Sleepy Classes
Free. Regular. Quality.

Science & Technology (PRE-Cure)

June 2019 - March 2020

Visit our website www.sleepyclasses.com or

our YouTube channel for entire GS Course **FREE** of cost

Also Available: Prelims Crash Course || Prelims Test Series

Sleepy Classes
Free. Regular. Quality.

Table of Contents

1. Nipah Virus 1
2. E - Cigarettes 2
3. Sexually Transmitted Infections 3
4. Fixed Dose Combination Drugs 3
5. Astrobee 4
6. Sheath Blight 5
7. National Animal Disease Control Programme 5
8. Janani Suraksha Yojana 6
9. International Pulsar Timing Array 8
10. Gravitational Waves 8
11. 3D X-ray Map of Universe 9
12. Wolbachia 9
13. Sensors to Sniff out Explosives 10
14. Public Health Emergency of International Concern 11
15. 'Dirty Fuel' 11
16. Milky Way 12
17. World Food Programme 13
18. WHO Self-care Guidelines 14
19. Ramanujan Machine 15
20. Internet Saathi 15
21. PM-STIAC 16
22. Public Health Emergency of International Concern 16
23. 'Dirty Fuel' 17
24. Semi-Cryogenic Engine 18
25. Milky Way 18
26. Gaia Space Observatory 18
27. Chief of Defence Staff 19
28. Doctrine of Nuclear No First Use 19
29. SPYDER 20
30. MIRV Technology 20
31. E-Cigarettes 21
32. Class A Poison 22
33. Ranitidine 22
34. Hypertension 23
35. Salmonella 23
36. Bombay Blood Group 24
37. GEMINI 25
38. Pradhan Mantri Innovative Learning Programme (PMILP) - DHRUV 25
39. International Astronomical Union 26
40. Nobel Prize in Chemistry 27
41. African Swine Fever 27
42. Tech Sagar 28
43. CartoSAT-3 Mission/PSLV-C 47 28
44. Golden Rice 28
45. Winter Grade Diesel 29
46. Pink Ball Cricket 29
47. Vigyan Samagam 30
48. Alzheimer's disease 30
49. International Treaty of Plant Genetic Resources for Food and Agriculture (ITPGRFA) 31
50. Tiger Triumph 2019 32
51. World Malaria Report 32
52. Extra Neutral Alcohol (ENA) 33
53. Anaemia In India 33
54. Hysterectomy in India 34
55. PSLV 35
56. Torrefaction 36
57. Chagos Archipelago 36
58. Chandrayaan-3 & Gaganyaan 37
59. 2nd Launch Port for ISRO 37
60. Be Healthy Be Mobile (BHBM) Initiative 38
61. Cessation Programme–Quit Tobacco for Life 38
62. Extraocular Vision 39
63. Indian Data Relay Satellite System 40
64. GOCO Model 40
65. H9N2 Virus 41
66. Oldest Material on Earth 41
67. Hydrochlorofluorocarbon (HCFC) - 141 b 42
68. Vyommitra 42

69. Thirty Metre Telescope 42
70. Air Defence Tactical Control Radar (ADTCR) 43
71. Mesothelioma 44
72. Project NETRA 44
73. Blue Dot Network 45
74. Classical Swine Fever 45
75. Vikram Sarabhai Centenary Programme 46
76. INS Karanj 47
77. Solar Orbiter (Solo) 47
78. Integrated Air Defense Weapon System 48
79. Dark Fibre 48
80. Import of Li–ion Batteries 48
81. India's First Space Science Museum.....49
82. SUTRA PIC 49
83. NASA InSight.....50
84. Habitable-zone Planet Finder (HPF).....51
85. Global Health Security Index 51
86. Pradhan Mantri Bhartiya Janaushadhi Pariyojana 52
87. Flow Diverter Stents Technology 53
88. Milan Exercise 54
89. Bi-luminescent Security Ink.....54
90. National Supercomputing Mission 54
91. Terminology in Diseases 55
92. KIRAN Scheme.....55
93. India as an observer at Indian Ocean Commission (IOC) 55
94. Covid -19.....55
95. Ventilator.....56
96. Serological Test 57

