Year-End Review -2022: Ministry of Science & Technology Part-2

PROGRAMME LEVEL ACHIEVEMENTS

To know about Part-1, click here

1. National Supercomputing Mission

- NSM is jointly led by DST and Ministry of Electronics and Information Technology (MeitY) in 2015.
- The nodal agencies spearheading the mission are Centre for Development of Advanced Computing (C-DAC), Pune, and Indian Institute of Sciences (IISc), Bengaluru.
- The NSM envisaged setting up a network of 70 high-performance computing facilities across academia and research institutes, by 2022.
- **PARAM Siddhi-AI** is the fastest supercomputer in India built under NSM with a capacity of 5.26 PF.

2. The INSPIRE Awards - MANAK (Million Minds Augmenting National Aspirations and Knowledge)

- It was launched in 2018 and is being executed by DST with National Innovation Foundation – India (NIF), an autonomous body of DST.
- It aims to motivate students in the age group of 10-15 years and studying in classes 6 to 10.
- Objective - To target 1 million original ideas rooted in science and societal applications to foster a culture of creativity and innovative thinking among school children.

3. KIRAN (Knowledge Involvement in Research Advancement for Nurturing) Scheme

- In 2014, all the women specific programmes were restructured under one umbrella known as KIRAN.
- KIRAN is addressing various issues related with women scientists (e.g. unemployment, relocation etc.) and aimed to provide opportunities in
    - Research (WOS-A),
    - Technology development/demonstration (WOS-B), and
    - Self-employment (WOS-C) etc.
- KIRAN is actively involved in taking proactive measures, under the name **CURIE (Consolidation of University Research for Innovation and Excellence in Women Universities).**
- Under CURIE, the state-of-the-art infrastructure will be developed in women universities in order to attract, train and retain promising girls students in S&T

domain.

4. Augmenting Writing Skills for Articulating Research (AWSAR)

- AWSAR is an initiative that aims to disseminate Indian research stories among the masses in an easy to understand and interesting format to a common man.
- Under this initiative, PhD Scholars and Post-Doctoral Fellows (PDFs) in S&T streams would be encouraged to write at least one popular science article during the tenancy of their fellowship.

5. Initiatives of SERB

- **SERB-POWER** - Promoting Opportunities for Women in Exploratory Research
- **SERB-VAJRA** - Targeting to bring best of global science and scientists to India including NRIs
- **SERB-SURE** - To create a robust R&D ecosystem in state universities and colleges
- **SERB-FIRE** - To support research and development to solve critical problems which are relevant to industries on a public private partnership mode

6. IMPacting Research, INnovation and Technology (IMPRINT)

- It focuses on translation of research knowledge into viable technology (products and processes).
- The maiden version of IMPRINT was launched in 2015.
- The next version, called **IMPRINT II** was launched as a joint effort of Ministry of Human resource Development (MHRD) and DST (steered by Science and Engineering Research Board, SERB) in 2018.

7. North East Centre for Technology Application and Reach (NECTAR)

- The NECTAR is an autonomous body under the Department of Science & Technology.
- The saffron bowl of India, so far confined to parts of Kashmir, has now spread its wings to parts of the North East (Sikkim, Arunachal Pradesh Meghalaya) through the efforts of NECTAR.
- The Northeast saw the successful cultivation of saffron for the first time in Yangang village of South Sikkim.

INDIA'S SCIENTIFIC DEVELOPMENTS IN 2022

1. Vikram-S

- Mission Prarambh's Vikram-S India's first private rocket, lifted off from ISRO's Launchpad in Sriharikota in 2022.
- It was developed by Hyderabad-based start-up Skyroot Aerospace Private Limited using advanced technologies including carbon composite structures and 3D-printed components.
- Vikram-S is a sub-orbital launch vehicle.
- The solid fuelled rocket is single-staged.

