/close the switch.

OBSERVATION

When switch is open, smoke escapes out from upper end of chimney, but when switch is nclosed smoke stops coming ot.

Uses of precipitator chimney

Despite being a simple electrical device, a precipitator chimney has an effectiveness of removing about 99% of particular matter from exhaust.

Electrostalic precipitator are used in:

*industrial plants.

*exhuahst systems.

*air purifiers

*respiratory health equipments.

SOURCE OF ERRORS

*connections may be lose.
*supply may not be high voltage
*battery may be drained.
*suspended wire and collector plate may be touched.

PRECAUTIONS

*Keep high voltage supply away from body.
*Don't touch wire directly when switch is closed.
*testing must be done under supervision.
.*use of non-conducting hand gloves while reduce chances of getting shocked.
*suspended wire (ionize) and collector plate must not touch.

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https://byjus.com/physics.

.https://en.m.wikipedia.org/wiki
https://www.geeksforgeeks.org
https://energyeducation.ca/electronics
https://www.youtube.com
. BOOKS:
NCERT physics li[h]
MTG fingertips 11[th],12th

Contact Address
Prof. T.P. Sarma,
Dr.Munindra Ruwali
Coordinator

Rajya Stariya Bal Vaigyanik Pradarshini 2025-26

DEPARTMENT OF EDUCATION IN SCIENCE AND MATHEMATICS

NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

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