1. Nipah Virus

Context

- In 2018, Kerala witnessed its first outbreak of the
- Nipah virus Nipah is a zoonotic disease
  - ✓A disease transmitted from animals to humans
  - ✓Virus belongs to a new genus termed Henipavirus

About the Virus

- It is a fragile virus
- It may survive in the environment for several hours up to a couple of days outside of bats

Transmission

- From Humans: Humans are infected after direct contact with infected bats, pigs or from other Nipah virus-infected persons
  - ✓Fruit bats, also known as flying foxes, are natural reservoir hosts of Nipah and Hendra viruses
- From Animals: Virus is present in bat urine, and potentially in bat faeces, saliva and birthing fluids
- Contaminated Food: Fruits contaminated with bat secretions may potentially transmit infection

Symptoms

- Similar to that of influenza: fever, muscle pain and respiratory problems
  - ✓Influenza-like illness with symptoms of pneumonia with fever, cough, sore throat, headache and tiredness
- Inflammation of the brain can also cause disorientation
- Late onset of Encephalitis can also occur
- Sometimes a person can have an asymptomatic infection, and be a carrier of Nipah and not show any symptoms
- It presents itself in humans in the form of Acute Encephalitis Syndrome (AES), with symptoms of headache, high fever, drowsiness that progresses to convulsions and/or coma and death After exposure and an incubation period of 5 to 14 days, the illness presents with 3 to 14 days of fever and headache, followed by drowsiness, disorientation and mental confusion
- Can progress to coma within 24 to 48 hours
- 50% patients show severe neurological/pulmonary signs

Prevention

- Fruits bitten by bats or birds should not be eaten
- Fruits and vegetables should be thoroughly washed before eating
- Avoid exposure to sick pigs

- Hand hygiene, personal protective equipment practices should be followed
- Seeking clinical care is essential for early detection and better care

Treatment

- There is no preventive treatment
- Symptomatic and supportive care is the mainstay of treatment

2. E - Cigarettes

- An electronic cigarette or Electronic Nicotine Delivery System (ENDS) is a battery- operated device that emits doses of vaporized nicotine, or non-nicotine solutions, for the user to inhale
- It aims to provide a similar sensation to inhaling tobacco smoke, without the smoke (i.e., without burning tobacco)
- Because they heat a liquid to generate a nicotine-containing aerosol, instead of burning tobacco, they do not produce toxic tars
- They are marketed as a way to stop or cut down on smoking
- They first appeared in Chinese market in 2004 and were subsequently taken up by millions around the world

In India

- Delhi High Court, on a hearing in a PIL, was planning to ban ecigarettes sale
- Karnataka and Maharashtra has already banned the same
- ICMR has recommended complete prohibition on ENDS or ecigarettes in India in the greater interest of protecting public health

Concerns

- While it may help existing smokers to give up, there is concern that young people are starting to vape for its own sake, and not to replace tobacco use
- At high temperatures, e-cigarettes produce carcinogens such as formaldehyde, although these are fewer in number compared to regular cigarettes. They also increase the odds of lung disease and myocardial infarction, but to a lesser extent than normal cigarettes do
- E-cigarette use adversely affects the cardiovascular system, impairs respiratory immune cell function and airways in a way similar to cigarette smoking and is responsible for severe respiratory disease. It also poses risk to foetus, infant, and child brain development
- E-cigarette vaping does more harm than good. A new study highlights that it hampers the cleaning of mucus from the airways
- The study also stated that a single session of vaping can deliver more nicotine to the airways than smoking one cigarette
- Mucociliary dysfunction: Exposing It is a feature of many lung diseases, including asthma, chronic obstructive pulmonary disease (COPD) and cystic fibrosis

3. Sexually Transmitted Infections

- Every day, more than 1 million new cases of curable sexually transmitted infections (STIs) are detected in people aged 15-49 years, according to latest data released by the World Health Organisation (WHO)
  - ✓This amounts to more than 376 million new cases annually of four infections — chlamydia, gonorrhoea, trichomoniasis and syphilis
  - ✓On average, approximately 1 in 25 people globally have at least one of these STIs
  - ✓WHO says they are seeing a concerning lack of progress in stopping the spread of sexually transmitted infections (STI) worldwide
- WHO finds that there remains a persistent and endemic health threat worldwide and since the last study in 2012 there has been no substantive decline in either the rates of new or existing infections

Recommendations

- Timely and affordable testing and treatment are crucial for reducing the burden of STIs globally, alongside efforts to encourage people who are sexually active to get screened for STIs
- Pregnant women should be systematically screened for syphilis as well as HIV
- All bacterial STIs can be treated and cured with widely available medication. However, recent shortages in the global supply of benzathine penicillin has made it more difficult to treat syphilis.

