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A Shankar IAS Academy Initiative

## SCIENCE MONTHLY

### SEPTEMBER 2019

**Shankar IAS Academy™**

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## SCIENCE MONTHLY SEPTEMBER 2019

### SPACE

#### 1. ASTEROID NAMED AFTER CLASSICAL SINGER

##### *Why in News?*

The International Astronomical Union (IAU) has named an asteroid, discovered in 2006, after Indian classical singer Pandit Jasraj.

##### *What is IAU?*

- The International Astronomical Union (IAU) was founded in 1919.
- Headquarters: Paris, France
- Its mission is to promote and safeguard the science of astronomy.
- The IAU also works to promote research, education and public outreach activities in astronomy for the public.
- IAU serves as the internationally recognized authority for assigning designations to celestial bodies and surface features on them.

##### *What is an Asteroid?*

- Asteroids are actually minor planets.
- They can neither be classified either as a planet or as a comet.

- These are generally in the direct orbit around the Sun.
- They are also known as the inner solar system.
- The larger forms of asteroids are also known as planetoids.
- These are different from the minor planets in the outer solar system in their volatile-based surfaces much like comets.
- These are generally known as asteroid belt.

##### *What is the origin of asteroid?*

- It is believed that these are mainly the remnants of circumstellar disk of gas around newly-formed star and the debris disk together.
- Their remains together are known as planetesimals.
- Mainly the known asteroids are present in the Jupiter Trojans or in the asteroid belt formed between the Mars' orbit and that of Jupiter.
- Others are found in the solar system near Earth, termed as near-Earth asteroid.
- The size of asteroids can vary from 1000 km to 10 meter.



- Asteroids may be spherical or irregular in shape.

### ***What is the difference between an asteroid and a comet?***

- The main difference between asteroids and comets is their composition, as in, what they are made of.
- Asteroids are made up of metals and rocky material, while comets are made up of ice, dust and rocky material.
- Both asteroids and comets were formed early in the history of the solar system about 4.5 billion years ago.
- Asteroids formed much closer to the Sun, where it was too warm for ices to remain solid.
- Comets formed farther from the Sun where ices would not melt.
- Comets which approach the Sun lose material with each orbit because some of their ice melts and vaporizes to form a tail.

## **MANGALYAAN MISSION**

### ***Why in News?***

The Mangalyaan mission, which was initially meant to last six months, completed five

years of orbiting Mars on Tuesday and is likely to continue for some more time.

### ***What are the important facts about Mars?***

- It is the second smallest planet in the solar system.
- Mars is also often described as the “Red Planet” due to its reddish appearance.
- Mars is a terrestrial planet with a thin atmosphere composed primarily of carbon dioxide.
- Moons: Phobos, Deimos
- The presence of Methane gas, also called 'marsh gas', on Earth is one of the clinching signs of the presence of carbon-based life forms.

### ***What are the important facts of Mangalyaan or Mars Orbiter Mission?***

- By placing Mangalyaan in the Mars orbit, India joined the US, the European Space Agency and Russia in the elite club of Martian explorers.
- China and Japan have failed.
- The Mars Orbiter Mission was achieved on a budget of \$74 million, nearly a tenth of the amount the U.S. space agency NASA spent on sending the Maven spacecraft to Mars.

- Apart from India, no other country managed to succeed on their first attempt.
- Mangalyaan, was launched in November, 2013, aboard India's Polar Satellite Launch Vehicle-C25 rocket.
- The mission is meant to test India's ability to place a craft in Martian orbit and technologies required for a future interplanetary mission.
- Five solar-powered instruments aboard Mangalyaan will gather data to help determine how Martian weather systems work and what happened to the water that is believed to have once existed on the planet in large quantities.

#### ***What are the objectives of Mars Orbiter Mission?***

- A. Technological Objectives:
- Design and realisation of a Mars orbiter with a capability to survive and perform Earth bound manoeuvres, cruise phase of 300 days, Mars orbit insertion / capture, and on-orbit phase around Mars.
- Deep space communication, navigation, mission planning and management.
- Incorporate autonomous features to handle contingency situations.

- B. Scientific Objectives:
- Exploration of Mars surface features, morphology, mineralogy and Martian atmosphere by indigenous scientific instruments.

