

NATIONAL**Power ministry mandates use of smart prepaid meters from April 2019**

The government has mandated the use of smart prepaid electricity meters in the country beginning April next year, as it looks to complete the transition over the next three years.

Utility of Smart Prepaid Meters

- Smart meters are a part of the overall advanced metering infrastructure solutions (AMI) aimed at better demand response designed to reduce energy consumption during peak hours.
- Manufacturing of smart prepaid meters will also generate skilled employment for the youth.
- Reduction in AT&C losses
- Better health of DISCOMs
- Incentivizing energy conservation
- Ease of bill payments and doing away with the paper bills

Initiatives so far

- The government is procuring smart and prepaid meters to be deployed across the country.
- State-owned Energy Efficiency Services Limited (EESL) has floated two global tenders for procuring a total of 10 million smart meters.
- The government also plans to install 10 million prepaid meters in Uttar Pradesh as part of the Saubhagya scheme which aims to electrify over four crore households till March 2019.

Role of the States: State governments had earlier signed the Power for All documents and had agreed to supply power round the clock to their consumers. Under this, the distribution licensee shall provide 24×7 power to their consumers by 1st April, 2019 or earlier.

India's first music museum to be set up in Thiruvaiyaru:

The country's first music museum will be set up with assistance from the Central government in Thiruvaiyaru, Tamilnadu, the birth place of Saint Tyagaraja, one of the Trinities of Carnatic music. The other two of the Trinity are Muthuswami Dikshitar and Syama Sastri.

Carnatic music, is a system of music commonly associated with South India, including the modern Indian states of Andhra Pradesh, Telangana, Karnataka, Kerala, and Tamil Nadu as well as Sri Lanka. The main emphasis in Carnatic music is on vocal music; most compositions are written to be sung, and even when played on instruments, they are meant to be performed in *gyaki* (singing) style.

ECONOMY**Weakness of Indian rupee led to higher FPI outflows**

For the Indian equity markets, year 2018 will end as the worst in terms of foreign money outflows since 2008 when markets across the globe were reeling under the sub-prime crisis and Lehman Brothers filed for the largest bankruptcy in history.

In the Indian context, 2018 would also be only the third such year in the last decade when foreign portfolio investors (FPIs) would end a calendar year as net sellers of Indian shares.

- Foreign investors, who have always been looked upon as the prime drivers of any bull run in the Indian equity market, have been net sellers at almost \$4.8 billion or Rs. 33,344 crore during the current calendar year, till date.
- There was also heightened volatility globally due to the concerns related to the trade war between U.S. and China that made investors stay away from the emerging market pack, including India. The bubble kind of situation in the mid-cap and small-cap segments at the start of the year also led to profit booking from such investors.
- Meanwhile, most market participants believe that the potential losses this year have been largely mitigated due to the strong buying support, especially in index constituents, from domestic institutional investors such as mutual funds and the Life Insurance Corporation (LIC).

SCIENCE AND TECHNOLOGY**Various achievements of Indian scientists in 2018:**

The year 2018 is ending with spectacular success of Indian scientists and technologists in space and defence sectors, with a series of high impact missions.

A gel that can protect farmers from toxic pesticides

- Most farmers do not wear any protective gear while spraying chemicals in fields, which often leads to pesticide exposure and toxicity.
- Scientists at the Institute for Stem Cell Biology and Regenerative Medicine, Bangalore have developed a protective gel – poly-Oxime.
- It can be applied on skin and can break down toxic chemicals into safe substances

- This will prevent them from going deep into the skin and organs like the brain and the lungs.

World's thinnest material with novel technique

- Pushing the envelope in nanotechnology, researchers at the IIT Gandhinagar have developed a material that is 100,000 times thinner than a sheet of paper.
- They synthesized a two-dimensional material of just one-nanometer thickness (a human hair is about 80,000 nanometer wide) using Magnesium diboride – a compound of boron.
- This is said to be the world's thinnest material.
- It can find a range of applications – from next-generation batteries to ultraviolet absorbing films.

Gene editing applied to banana genome

- Using the gene editing technique – CRISPR/Cas9 – researchers at the National Agri-Food Biotechnology Institute, Mohali have edited the banana genome.
- This is the first such work in any fruit crop in India.
- Banana is a the fourth most important food crop after wheat, rice and corn in terms of gross value of production.
- Gene editing could be deployed for improving nutritional quality, agronomical important traits as well as pathogen resistance in banana.