Impact

- STIs have a profound impact on the health of adults and children worldwide. If untreated, they can lead to serious and chronic health effects that include neurological and cardiovascular disease, infertility, ectopic pregnancy, stillbirths, and increased risk of HIV
  - ✓Syphilis alone caused an estimated 2,00,000 stillbirths and newborn deaths in 2016, making it one of the leading causes of infant mortality globally
- They are also associated with significant levels of stigma and domestic violence

4. Fixed Dose Combination Drugs

What are FDCs?

- It is a cocktail drug, meaning it has two or more therapeutic ingredients in a single dose
- Many of the popular cough syrups, painkillers, topical medications, antidiabetes drugs as well as antibiotics in the market today are FDCs brands
- Domestic pharmaceutical market size is pegged at around Rs 1.18-1.2 lakh crore, and FDCs reportedly make up nearly 50% of the sales

Why Government banned FDCs?

- Government is convinced that a large part of the products sold as FDCs are —irrational and lack therapeutic justification, besides risking the health of patients

- Move is also to check the misuse of such medicines in India, which has the highest market share of FDCs over single drugs

Are all FDCs dangerous?

- A government document titles 'Policy Guidelines for Approval of Fixed Dose Combinations in India', released in June 2013 had claimed that "FDCs have shown to be particularly useful in the treatment of infectious diseases like HIV, malaria and tuberculosis where giving multiple antimicrobial agents is the norm. FDCs are also of use in chronic conditions especially when multiple disorders often co-exist."
- Not all are unsafe. Some are crucial to treat chronic illnesses like diabetes and HIV
- At the same time, there are many marketed with licenses approved only by state regulatory agencies instead of the DCGI. These FDCs could be irrational and unsafe for patients
- Some doctors are also of the view that rampant use of FDCs has allowed antibiotic resistance to assume threatening proportions in India
- FDCs are accepted in international markets like the US and the EU
  - ✓ However, the applicant has to prove the therapeutic advantages of those combinations, based on long-term clinical studies

5. Astrobee

- It is a free-flying robot system that will help researchers test new technologies in zero gravity and perform routine work alongside astronauts aboard the International Space Station (ISS)
  - ✓ They can move in any direction and turn on any axis in space
  - ✓ Astrobee system consists of three cubed-shaped robots, software and a docking station used for recharging
  - ✓ The robots use electric fans as a propulsion system that allows them to fly freely through the microgravity environment of the station
- Bumble became the first Astrobee robot to fly under its own power in space
- After Bumble and a second Astrobee, 'Honey,' launched to the space station, a third robot named 'Queen' is also scheduled in coming months
- Working autonomously or via remote control by astronauts, flight controllers or researchers on the ground, these robots are designed to complete tasks such as taking inventory, documenting experiments conducted by astronauts with their built-in cameras or working together to move cargo throughout the station
- In addition, the system serves as a research platform that can be outfitted and programmed to carry out experiments in microgravity - helping us to learn more about how robotics can benefit astronauts in space
- It builds on the legacy and lessons learned from the SPHERES (Synchronised Position Hold, Engage, Reorient, Experimental Satellite) robots, which have been aboard