## **2. PUTTING STEM TO WORK**

### ***What Is STEM?***

- STEM is a growing movement in education, not just in the United States but around the world.
- STEM-based learning programs are intended to increase students' interest in pursuing higher education and careers in those fields.
- STEM education typically uses a newer model of blended learning that combines traditional classroom teaching with online learning and hands-on learning activities.
- This model of blended learning aims to give students the opportunity to experience different ways of learning and problem-solving.

### ***What is Vigyan Jyoti scheme?***

- 'Vigyan Jyoti' is an initiative of Department of Science & Technology (DST).
- The objective of the scheme is to create gender-enabling S&T ecosystem and to

inculcate scientific temperament among school girls.

- It aims to attract girl child or students to take up career in science and technology.
- This program helps brightest students in classes IX, X, and XI will get a chance to rub shoulders with top woman scientists of India.
- IITs and IISERs would be the nodal centres and function as “Vigyan Jyoti Knowledge Centres”.

#### **What is INSPIRE?**

- Innovation in Science Pursuit for Inspired Research (INSPIRE) is an innovative programme sponsored.
- It is managed by the Department of Science & Technology for attraction of talent to Science.
- The basic objective of INSPIRE is to:
  - Communicate to the youth of the country the excitements of creative pursuit of science
  - Attract talent to the study of science at an early age
  - Build the required critical human resource pool for strengthening and

- Expanding the Science & Technology system and R&D base.

- A striking feature of the programme is that it does not believe in conducting competitive exams for identification of talent at any level.
- It believes in and relies on the efficacy of the existing educational structure for identification of talent.
- INSPIRE has three components:
  1. Scheme for Early Attraction of Talent (SEATS)
  2. Scholarship for Higher Education (SHE)
  3. Assured Opportunity for Research Careers (AORC)

### **3. SELECTING ASTRONAUTS FOR GAGANYAAN MISSION**

#### **Why in News?**

- The Indian Air Force has completed the first level of selecting astronauts for the ambitious Gaganyaan mission from its pool of test pilots.

#### **What is Gaganyaan?**

- It is India's first manned space mission.
- ISRO and Roscosmos (Russia's federal space agency) have agreed to worked

together for India's first manned space mission Gaganyaan.

- Under it, India is planning to send three humans (Gaganyatris) into space i.e. in low earth orbit (LEO) by 2022 i.e. by 75th Independence Day for period of five to seven days.
- The mission was announced by Prime Minister Narendra Modi during his 72nd Independence Day speech.
- Under this mission, crew of three astronauts will conduct experiments on microgravity in space.
- This mission will make India fourth nation in the world after USA, Russia and China to launch human spaceflight mission.

#### ***What are the Objectives of Gaganyaan Mission?***

- To enhance science and technology levels in the country.
- To serve as national project involving several institutes, academia and industry.
- To improve of industrial growth, inspire youth, develop technology for social benefits and
- To improve international collaboration

## **ENVIRONMENT**

### **4. BIO-RESTORING DEGRADED PATCHES OF SUNDERBANS**

#### ***Why in News?***

- A team of researchers from, set out with the herculean task of identifying the major reasons for the decline and also devising new restoration strategies for Sunderbans.

#### ***What are the reasons for the decline?***

- Increasing anthropogenic activities along with natural stresses have led to massive degradation of one of India's World Heritage Site — the Sunderbans.
- Nutrient depletion especially phosphorus and nitrogen was found to be directly connected with the decline in forest cover.

#### ***What are mangroves?***

- Mangrove trees grow in areas with low-oxygen soil, where slow-moving waters allow fine sediments to accumulate.
- Mangrove forests only grow at tropical and subtropical latitudes near the equator.
- Because they cannot withstand freezing temperatures.



- Many mangrove forests can be recognized by their dense tangle of prop roots.
- This tangle of roots allows the trees to handle the daily rise and fall of tides, which means that most mangroves get flooded at least twice per day.
- The roots also slow the movement of tidal waters, causing sediments to settle out of the water and build up the muddy bottom.
- Mangrove forests stabilize the coastline, reducing erosion from storm surges, currents, waves, and tides.
- The intricate root system of mangroves also makes these forests attractive to fish and other organisms seeking food and shelter from predators.
- The root systems of mangroves that grow in tidal mudflats are characterized by the presence of “breathing roots” known as pneumatophores.