Mission Prarambh

- It is the maiden mission of launching 3 payloads to the sub-orbit in Vikram-S.
- It marks the first launch of a launch vehicle developed by a private company in India.
- The mission was authorized by IN-SPACe.

2. ISRO's foray into the commercial market

- ISRO also made its mark in the commercial launch service market by launching 36 **OneWeb Satellites** on the LVM3 rocket in 2022.
- Also called **GSLV Mark 3**, the rocket is the heaviest ISRO has ever launched with its weight clocking at 5.7 tonnes.
- OneWeb demonstrated its commitment to provide connectivity across India by 2023.
- **Salient features of the Mission**
  - First commercial mission of LVM3
  - First multi-satellite mission with 36 OneWeb Satellites onboard
  - First launch of LVM3 to LEO
  - First Indian rocket with 6 ton payload
  - First NSIL Mission with LVM3
  - First OneWeb Mission with NSIL/DoS

3. Mangalyaan Concluded its Journey

- Also known as **Mars Orbiter Mission** (MOM), Mangalyaan is the maiden interplanetary mission of the ISRO.
- Launched in 2013, the probe was successfully inserted into Martian orbit on September 24, 2014 in its first attempt.
- **Objective** - To explore and observe Mars surface features, morphology, mineralogy and the Martian atmosphere.
- **Launch vehicle** - PSLV-C25

4. Chandrayaan-2 assessed sodium content on Moon's surface

- The Chandrayaan-2 had an orbiter, lander and rover.
- Lander and rover malfunctioned in the final moments and crash-landed, getting destroyed in the process.
- Through different methods, the 8 instruments of the Orbiter carried out broad tasks.
- Using Chrandrayaan-2, scientists at ISRO mapped out the distribution of sodium on the Moon's surface.
- This would help understand the connection between the moon's surface and its exosphere.

5. iNCOVACC

- The iNCOVACC is India's first nasal COVID-19 vaccine that has been developed by Bharat Biotech.

- It is a ChAd36-SARS-CoV-S COVID-19 (Chimpanzee Adenovirus Vectored) recombinant vaccine.
- The iNCOVACC serves as an instrument for primary immunisation against Covid-19 in adults in the 18+ age group and it is meant for restricted use in emergencies only.
- For the time being, it can be administered only to the unimmunised.
- The vaccine is stable between 2 and 8 degrees Celsius for easy storage and distribution.

6. Artificial Photosynthetic System

- Researchers from IISER-Thiruvananthapuram and IIT-Indore have found an atom-precise nano-cluster to imitate photosynthesis and capture light for power conversion.
- This harvested energy from sunlight could generate current with better yields than previous technology.

7. Marine heatwaves in Arabian Sea

- The number of marine heatwave days in the Arabian Sea has increased significantly between 2000 and 2015 which is driven by the mean sea surface temperature of the sea.
- Though the heatwaves are influenced by the El Niño Southern Oscillation, climatic events are being aggravated by human-induced climate change.

8. Retreating of Glaciers at Pangong

- In the Pangong region of Ladakh, 87 glaciers have retreated by 6.7% since 1990, according to a recent research, mostly related to increased anthropogenic activity and atmospheric warming.
- The melting of glaciers causes the soil to retain less moisture, which affects the vegetation and, in turn, the region’s flora and wildlife.

9. Fossilised dinosaur eggs

- A team of University of Delhi researchers discovered a remarkable set of fossilised dinosaur eggs, with one egg nesting within the other, at the Dinosaur Fossil National Park in Madhya Pradesh.
- While eggs-within-eggs are unusual phenomenon, they are so far known to occur solely in birds and have never been seen in reptiles.
- This research shows possible links between reptile and avian evolution.