6. Sheath Blight

- It is a fungal disease caused by Rhizoctonia solani
- Infected leaves senesce or dry out and die more rapidly, young tillers can also be destroyed
  - ✓As a result, the leaf area of the canopy can significantly be reduced by the disease. This reduction in leaf area, along with the diseased-induced senescence of leaves and young infected tillers are the primary causes of yield reduction
- It occurs in areas with high temperature (28-32°C), high levels of nitrogen fertiliser and relative humidity of crop canopy from 85-100%
- Plants are more vulnerable to sheath blight during the rainy season
- High seeding rate or close plant spacing, dense canopy, disease in the soil, sclerotia or infection bodies floating on the water, and growing of high yielding improved varieties also favour disease development
- Sheath blight is considered to be an important disease next to rice blast
  - ✓Rice sheath blight is an increasing concern for rice production especially in intensified production systems
- There is currently no resistant rice variety available for cultivation. The main management options available to minimize sheath blight include:
  - ✓use a reasonable level of fertilizer adapted to the cropping season
  - ✓use reasoned density of crop establishment (direct seeding or transplanting)
  - ✓carefully control of weeds, especially on the levees
  - ✓drain rice fields relatively early in the cropping season to reduce sheath blight epidemics
  - ✓use fungicide to treat seeds
  - ✓improve canopy architecture by reducing seeding rate or providing wider plant spacing

7. National Animal Disease Control Programme

- It is a new Central Sector Scheme for Foot and Mouth Disease (FMD) and Brucellosis

Foot and Mouth Disease (FMD) control programme

- ✓The programme envisages 100% vaccination coverage of cattle, buffaloes, sheep, goats and pigs at six month interval in the entire country
- ✓Animals will be identified using unique animal identification ear tags
- ✓It also includes de-worming of targeted population of livestock twice a year
- ✓Foot and Mouth disease is an infectious and sometimes fatal viral disease that affects clovenhoofed animals, including domestic and wild bovids

✤The virus causes a high fever for between two and six days, followed by blisters inside the mouth and on the feet that may rupture and cause lameness

Brucellosis Control Programme:

- It envisages 100% vaccination coverage of female cattle and buffalo calves (4-8 months of age) once in a life time
- Brucellosis is also known as Malta fever, Mediterranean fever, a bacterial infection, is a highly contagious zoonosis caused by ingestion of unpasteurised milk or undercooked meat from infected animals, or close contact with their secretions

✓It induces inconstant fevers, miscarriage, sweating, weakness, anaemia, depression and muscular and bodily pain

8. Janani Suraksha Yojana

- It is a safe motherhood intervention under the National Health Mission (NHM), launched with the objective of reducing maternal and neonatal mortality.
- It promotes institutional delivery among pregnant women especially with weak socio-economic status i.e. women from Scheduled Castes, Scheduled Tribes and BPL households
- The scheme focuses on the poor pregnant woman with special dispensation for States having low institutional delivery rates namely the States of Uttar Pradesh, Uttaranchal, Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Assam, Rajasthan, Orissa and Jammu and Kashmir.

✓While these States have been named as Low Performing States (LPS), the remaining States have been named as High performing States (HPS)

- The exclusion criteria has been removed and eligible mothers are entitled to JSY benefit regardless of any age and any number of children
- BPL pregnant women, who prefer to deliver at home, are entitled to a cash assistance of Rs 500 per delivery regardless of age of women and the number of children
- It enables the States/UTs to hire the services of a private specialist to conduct Caesarean section or for the management of Obstetric complications, in the Public Health facilities, where Government specialists are not in place
- States are encouraged to accredit private health facilities for increasing the choice of delivery care institutions
- Acute Encephalopathy Syndrome (AES)
- It is a serious public health problem in India characterised as acute-onset of fever and a change in mental status (mental confusion, disorientation, delirium, or coma) and/or new-onset of seizures in a person of any age at any time of the year
- It most commonly affects children and young adults and can lead to considerate morbidity and mortality

Causes

- Viruses are the main causative agents, although other sources such as bacteria, fungus, parasites, spirochetes, chemicals, toxins and noninfectious agents have also been reported over the past
  - ✓Herpes simplex virus, Influenza A virus, West Nile virus, measles, dengue etc. are other causes of AES in sporadic and outbreak form in India
- Japanese encephalitis virus (JEV) is the major cause of AES in India
  - ✓AES due to JEV was clinically diagnosed in India for the first time in 1955 in Madras
  - ✓In India during 2018, 15% of cases of AES were found positive for infection due to JEV
- Some are the zoonotic disease, that transmitted from animals to humans via mosquitoes (e.g. Japanese encephalitis virus, and West Nile virus) or ticks, (Tick-borne encephalitis virus), while for other flaviviruses humans are the natural hosts
- Nipah virus, Zika virus are also found as causative agents for AES
- AES cases were reported mainly from Assam, Bihar, Jharkhand, Karnataka, Manipur, Meghalaya, Tripura, Tamil Nadu, Uttar Pradesh
- The AES cases in Muzaffarpur, Bihar and adjoining litchi producing districts have been observed mostly during April to June particularly in children who are undernourished with a history of visiting litchi orchards. In 2014, a relationship between consumption of litchi and AES was postulated by National Centre for Disease Control, Delhi (along with Centre for Disease Control US) in acute encephalitis in children, in Muzaffarpur