#### ***What are the States/Union Territories in India with mangrove cover?***

- West Bengal
- Orissa
- Andhra Pradesh
- Andaman & Nicobar
- Tamil Nadu

- Kerala
- Karnataka
- Goa
- Maharashtra

### **5. DE-INCENTIVISE PRE-2005 VEHICLES UNDER NEW EMISSION NORMS**

#### ***Why in News?***

Vehicle scrappage policy has gone for a Cabinet approval is likely to see stringent registration and fitness norms for pre-2005 manufactured vehicles.

#### ***What are Bharat Stage norms?***

- Bharat Stages are standards instituted by the government to regulate emission of air pollutants from motor vehicles.
- The norms were introduced in 2000.
- With appropriate fuel and technology, they limit the release of air pollutants such as nitrogen oxides, carbon monoxide, hydrocarbons, particulate matter (PM) and sulphur oxides from vehicles using internal combustion engines.
- As the stage goes up, the control on emissions become stricter.
- Bharat Stage VI norms are two stages ahead of the present Bharat Stage IV norms in regulating emissions.

- These norms are based on similar norms in Europe called Euro 4 and Euro 6.
- **What are the differences between two stages?**
- The extent of sulphur is the major difference between Bharat Stage IV and Bharat Stage VI norms.
- BS-IV fuels contain 50 parts per million (ppm) sulphur, the BS-VI grade fuel only has 10 ppm sulphur.
- BS VI can bring PM in diesel cars down by 80 per cent .
- The new norms will bring down nitrogen oxides from diesel cars by 70 per cent and in petrol cars by 25 per cent.
- BS VI also make on-board diagnostics (OBD) mandatory for all vehicles.
- OBD device informs the vehicle owner or the repair technician how efficient the systems in the vehicle are.

## **6. ELECTRIC VEHICLE POLICY 2019**

### ***Why in News?***

The Tamil Nadu State Government introduced its first-ever electric vehicle (EV) policy.

### ***What is the need for the policy?***

- The Tamil Nadu Electric Vehicle Policy, 2019, provides for various concessions to manufacturers of e-vehicles.
- Tamil Nadu, known as the Detroit of South India, accounts for 6.4% of the electric vehicles sale in the country.
- To encourage start-ups in the EV sector, incubation services will be offered in the form of office space, common facilities and mentoring support.

### ***What is the significance of EV policy?***

- An EV Venture Capital Fund will be created to offer financial support to EV start-ups.
- EV-related and charging infrastructure manufacturing units will be provided 100% exemption on electricity tax till December 2025.
- Units that obtain land by sale or lease shall be entitled to 100% exemption on stamp duty for transactions till December 2022.
- Units that obtain land from SIPCOT, SIDCO or other governmental agencies will be provided a 15% subsidy on the cost.



- They will be provided 50% subsidy if the investment is in the southern districts.
- The government will provide a higher capital subsidy of 20% of the eligible investment over 20 years in cases where units are engaged in making EV batteries.
- Amendment to building and construction laws will ensure that charging infrastructure is integrated at the planning stage itself for all new constructions in cities.
- Chennai is home to major automobile manufacturing firms, including Hyundai, Ford, Nissan, TVS, Mahindra and Daimler

### ***Environment friendly leather processing***

#### ***Why in News?***

- A novel amylase-based biocatalyst developed by researchers at the Central Leather Research Institute (CSIR-CLRI), Chennai, helps in processing leather in an environment-friendly.

#### ***What are the other advantages of the finding?***

- It also drastically cuts the time taken to process the skin at the pre-tanning stage.

- Pre-tanning process generates 60-70% of total pollution during processing.
- The quantum of effluent discharge is considerably cut.
- Threefold reduction in water usage

#### ***What is a catalyst?***

- A catalyst is a chemical substance that affects the rate of a chemical reaction by altering the activation energy required for the reaction to proceed.
- This process is called catalysis.
- A catalyst is not consumed by the reaction and it may participate in multiple reactions at a time.
- The only difference between a catalyzed reaction and an uncatalyzed reaction is that the activation energy is different.
- There is no effect on the energy of the reactants or the products.
- The  $\Delta H$  for the reactions is the same.

#### ***What are biocatalysts?***

- Biocatalysis is “the use of natural substances to speed up (catalyze) chemical reactions”.
- In most cases, a group of proteins called enzymes will be carrying out the catalysis, but a combination of enzymes as well as cells can be used.



- These enzymes can be taken from the cell, either from the original cell or from a different cell that was modified to produce the enzyme.
- Enzymes are involved in life processes, including digestion and getting energy from digested food.
- Therefore, a lot of chemical reactions catalyzed by enzymes have a biologically-related function.
- Possibly the oldest example of biocatalysis is brewing, where microorganisms are used to convert sugars into alcohol.