Discoveries to tackle Zika, Dengue, JE and Chikungunya

- The National Brain Research Centre (NBRC) at Manesar has figured out cellular and molecular mechanisms that show how Zika virus causes microcephaly or small head size in babies.
- Researchers discovered that envelop protein of Zika virus affects proliferation rates of human neural stem cells and promotes premature but faulty neuron formation.
- Another study led by scientist at the Regional Centre for Biotechnology, Faridabad has identified a key protein which helps dengue as well as Japanese Encephalitis viruses replication inside human body by inhibiting anti-viral cytokines.
- This finding could pave way for development of targeted drugs for dengue and JE.
- For detecting Chikungunya, a group of researchers have developed a biosensor using molybdenum disulphide nanosheets.

Faster diagnostic tests for tuberculosis

- Scientists at the Translational Health Science and Technology Institute, Faridabad and AIIMS, New Delhi have jointly developed highly sensitive and rapid tests for detection of TB infection.
- The current test uses antibodies for detection of bacterial proteins in sputum samples.
- New tests use Aptamer Linked Immobilized Sorbent Assay (ALISA) and Electrochemical Sensor (ECS) for detection of a bacterial protein in the sputum.

Space weather warning model rules out 'mini ice age'

- A team of scientists from the IISER Kolkata have dismissed the speculation that the upcoming sunspot cycle is going to be stronger, based on calculations using a model developed by them.
- The near-Earth and inter-planetary space environmental conditions and solar radiative forcing of climate over the upcoming sunspot cycle 25 will likely be similar or marginally more extreme.
- The method makes it possible to make predictions almost a decade before the next sunspot cycle activity peaks in strength.

New tool developed for autism screening

- In many cases, autism is misdiagnosed as mental retardation and attention deficit hyperactivity disorder.
- Early identification and interventions may help children with autistic disorders.
- To help this process, scientists at the GMCH, Chandigarh, have developed an Indian tool for screening children for autism.
- The Chandigarh Autism Screening Instrument (CASI) is designed to help community health workers to carry out initial screening for autism.

Hope for Alzheimer's, Huntington's

- Scientists at the IISc Bengaluru, have figured out the way memory deficit develops in early stages, resulting in Alzheimer's disease.
- They have found that early breaking down of a protein, fibrillar actin or F-actin, in the brain leads to disruption in communication among nerve cells and consequently memory deficits.
- This knowledge can be used to develop early diagnosis test in future.

- In another study done in fruit flies, researchers at Department of Genetics at Delhi University found that it was possible to restrict the progression of Huntington's disease by increasing insulin signaling in the brain neuronal cells.

Green technique can address Plaster of Paris pollution

- A team of scientists at Pune-based CSIR-NCL has developed a technique that helps recycle Plaster of Paris waste from hospitals in an eco-friendly and economical way.
- The new technique disinfects waste and converts it into useful products like ammonium sulphate and calcium bicarbonate.
- The technique can also be used to disintegrate PoP waste from idols immersed in water bodies.

Stone Age tools, genetic studies throw new light on peopling of India

- The Stone Age tools discovered in a village near Chennai suggest that a Middle Palaeolithic culture was present in India around 385,000 years ago.
- It is roughly the same time that it is known to have developed in Africa and in Europe.
- The discovery pushes back the period when populations with a Middle Palaeolithic culture may have inhabited India.
- It challenges popular theory that the Middle Palaeolithic was brought to India by modern humans dispersing from Africa only around 125,000 years ago or later.
- In the North, a population genetic study has revealed that the Rors who inhabit modern Haryana came to the Indus Valley when it was flourishing during the Bronze Age and inducted West Eurasian genetic ancestry.

Computing capacity for weather forecasting gets a boost

- During the year, the Indian Institute of Tropical Meteorology (IITM) upgraded its computing capacity for weather forecasting and climate monitoring.
- It took its total high performance computing (HPC) power to as high as 6.8 Petaflop.
- With this, India rose to the fourth position, next only to United Kingdom, Japan and USA in terms of dedicated capacity for HPC resources for weather and climate proposes.

Scientists use silk polymer to develop artificial vertebral disc

- Scientists at IIT, Guwahati developed a silk-based bioartificial disc that may find use in disc replacement therapy in future.
- The group has developed a fabrication procedure for a silk-based bioartificial disc adopting a "directional freezing technique".
- The disc mimics internal intricacy of human disc and its mechanical properties too are similar to those of the native ones.
- The use of a silk biopolymer to fabricate a biocompatible disc can reduce the cost of artificial discs in future.