Diagnosis

- National Vector Borne Disease Control Programme in India has set up country wide surveillance for AES through sentinel sites with a focus on detecting Japanese encephalitis (JEV). In the sentinel surveillance network, AES/JE is diagnosed by IgM Capture ELISA, and virus isolation is done in National Reference Laboratory.

Management

- Management is essentially symptomatic
- The disease affects the Central Nervous System and can cause severe complications, seizures and even deaths.

Analysis Of Current Situation In Bihar

- A Lancet study brings out three unacceptable factors
  - ✓Continued lack of clarity on the direct and distal causal factors that should and could have been addressed on priority, enabling the formulation and enforcement of protocols for prevention and treatment
    - ✤This is saddening since within a space fo 5 years, there has been at least four outbreaks of child deaths in Bihar and UP — 2014, 2016, 2017 and 2019

✓Poverty-associated hunger and dietary practices: The children who died were all from poor families whose poverty status was multidimensional — unclean habitation, poor housing, overcrowding, hunger and illiteracy

✤Eating unripe, rotten litchis, from the ground and partially consumed ones, followed by no meal and not eating litchis per se, is the cause

✓Collapse of primary healthcare system: Healthcare in general and primary care in particular has been severely neglected in the past. Even as the agenda of revitalising a moribund primary healthcare system is unfinished, policy attention shifted to non-communicable disease control and hospital insurance. Preventive measures and simple treatments like providing glucose correction can be done in PHCs and community centres at the block level

9. International Pulsar Timing Array

- Pune-based National Centre for Radio Astrophysics (NCRA) hosted the five-day annual International Pulsar Timing Array (IPTA) meet in June

✓The meet is a collaboration of radio astronomers from a dozen countries across the globe

- Upgrade of the Giant Metrewave Radio Telescope (GMRT) in Pune and the Ooty Radio Telescope (ORT) has helped India meet the parameters for being a full member of the IPTA
- IPTA is a collaboration of radio astronomers from a dozen countries across the globe. It uses more than 12 radio telescopes all over the world with an aim to detect ultra-low frequency gravitational waves (nano-hertz gravitational waves)
- India has been an associate member (not a permanent member) of the IPTA since the last four years. But this is the first time that we will be hosting the annual meeting.

10. Gravitational Waves

- Gravitational waves are disturbances in the space-time metric and are caused by the motion of mass in the universe

✓They are a consequence of Einstein's theory of General Relativity, with their existence demonstrated through timing observations of double neutron star binaries

✓Gravitation waves are like waves with a ripple effect just like the ripple effect we see when a pebble is dropped in a still pond. Instead of the up and down motion, the G waves are like sound waves; they expand and compress

✓These waves affect radio pulses from 10 km size stars called radio pulsars by changing ever so slightly the period of radio pulsation of these stars

✓The first gravitational waves detected by LIGO was a high frequency wave, while what IPTA is trying to detect has a frequency of about a billionth of a second

- It is a set of pulsars which is analysed to search for correlated signatures in the pulse arrival times
- There are many applications for pulsar timing arrays. The most well known is to use an array of millisecond pulsars to detect and analyse gravitational waves

- Pulsar is a highly magnetised rotating celestial object of very high mass that emits a beam of electromagnetic radiation

  ✓The radiation can be seen when it points towards the earth as pulses of emissions, which appear with clockwise precision

  ✓Hence they are the best celestial clocks

- If there is a gravitation wave passing past the pulsar, there will be a blip or difference in the otherwise disciplined pulsars. By studying this variation over a period of time, we can determine a pattern in it.