### ***New species of pterosaur unveiled***

#### ***Why in News?***

- Scientists unveiled a new species of pterosaur, the plane-sized reptiles that lorded over primeval skies above T-rex, Triceratops and other dinosaurs of the late Cretaceous.

#### ***What is Cretaceous period?***

- Cretaceous Period is the last of the three periods of the Mesozoic Era.
- The Cretaceous began 145.0 million years ago and ended 66 million years ago.
- It followed the Jurassic Period and was succeeded by the Paleogene Period.

- The Cretaceous is the longest period of the Phanerozoic Eon.
- Spanning 79 million years, it represents more time than has elapsed since the extinction of the dinosaurs, which occurred at the end of the period.

#### ***What is Mesozoic Era?***

- This era began 251 million years ago and lasted about 186 million years.
- The name was compounded from Greek *mesos* (middle) and *zoon* (animal).
- Popular name: Age of Reptiles.

## **7. RESTORATION CAN PROMOTE RECOVERY OF TROPICAL RAINFORESTS**

#### ***Why in News?***

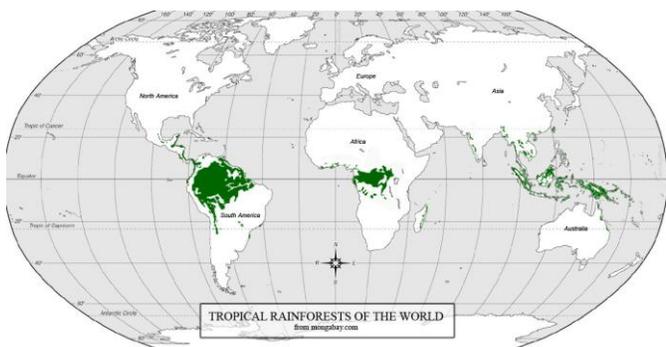
A two-decade long study carried out by ecologists finds that active restoration can promote recovery of tropical rainforest fragments with seven to 15 years of effort.

#### ***What is the Geography and climate of tropical rainforests?***

- Tropical rainforests lie in the "tropics," between the Tropic of Capricorn and Tropic of Cancer.
- In this region sunlight strikes Earth at roughly a 90-degree angle resulting in intense solar energy (solar energy

diminishes as you move farther north or south).

- This intensity is due to the consistent day length on the equator: 12 hours a day, 365 days per year (regions away from the equator have days of varying length).
- This consistent sunlight provides the essential energy necessary to power the forest via photosynthesis.



- Map showing world distribution of rainforests
- Because of the ample solar energy, tropical rainforests are usually warm year round with temperatures from about 22-34C, although forests at higher elevations, especially cloud forests, may be significantly cooler.
- The temperature may fluctuate during the year, but in some equatorial forests the average may vary as little as 0.3C throughout the year.
- Temperatures are generally moderated by cloud cover and high humidity.

- Rainforests lie in the intertropical convergence zone where intense solar energy produces a convection zone of rising air that loses its moisture through frequent rainstorms.
- Rainforests are subject to heavy rainfall, at least 2,000 mm and in some areas over 10,920 mm of rain each year.
- Rainforests are characterized by a unique vegetative structure consisting of several vertical layers including the overstory, canopy, understory, shrub layer, and ground level.

## **8. TARGET TO 450 GW RENEWABLE ENERGY BY 2022**

### *Why in News?*

India's renewable energy target will be increased to 450 GW, Prime Minister Narendra Modi said at the United Nations Climate Action Summit.

### *What is the current target for renewable energy?*

- Solar power : 100GW
- Wind power : 60GW
- Bio mass : 10GW
- Small hydro power : 5 GW
- Total by 2022 : 175GW

### **What is new initiative to ensure Har Ghar Jal?**

- The Government has vowed to provide piped drinking water to every rural household by 2024 - under its Jal Jeevan Mission.

Newly-created Union Ministry of Jal Shakti would work with the state governments to implement Jal Jeevan Mission.

- The Jal Shakti Ministry was formed by merging the Ministry of Drinking Water and Sanitation and Water Resources and Ganga Rejuvenation.
- The aim of the scheme is to ensure “Har Ghar Jal” (Water in every home) by providing water through pipelines to all rural households by 2024.
- A dedicated fund called Rashtriya Jal Jeevan Kosh will be set up for the mission.