Transgenic rice with reduced arsenic accumulation, flowering mustard

- To address the problem of arsenic accumulation in rice grains, researchers at Lucknow- based CSIR-NBRI developed transgenic rice.
- They inserted a novel fungal gene, which results in reduced arsenic accumulation in rice grain.
- They cloned Arsenic methyltransferase (WaarsM) gene from a soil fungus and inserted it into rice genome.
- In another study, TERI School of Advanced Studies has developed an early flowering transgenic variety of mustard.

ENVIRONMENT & GEOGRAPHY

Govt rejects demand for different time zone for northeastern states for 'strategic reasons'.

The debate for a separate time zone for the northeast has been in existence for as long as the history of modern India goes. Amidst the pros and cons of having two time zones for the country, no implementable solution has been proposed so far. Back in October this year, the CSIR-National Physical Laboratory (CSIR-NPL) and the National Measurement Institute (NMI) of India explored the possibility and also proposed an implementable solution.

Proposed time zones: IST-I and IST-II:

The custodian of Indian Standard Time (IST) proposed two time zones IST-I and IST-II for the country as follows:

- IST-I would be same as current IST, that is, UTC +5:30.
- IST-II would be UTC +6:30 owing to the difference of one hour between eastern and western part of the country.

- The borderline between two time zones would have been 89°52'E, the narrow border between Assam and West Bengal. States west of this line would have followed IST-I (UTC +5:30) while states east of this line (Assam, Meghalaya, Nagaland, Arunachal Pradesh, Manipur, Mizoram, Tripura, Andaman & Nicobar Islands) would have followed IST-II (UTC +6:30).

Time Zone:

- Earth is divided into 360 vertical lines or the longitudes. A shift in every longitude gives a time difference of four minutes; so, the planet is divided into 24 time zones.
- Longitude is the angular distance between a point on any Meridian and the prime meridian in Greenwich. The time at Greenwich is called as Greenwich Mean Time (GMT).

Need for two time zones:

India extends from 68°7'E to 97°25'E, with the spread of 29 degrees, which amounts to almost two-hours from the geographical perspective. For decades, legislators, activists, industrialists and ordinary citizens from India's northeast have complained about the effect of IST on their lives. Following are the factors which compelled the people from northeast to demand a different time zone:

- Loss of daylight hours and excess electricity usage. A different time zone would allow sunsets to take place later, allowing the citizens to better use their daylight hours.
- Effect on biological clocks of citizens. The longitudinal extremes of the country are assigned a single time zone which not only creates the loss of daylight hours but also creates problems relating to the biological clock.

NE and Himalayan states stare at climate risk

All the 12 Himalayan states in India are extremely vulnerable to global warming with Assam, Mizoram and J&K topping the list says a report.

Climate Vulnerability Assessment

- The report titles 'Climate Vulnerability Assessment for the Indian Himalayan Region Using a Common Framework'.
- It is submitted by IIT Mandi and IIT Guwahati in collaboration with IISc Bangalore presents a chilling vulnerability map and assessment for the Indian Himalayan Region.
- The study is based on four broad indicators in each state:
 - Economic and sociological status of the people and their health,
 - Possible impact on agriculture production,
 - Forest-dependent livelihoods
 - Access to information services and infrastructure.
- States having low per capita income, low area under irrigation and low area under forests per 1,000 households and high area under open forests received a high vulnerability score.
- Assam has the least area under irrigation, least forest area available per 1,000 rural households and the second lowest per capita income among the other IHR states, and thus scores the highest vulnerability score.

Prospects of the report

- The Himalayan ecosystem is vital to India's ecological and economic security.
- Himalayan communities have a large dependency on climate-sensitive sectors such as rain-fed agriculture and have a fragile mountain ecosystem.
- The communities have limited livelihood options and experience higher marginalization because physical infrastructure is limited and there is a high dependence on natural resources.
- Under changing and variable climate such constraints are likely to add to the vulnerability of Himalayan communities.

Policy Measures

- In response to the serious threats posed by climate change to the development process and the limitations, the Centre has a National Mission for Sustaining the Himalayan Ecosystem.
- Recently NITI Aayog has constituted the 'Himalayan State Regional Council' to ensure sustainable development of the Indian Himalayan region.