11. 3D X-ray Map of Universe

- A joint team of German-Russian scientists launched a space telescope named Spectrum-Roentgen Gamma (SRG), which will create a three-dimensional (3D) X-ray map of the universe and unveil unknown supermassive black holes, dark energy and stars.
- The four-year mission will survey the entire sky eight times and track the evolution of the universe and dark energy — a mysterious repulsive force — that is accelerating its expansion.
- It also aims to detect up to three million supermassive black holes — many of which are unknown — and X-rays from as many as 700,000 stars in the Milky Way. The telescope is the first to be sensitive to highenergy 'hard' X-rays and map the entire sky.
- SRG will carry two independent X-ray telescopes:

  ✓German-built eROSITA (Extended Roentgen Survey with an Imaging Telescope Array)

  ✓Russian-built ART-XC (Astronomical Roentgen Telescope — X-ray Concentrator)

- The SRG will also find how dark matter — the main engine of galaxy formation — is spread in the universe

  ✓It will, however, not detect gamma radiation

- X-ray sky surveys have also been conducted by previous missions, but they were not able to map the entire sky
- While Germany's ROSAT mission in the 1990s was sensitive only to 'soft' X-rays, with energies of about 2 keV, existing missions, such as NASA's Chandra X-ray Observatory and NuSTAR, can see high-energy radiation and resolve tiny details of cosmic structures. But, they see only small parts of the sky
- SRG was first proposed in 1987, but due to numerous developments like collapse of Soviet Union, end of NASA's space-shuttle programme, delayed it.

12. Wolbachia

Context

- One of the novel ways being experimented to control dengue and chikungunya is to release mosquitoes infected with a bacteria, Wolbachia, which prevents replication of disease-causing virus in the guts of mosquitoes

✓Now, Indian scientists have found that a strain of wolbachia naturally occurs in mosquito species, Ae. Aegypti, in South India

Details

- Wolbachia is shown to hinder the replication and dissemination of pathogens in mosquito besides, inducing reproductive abnormalities

  ✓Therefore, researchers have been artificially infecting mosquitoes with wolbachia and exploring if such mosquitoes may be released to for controlling dengue

- Though, the prevalence of wolbachia in Culex mosquito was detected in 1924, the wolbachia infection of Anopheles mosquitoes was detected only in 2014

- Certain strains of wolbachia have proven efficient to interfere with mosquitoes' biology thereby reducing virus transmission

  ✓It is also safe to humans

- Scientists have been trying to trans infect this bacterium into mosquito eggs artificially and release them. Mostly, the bacteria get expelled from the mosquitoes in subsequent generations, unless the infection happens in a natural way. So finding the natural occurrence of wolbachia strains in these mosquitoes is important

- Wolbachiaint errupts viral replication in mosquitoes. This results in low viral concentration within mosquitoes, making them incapable of transmitting the disease

13. Sensors to Sniff out Explosives

Context

- A group of Indian scientists has now developed a new polymer-based fluorescent optical sensor, which is a highly sensitive, selective and economically viable explosive detector.

Details

- The polymer material was synthesised using the Reversible Addition-Fragmentation Chain-Transfer (RAFT) copolymerisation technique. The material — alanyl-based fluorescent dansyl tagged copolymer (DCP) — exhibits yellow-green fluorescence under ultra violet light and works on 'quenching' of the emission.

  ✓Quenching is a property wherein the usually electron-rich fluorescent material transfers electrons — by photo-induced-electron-transfer — to an electron acceptor like the nitroaromatics. When exposed to explosives, the copolymer loses its fluorescent light intensity, indicating the presence of nitroaromatics

- Nitroaromatics are industrial-class chemicals used widely in making dyes, pesticides and polymers

  ✓They also form the primary compounds of explosives like Trinitrotoluene (TNT), which are hazardous chemicals, hard to detect, and pose civilian as well as military safety threat

- It exhibits high sensitivity and selectivity towards nitroaromatic explosives like DNT, TNT and TNP in solution,even at extremely low concentrations. It is also effective in detecting the saturated vapours of these explosives

- Conventional methods used to detect explosives involve employing sniffer dogs or sophisticated instruments, which are neither economical nor readily translated for field use