## **9. WORLD OZONE DAY**

### **Why in News?**

World Ozone Day’, September 16 commemorates the Montreal Protocol that was signed on this date by 24 UN member nations in 1987.

### **Where Ozone is located?**

- The Earth's atmosphere is divided into several layers.
- The lowest region, the troposphere, extends from the Earth's surface up to about 10 kilometers (km) in altitude.
- The next layer, the stratosphere, continues from 10 km to about 50 km.
- Most atmospheric ozone is concentrated in a layer in the stratosphere, about 15–30 kilometers above the Earth's surface.
- Ozone is a molecule containing three oxygen atoms.
- It is blue in color and has a strong odor.
- Normal oxygen, which we breathe, has two oxygen atoms and is colorless and odorless.
- Ozone is much less common than normal oxygen.
- Out of each 10 million air molecules, about 2 million are normal oxygen, but only 3 are ozone.

### **Why ozone is important?**

- The ozone layer absorbs a portion of the radiation from the sun, preventing it from reaching the planet's surface.
- Most importantly, it absorbs the portion of ultraviolet light called UVB.

- UVB has been linked to many harmful effects, including various types of skin cancer, cataracts, and harm to some crops, certain materials, and some forms of marine life.
- At any given time, ozone molecules are constantly formed and destroyed in the stratosphere.
- The total amount, however, remains relatively stable.
- When CFCs reach the stratosphere, the ultraviolet radiation from the sun causes them to break apart and release chlorine atoms.
- The chlorine atom reacts with ozone, starting chemical cycles of ozone destruction that deplete the ozone layer.
- One chlorine atom can break apart more than 100,000 ozone molecules.
- Other chemicals that damage the ozone layer include methyl bromide (used as a pesticide) and halons (used in fire extinguishers).
- As methyl bromide and halons are broken apart, they release bromine atoms, which are 40 times more destructive to ozone molecules than chlorine atoms.

### ***What are the factors affecting ozone formation?***

- Ozone concentrations vary naturally with sunspots, the seasons, and latitude, these processes are well understood and predictable.
- Each natural reduction in ozone levels has been followed by a recovery.

### ***How does ozone depletion occur?***

- It is caused by the release of chlorofluorocarbons (CFCs) and other ozone-depleting substances (ODS), which were used widely as refrigerants, insulating foams, and solvents.
- Although CFCs are heavier than air, they are eventually carried into the stratosphere in a process that can take as long as 2 to 5 years.

## **BIO-TECHNOLOGY**

### **10. BCG WITH ENHANCED EFFICACY AT NANOSCALE**

#### ***Why in News?***

A study carried out has found that curcumin in nanoparticle form has the potential to enhance the efficacy of BCG vaccine such that it confers protection against adult pulmonary TB.

### **What Are Vaccines?**

- A vaccine is a biological substance designed to protect humans from infections caused by bacteria and viruses.
- Vaccines are also called immunizations because they take advantage of our natural immune system's ability to prevent infectious illness.
- **What is BCG?**
- It is an effective immunization against tuberculosis.
- BCG stands for Bacille Calmette Guerin.
- BCG is a weakened (attenuated) version of a bacteria called Mycobacterium bovis which is closely related to Mycobacterium tuberculosis, the agent responsible for tuberculosis.
- It is given to infants to protect them from tubercular meningitis and disseminated TB.
- **When to give** – BCG vaccine is given at birth or as early as possible till 1 year

## **11. BIPOLAR DISORDER**

### **Why in News?**

A study by researchers in Bengaluru, identifies two specific genes which may be

related to bipolar disorder, a neuropsychiatric disorder.

### **What is Bipolar disorder?**

- Bipolar disorder, also known as manic-depressive illness, is a brain disorder that causes unusual shifts in mood, energy, activity levels, and the ability to carry out day-to-day tasks.
- There are four basic types of bipolar disorder; all of them involve clear changes in mood, energy, and activity levels.
- These moods range from periods of extremely “up,” elated, and energized behavior (known as manic episodes) to very sad, “down,” or hopeless periods (known as depressive episodes).
- Less severe manic periods are known as hypomanic episodes.

## **12. CELLS IN HUMAN BODY**

### **Why in News?**

- Researchers have shown that simple biochemical processes drive single-celled organisms to differentiate and become varied communities of cells having different metabolism.