KEY ACHIEVEMENTS OF COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH (CSIR)

The Council of Scientific & Industrial Research (CSIR)

- CSIR is a contemporary R&D organization known for its cutting edge R&D knowledge base in diverse S&T areas.
- CSIR covers oceanography, geophysics, chemicals, drugs, genomics, biotechnology,

nanotechnology, mining, aeronautics, instrumentation, environmental engineering and information technology.
- The Presidency of CSIR is held by the **Prime Minister.**
- **Vision of CSIR@2030** - To enhance quality of life of the citizens of India through innovative S&T, globally competitive R&D, by developing sustainable solutions and capacity building to fulfil dream of Atmanirbhar Bharat.

1. Jigyasa Vigyan Mahotsav 2022

- It is a national level scientific creativity competition that aims to provide an opportunity to school children to exhibit their creative skills and also develop their scientific knowledge.

2. CSIR-IIIM's BioNEST- Bioincubation Centre

- CSIR- Indian Institute of Integrative Medicine (CSIR-IIIM) is setting up a "BioNEST Bio-incubation Centre" at Jammu.
- This is the first of its kind incubator in the region to ignite the entrepreneurship mindset and to nurture start-up culture among youth, local farmers and entrepreneurs of Jammu & Kashmir.
- This would help in developing successful business ventures that would create jobs and generate wealth in the J&K region.

3. Iconic 75 Industry Connect ('i' Connect)

- It is a series of events to showcase the achievements in various S&T areas.
- The purpose is to forge partnerships with industry in thematic /focus areas.

4. Awards Won

- **Golden Peacock Eco-Innovation Award 2022** - CSIR won the Golden Peacock Eco-Innovation Award for environmental surveillance for SARS-CoV-2 virus in wastewater for effective management.
- **National Intellectual Property Awards 2021 & 2022** - CSIR bagged this award under the category "Top R&D institution for Patents Filing, Grant & Commercialization".
- **Tata Innovista 2022 Award** – The award in the category of "Most Innovative Partner" was awarded to CSIR-NML, Jamshedpur.

5. Swachh Sagar Surakshit Sagar Campaign

- The "Swachh Sagar, Surakshit Sagar/**Clean Coast Safe Sea** "campaign is a 75-day citizen-led campaign for improving ocean health through collective action.
- The coastal cleanup drive will be carried out at 75 beaches across the country with 75 volunteers for every kilometre of the coastline.
- The three underlying goals of the campaign are to
    - Consume Responsibly
    - Segregate waste at home

    - Dispose Responsibly
- It is the first-of-its-kind and longest running coastal cleanup campaign in the world with highest number of people participating in it.
- Through this campaign, a mass behavioural change among the masses is intended by raising awareness about the ill effects of plastic usage.

6. Steel Slag Valorization Technology

- India is the world's second largest steel producer and also generates around 19 million tons of solid steel slag waste annually.
- Steel Slag Road is a brainchild of the Central Road Research Institute (CRRI), NITI Aayog, and the CSIR.
- This road is built under the 'Waste to Wealth and Clean India' initiative.
- Surat has become the first city in the country to get a processed steel slag.

7. CSIR-NAL's Octa-Copter

- CSIR-NAL has developed a medium-class BVLOS (Beyond Visual Line of Sight) multi-copter UAV made out of a lightweight carbon fiber foldable structure for ease of transportation.
- NAL's Octa-copter Drone is capable of carrying payload of 20 kg for a duration of 20 minutes.
- It can fly at an operational altitude of 500 m AGL and a maximum flying speed of 36 kmph.
- It will be perfect for last-mile delivery, floriculture mapping, geo exploration, precision agriculture pesticide spraying and medical transport at remote places.

8. Phenome India - CSIR Health Cohort Knowledgebase (PI-CHeCK)

- CSIR initiated a longitudinal cohort study (Phenome-India Cohort) to estimate the burden of COVID-19 and to assess antibody stability.
- In a first-of-its-kind study from India, this cohort enabled to ascertain the sero-positivity across the country and identify variable susceptible associations for contacting infection.

References

1. PIB| Year-End Review -2022: CSIR
2. The Hindu | India's scientific developments in 2022