14. Public Health Emergency of International Concern

- WHO has declared the Ebola virus disease (EVD) outbreak in Democratic Republic of the Congo a Public Health Emergency of International Concern (PHEIC)
- Some serious public health events that endanger international public health may be determined under the Regulations to be public health emergencies of international concern (PHEIC)
- It is defined as "an extraordinary event which is determined
  - ✓to constitute a public health risk to other States through the international spread of disease
  - ✓to potentially require a coordinated international response"
- The definition implies a situation that is serious, unusual or unexpected, carries implications for public health beyond the affected State's natural border and may require immediate international action
- The responsibility of determining whether an event is within this category lies with the WHO DirectorGeneral and requires the convening of a committee of experts
- Under the 2005 International Health Regulations (IHR), States have a legal duty to respond promptly to a PHEIC
- Between 2009 and 2019, there have been five PHEIC declarations
  - ✓2009 H1N1 (or swine flu)
  - ✓2014 polio declaration
  - ✓2014 outbreak of Ebola in Western Africa
  - ✓2015-16 Zika virus epidemic
  - ✓2018-19 Kivu Ebola epidemic
- The recommendations are temporary and require three-monthly reviews
- SARS, smallpox, wild type poliomyelitis and any new subtype of human influenza are always a PHEIC
- It is not confined to infectious diseases and may cover an emergency caused by a chemical agent or a radio nuclear material

15. 'Dirty Fuel'

- The fuel that powers the core of the GSLV Mk-III, the rocket that was used in Chandrayaan-2 mission has two chemicals at play — UDMH (Unsymmetrical Di-Methyl Hydrazine), which is the fuel and Nitrogen tetroxide, the oxidiser
- This is called a "dirty combination"
  - ✓UDMH is highly toxic and corrosive it if comes into contact with the oxidiser and may result in explosion

- Elsewhere in the world, space programmes have moves to cleaner and greener fuel — liquid methane or kerosene
- ISRO is reluctant to shift because shifting to liquid methane would mean bringing in another cryogenic engine because any liquefied gas would need to be kept in extremely low temperatures to stay liquefied
- ISRO is working on the semi-cryogenic engine that uses kerosene as the fuel (it can be kept at room temperature) and liquid oxygen as the oxidizer
- But ISRO is stuck with the dirty fuel due to legacy issues — PSLV and GSLV worked fine using the dirty fuel

Semi-Cryogenic Engine

- The fuel is at normal temperatures and only the oxidiser (liquid oxygen) has to be kept extremely cold
- In full cryo, both the fuel and the oxidiser need to be ultra cold
  - ✓GSLV MK III's cryogenic engine has liquid hydrogen (fuel) at -250 degrees C and liquid oxygen at -150 degrees C
- A new engine essentially means a different rocket. Straight-jacketed with a tight schedule of launches, ISRO, with its limited bandwidth, has little headroom to try out a new rocket

16. Milky Way

- The Milky Way, home to our sun and billions of other stars, merged with another smaller galaxy in a colossal cosmic collision roughly 10 billion years ago, scientists said based on data from the Gaia space observatory
- The union of the Milky Way and the so-called dwarf galaxy Gaia-Enceladus increased our galaxy's mass by about a quarter and triggered a period of accelerated star formation lasting about 2 to 4 billion years
- Galaxies of all types, including the Milky Way, began to form relatively soon after the Big Bang explosion that marked the beginning of the universe some 13.8 billion years ago, but were generally smaller than those seen today and were forming stars at a rapid rate. Subsequent galactic mergers were instrumental in configuring galaxies existing now
- High-precision measurements of the position, brightness and distance of around a million stars within 6,500 light years of the sun, obtained by the Gaia space telescope, helped pinpoint stars present before the merger and those that formed afterward
- Certain stars with higher content of elements other than hydrogen or helium arose in the Milky Way, they found, and others with lower such content originated in Gaia-Enceladus, owing to its smaller mass. While the merger was dramatic and helped shape the Milky Way, it was not a star-destroying calamity

Gaia Space Observatory

- European Space Agency's (ESA) Gaia telescope, launched in 2013, is an ambitious mission to chart a three-dimensional map of our Galaxy, the Milky Way, in the process revealing the composition, formation and evolution of the Galaxy
- Gaia will provide unprecedented positional and radial velocity measurements with the accuracies needed to produce a stereoscopic and kinematic census of about one billion stars in our Galaxy and throughout the Local Group. This amounts to about 1 per cent of the Galactic stellar population