### What are the types of cells in the human body?

- There are over 200 different cell types in the human body.
- Each type of cells is specialised to carry out a particular function.
- Different tissues then combine and form specific organs.

### What are the most important types of cells?

Stem cells	Embryonic stem cells Adult stem cells
Red blood cells	Erythrocytes
White blood cells	Granulocytes (neutrophils, eosinophils, basophils) Agranulocytes (monocytes, lymphocytes)
Platelets	Fragments of megakaryocytes
Nerve cells	Neurons Neuroglial cells
Muscle cells	Skeletal Cardiac Smooth
Cartilage cells	Chondrocytes
Bone cells	Osteoblasts

	Osteoclasts Osteocytes Lining cells
Skin cells	Keratinocytes Melanocytes Merkel cells Langerhans cells
Endothelial	Lining blood vessels
Epithelial cells	Lining body cavities
Fat cells	White adipocytes Brown adipocytes
Sex cells	Spermatozoa Ova

### 13. ELEPHANT ENDOTHELIOTROPIC HERPESVIRUS

#### Why in News?

Elephant died of suspected Herpes virus infection in Odisha's Nandankanan Zoological Park (NZP)

#### What is Elephant endotheliotropic herpesvirus?

- Elephant endotheliotropic herpesvirus (EEHV) is one of the most devastating viral infectious diseases in elephants worldwide.
- It is a type of herpesvirus.



- To date, it remains unclear how elephants get infected by the virus, where the virus persists, and what mechanisms drive the pathogenesis of the disease.
- It can cause a highly fatal hemorrhagic disease when transmitted to young Asian elephants.
- In African elephants, related forms of these viruses, which have been identified in wild populations, are generally benign, occasionally surfacing to cause small growths or lesions.
- Some types of EEHV can cause a highly fatal disease in Asian elephants.
- Unfortunately, proven healing medicine is not available for this disease.
- The disease can be treated with the rapid application of antiviral drugs, but this has only been effective in around a third of cases.
- For example, milk is often fortified with vitamin D, and calcium may be added to fruit juices.
- An enriched food means that nutrients that were lost during processing are added back in.
- Many refined grains are enriched.
- Wheat flour, for example, may have folic acid, riboflavin, and iron added back in after processing.
- This is intended to restore its original vitamin levels.

#### ***What is the purpose of food fortification?***

- The original purpose of food fortification was to decrease the occurrence of nutrient deficiencies, particularly in populations that lack access to sufficient amounts of essential nutrients.
- Food fortification helps people living in developed countries as well as those in underdeveloped countries, where a variety of foods are not always available.
- Food fortification is a cost effective way to get nutrients to people around the world

## **14. FORTIFIED FOODS**

### ***What's a fortified or enriched food?***

- Fortified foods are those that have nutrients added to them that don't naturally occur in the food.
- These foods are meant to improve nutrition and add health benefits.



## **15. GOVERNMENT HOSPITALS REMOVED FROM NHPM**

### **Why in News?**

- The Indian Medical Association (IMA) said government hospitals should be removed from the ambit of the Centre's ambitious Ayushman Bharat health insurance scheme, as services there are already free of cost.

### **What is Ayushman Bharat?**

- Ayushman Bharat is National Health Protection Scheme, which will cover over 10 crore poor and vulnerable families (approximately 50 crore beneficiaries)
- It provides coverage upto 5 lakh rupees per family per year for secondary and tertiary care hospitalization.
- Ayushman Bharat - NHPM will subsume the on-going centrally sponsored schemes - Rashtriya Swasthya Bima Yojana (RSBY) and the Senior Citizen Health Insurance Scheme (SCHIS).

### **What are the salient features of Ayushman Bharat?**

- Ayushman Bharat - - National Health Protection Mission (NHPM) will have a defined benefit cover of Rs. 5 lakh per family per year.

- Benefits of the scheme are portable across the country
- Beneficiary covered under the scheme will be allowed to take cashless benefits from any public/private empanelled hospitals across the country.
- This is an entitlement based scheme with entitlement decided on the basis of deprivation criteria in the SECC database.
- The beneficiaries can avail benefits in both public and empanelled private facilities.
- One of the core principles of Ayushman Bharat - NHPM is to co-operative federalism and flexibility to states.
- For giving policy directions and fostering coordination between Centre and States, it is proposed to set up Ayushman Bharat NHPM Council (AB-NHPMC) at apex level Chaired by Union Health and Family Welfare Minister.
- States would need to have State Health Agency (SHA) to implement the scheme.
- To ensure that the funds reach SHA on time, the transfer of funds from Central Government through

Ayushman Bharat - NHPM to State Health Agencies may be done through an escrow account directly.

