

## **1. MoU on cooperation in Polar Science**

### **Why in News?**

- Cabinet approves Memorandum of Understanding between India and Sweden on cooperation in Polar Science.

### **Highlights:**

- The agreement was signed between the Ministry of Earth Sciences (MoES), India and Ministry of Education and Research, Sweden in December 2019.
- The collaboration between India and Sweden in polar science will enable sharing of the expertise available with both Countries.
- India and Sweden are both signatories to the Antarctic Treaty and to the Protocol to the Antarctic Treaty on Environmental Protection.
- Sweden as one of the eight “Arctic States” is one of the Member States in the Arctic Council whereas India has the Observer Status in the Arctic Council.
- Arctic Council: The Arctic Council is the leading intergovernmental forum promoting cooperation, coordination and interaction among the Arctic States, Arctic indigenous communities and other Arctic inhabitants on common Arctic issues, in particular on issues of sustainable development and environmental protection in the Arctic.
- 8 Arctic States: Canada, the Kingdom of Denmark (including Greenland and the Faroe Islands), Finland, Iceland, Norway, Russia, Sweden and the United States.
- Sweden has a vigorous scientific program in the Polar Regions, both in Arctic and Antarctic.
- India likewise, has sustained scientific research programs in both the Polar Regions as well as in the oceanic realm.

## **2. Snow and Avalanche Study Establishment (SASE)**

### **Why in News?**

- Snow and Avalanche Study Establishment (SASE) has issued an Avalanche warning to Leh in Ladakh region.

### **SASE:**

- SASE is a laboratory of the Defence Research and Development Organization (DRDO).
- It is located near Manali, Himachal Pradesh.

- Its primary function is research in the field of snow and avalanches to provide avalanche control measures and forecasting support to Armed forces.
- Leh is important as it has two passes namely Chang La and Khardung La with world's highest motorable roads through them with several avalanche-prone zones.
- Its utility is also meant for the soldiers in the world's highest battle field Siachen, in the Region.

### **3. EPIPHANY Festival**

#### **Context:**

- Recently, the Epiphany festival was celebrated in parts of India, such as Goa and Kerala.

#### **About Epiphany Festival:**

- It is among the three oldest and major festival days in Christianity, the two others being Christmas and Easter.
- It is celebrated on January 6 by a number of Christian sects, including Roman Catholics, and on January 19 by some Eastern Orthodox churches.
- In the West, the duration between December 25 and January 6 is known as the Twelve Days of Christmas.
- It is a feast day, or a day of commemoration, which in Christianity marks the visit of the Magi to the Infant Jesus.
- In Goa, the celebration is known by its Portuguese name 'Festa dos Reis', and in parts of Kerala by its Syriac name 'Denha'. The day also commemorates the baptism of Jesus in the Jordan River.

### **4. Scientific Social Responsibility Policy**

#### **Context:**

- Recently, 107<sup>th</sup> Indian Science Congress considered the importance of communication and community outreach programmes to make people aware of Scientific Research.

#### **Scientific Social Responsibility (SSR):**

- It is the confluence of scientific knowledge with visionary leadership and social conscience.
- It is about building synergies among all stakeholders in scientific knowledge community and also about developing linkages between science and society.

### **Objectives:**

- It aims to harness the voluntary potential in the country's scientific community to strengthen science and Society Linkages.
- It primarily involves bridging science-society, science-science and society-science gaps, thereby bringing trust, partnership and responsibility of science at an accelerated pace towards achieving social goals.

### **SSR Policy:**

- The policy will facilitate easy access to resources and knowledge about the investments and impacts of Science and Technology (S&T) on society. It would inculcate moral responsibility amongst the scientific community which may trigger social entrepreneurship and start-ups impacting S&T ecosystem and society.
- It will include a range of activities like delivering lectures in educational institutes, writing an article in a magazine or doing something beyond the curriculum. The science outreach would be mandatory and researchers had to include this as part of their outcome report.
- The government will soon list activities that could be taken up under the Scientific Social Responsibility programme that was similar to Corporate Social Responsibility (CSR).

## **5. Hydrogen Powered Engine**

### **Why in News:**

- Recently in the 107<sup>th</sup> Indian Science Congress, the Indian Railways has announced that it will build a hydrogen-powered rail engine by the end of 2021.

### **About the Indian Railways Organisation for Alternate Fuels (IROAF):**

- It will be developing a hydrogen-powered rail engine — a technology that has been demonstrated successfully only in Germany so far.
- Hydrogen-powered rail engine will help to reduce reliance on fossil fuel-based energy sources like diesel and electricity and to find alternative sources of fuel to power its trains. It will be the input to the fuel cell and the power output of the fuel cell will drive the train.
- The train will have four passenger coaches operating at 75 km/hr. One coach will carry the hydrogen gas cylinders, fuel cells, supercapacitors and DC converters.

- 
- The next phase is to generate hydrogen on board the train from water. This means that water will be converted into hydrogen through water splitting technologies and hydrogen will then be used as the input for Fuel Cells.

#### **About the Fuel Cell:**

- It is an electrochemical device that convert chemical energy from the reactants directly into electricity and heat. The device consists of an electrolyte layer in contact with a porous anode and cathode on either side.
- In a standard fuel cell, gaseous fuels are fed continuously to the anode (Negative Electrode), while an oxidant (oxygen from the air) is fed continuously to the cathode (Positive Electrode). Electrochemical reactions take place at the electrodes to produce an Electric Current.