- In partnership with NITI Aayog, a robust, modular, scalable and interoperable IT platform will be made operational which will entail a paperless, cashless transaction.

## 16. MARFAN SYNDROME

### *What is marfan syndrome?*

- Marfan syndrome is a genetic disorder.
- It affects the body's connective tissue.
- Connective tissue holds all the body's cells, organs and tissue together.
- It also plays an important role in helping the body grow and develop properly.
- Connective tissue is made up of proteins.
- The protein that plays a role in Marfan syndrome is called fibrillin-1.
- Marfan syndrome is caused by a defect (or mutation) in the gene that tells the body how to make fibrillin-1.
- This mutation results in an increase in a protein called transforming growth factor beta, or TGF- $\beta$ .
- The increase in TGF- $\beta$  causes problems in connective tissues throughout the body, which in turn

creates the features and medical problems associated with Marfan syndrome and some related conditions.

- There is no cure for Marfan syndrome.
- The treatment focuses on preventing the various complications of the disease.
- To accomplish this, you'll need to be checked regularly for signs that the damage caused by the disease is progressing.

### *What are the main groups of connective tissues?*

- There are three main groups of connective tissues:
  - **Loose connective tissue** holds organs in place and attaches epithelial tissue to other underlying tissues.
  - **Dense connective tissue** helps attach muscles to bones and link bones together at joints.
  - **Specialized connective tissue** encompasses a number of different tissues with specialized cells and unique ground substances. Some are solid and strong, while others are fluid and flexible. Examples include adipose, cartilage, bone, blood, and lymph.

## 17. NATIONAL NUTRITION SURVEY

### Why in News?

The Comprehensive National Nutrition Survey conducted by the Ministry of Health and Family Welfare and UNICEF between February 2016 and October 2018 finds obesity and under nutrition coexists.

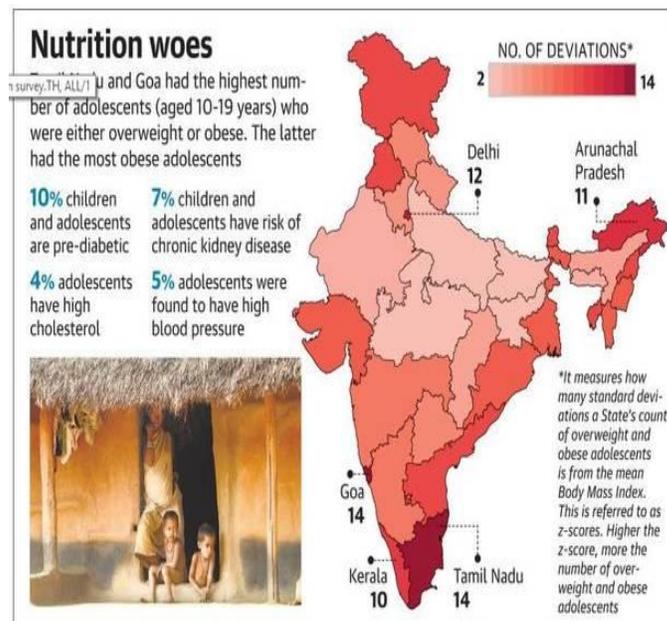
### What are the key findings?

- It is the first-ever national nutrition survey.
- Nearly 10% of children in the age group of 5-9 years and adolescents in the age group of 10-19 years are pre-diabetic.
- 5% are overweight and another 5% suffer from blood pressure.
- A quarter of 5-9 and 10-19 year-olds were thin for their age
- One in five children 5-9 years' old were stunted.

### What NNS measures and collects?

- Malnutrition
- micronutrient deficiencies through biochemical measures such as blood and urine samples
- anthropometric data as well as details of non-communicable diseases such as diabetes, hypertension, cholesterol and

kidney function in children and adolescents.



## 18. TITANIUM IMPLANT FOR BONE CANCER PATIENT

### Why in News?

- 3D printed titanium implant used on bone cancer patient for first time claims surgeon

### What are implants?

- Medical implants are devices or tissues that are placed inside or on the surface of the body
- Many implants are prosthetics, intended to replace missing body parts.
- Other implants deliver medication, monitor body functions, or provide support to organs and tissues.



- Some implants are made from skin, bone or other body tissues.
- Others are made from metal, plastic, ceramic or other materials.
- Implants can be placed permanently or they can be removed once they are no longer needed.

### ***What is the difference between implant and transplant?***

- If a biological substance is used to replace tissues, it will be named as TRANSPLANT.
- If a synthetic substance is used it will be named as IMPLANT.

## **19. TRANSGENIC GENES TRANSFERRED TO NATURALLY OCCURRING MOSQUITOES**

### ***Why in News?***

Contrary to claims made, genes from genetically-modified *Aedes aegypti* mosquito were found to have been transferred to naturally-occurring *A. aegypti* mosquito population

### ***What is Transgenesis?***

- Modern genetic technology can be used to modify the genomes of living organisms.
- This process is also known as “genetic engineering.”

- Genes of one species can be modified, or genes can be transplanted from one species to another.
- Genetic engineering is made possible by recombinant DNA technology.
- Transgenesis is the process of introducing an exogenous gene called a transgene into a living organism.
- As a result the organism will exhibit a new property and transmit that property to its offspring.
- Transgenesis can be facilitated by liposomes, enzymes, plasmid vectors, viral vectors, pronuclear injection, protoplast fusion, and ballistic DNA injection.
- Transgenics describes the process of introducing foreign deoxyribonucleic acid (DNA) into a host organism's genome.
- The foreign DNA, or "transgene," that is transferred to the recipient can be from other individuals of the same species or even from unrelated species.



## INNOVATION

### 20. NATGRID

#### *Why in News?*

The ambitious National Intelligence Grid (NATGRID) project wants to link social media accounts to the huge database of records related to immigration entry and exit, banking and telephone details among others.

#### *What is NATGRID?*

- NATGRID is the integrated intelligence grid which connects databases of core security agencies.
- NATGRID was formed with an aim to collect comprehensive patterns of intelligence.
- It can be readily accessed by intelligence agencies, will link 10 user agencies with certain databases that would be procured from 21 organisations
- The agencies concerned include the Intelligence Bureau, local police, and revenue and customs departments.
- NATGRID's data recovery centre - Bengaluru

#### *Why NATGRID?*

- NATGRID is an ambitious counter terrorism programme.

- It will utilise technologies like Big Data and analytics to study and analyse the huge amounts of data from various intelligence and enforcement agencies to help track suspected terrorists and prevent terrorist attacks.
- A post Mumbai 26/11 attack measure, NATGRID aims to mitigate a vital deficiency — lack of real time information, which was considered to be one of the major hurdles in detecting US terror suspect David Headley's movement across the country during his multiple visits between 2006 and 2009.

### 21. QUANTUM SUPREMACY ACHIEVED

#### *Why in News?*

Google had claimed to have achieved 'quantum supremacy'.

#### *What are quantum computers?*

- Quantum computers work differently from the classical computers we work on today.
- Conventional computers process information in 'bits' or 1s and 0s, following classical physics under which our computers can process a '1' or a '0' at a time.

- Exploiting the principles of quantum mechanics, they can easily tackle computational problems that may be tough for the classical computer as the size of the numbers and number of inputs involved grows bigger.
- Quantum computers do not look like desktops or laptops, Instead they resemble the air-conditioned server rooms.

### What is quantum computing?

- It takes advantage of the strange ability of subatomic particles to exist in more than one state at any time.
- Due to behaviour of the tiniest particles, operations can be done much more quickly and use less energy than classical computers.
- In classical computing, a bit is a single piece of information that can exist in two states – 1 or 0.
- In quantum computing, a qubit (short for “quantum bit”) is a unit of quantum information.

- Qubits have special properties that help them solve complex problems much faster than classical bits.
- One of these properties is superposition.
- That is instead of holding one binary value (“0” or “1”) like a classical bit, a qubit can hold a combination of “0” and “1” simultaneously.
- When multiple qubits interact coherently, they can explore multiple options and process information in a fraction of the time it would take even the fastest non-quantum systems.
- Unlike a usual bit, they can also store much more information than just 1 or 0, because they can exist in any superposition of these value

### How will it help us?

- The speed and capability of classical supercomputers are limited by energy requirements.
- Along with these they also need more physical space.
- Looking for really useful information by processing huge amounts of data quickly is a real-world problem and one that can be tackled faster by quantum computers.