Relevance

- With its all-sky survey of the position, brightness and motion of over one billion stars in our Milky Way galaxy, Gaia will provide a large dataset to search for exoplanets
- It will also map thousands of Solar System objects, primarily main belt asteroids circling the Sun between the orbits of Mars and Jupiter
- Gaia measures the position and motion of stars using a technique known as parallax, which involves looking at an object from different perspectives. From its position in space, Gaia is able to avoid atmospheric distortion when making its observations, and provide more precise estimates of stellar sizes. Ultimately, this helps in estimating the sizes of planets orbiting distant stars
- It will also detect killer asteroids on a potentially fatal collision course with our planet

17. World Food Programme

- The Food and Nutrition Security Analysis of India, 2019, a report by the Government of India and UN World Food Programme, says that by 2022, 31.4% of Indian children—or nearly one in three—will exhibit stunting
- Findings of the report, a base line analysis in assessing India's progress in meeting the second Sustainable Development Goal (tackling hunger), mean that the efforts under the National Nutrition Mission (NNM) that aims to contain prevalence of stunting in children to 25% must be significantly stepped up
- Poverty trap: a malnourished mother gives birth to a weak and a stunted child, and thus malnutrition is passed on from one generation to another. Given how under-nutrition affects a child's cognitive growth, resulting in the child getting left behind, the poverty cycle is also continued
- There is also disparate effect of stunting across Indian states—Bihar and UP have one in two children stunted, whereas Kerala and Goa have one in five children stunted
- Communities such as SCs and STs (42.5% and 43.6%, respectively) are also at a bigger disadvantage compared to other communities
- Only 16% of the total funds allocated to the Poshan Abhiyan (NNM)
- NNM aims to reduce stunting (a measure of malnutrition that is defined as height that is significantly below the norm for age) by 2% a year, bringing down the proportion of stunted children in the population to 25% by 2022

- Despite India becoming self-sufficient in foodgrain production with a large increase in the production of rice, wheat and other cereals, the per capita availability of these grain has not increased at the same level due to inequality, population growth, food wastage and losses
- The report said India should reduce stunting by at least 2% annually to reach the target of 25% by 2022 set under the National Nutrition Mission. Goa and Kerala already achieved the target during the 2015-'16 National Family Health Survey. Daman and Diu, Andaman and Nicobar Islands, Puducherry and Tripura have also reached the target, while Punjab (25.7%) is close to achieving it
- The prevalence of stunting in children under five years of age is the highest in Bihar (48%), Uttar Pradesh (46%), Jharkhand (45%), and Meghalaya (44%). Jharkhand also has the highest prevalence of children who are underweight (48%) and are wasting (29%).

18. WHO Self-care Guidelines

- It is the ability of individuals, families and communities to promote health, prevent disease, maintain health and cope with illness and disability with or without the support of a health-care provider. Selfcare interventions represent a significant push towards new and greater self-efficacy, autonomy and engagement in health for self-carers and caregivers
- WHO noted that self-care is also a means for people who are negatively affected by gender, political, cultural and power dynamics, including those who are forcibly displaced, to have access to sexual and reproductive health services, as many people are unable to make decisions around sexuality and reproduction
- World Health Organisation (WHO) has launched its first guidelines on self-care interventions for health in response to an estimate that by 2035 the world will face a shortage of nearly 13 million healthcare workers and the fact that currently at least 400 million people worldwide lack access to the most essential health services
- In its report WHO says, "We foresee a future where around 1 in 5 of the world's population will be living in settings that are experiencing humanitarian crises, this when the world is witnessing growth in new diagnostics, devices, drugs and digital innovations which are transforming how people interact with the health sector"
- The guidelines focus on sexual and reproductive health and rights. Some of the interventions include self-sampling for human papillomavirus (HPV) and sexually transmitted infections, self-injectable contraceptives, home-based ovulation predictor kits, human immunodeficiency virus (HIV) self testing and self-management of medical abortion
- They look at the scientific evidence for health benefits of certain interventions that can be done outside the conventional sector
- They do not replace high-quality health services nor are they a shortcut to achieving universal health coverage
- The guidelines will be expanded to include other self-care interventions, including for prevention and treatment of non-communicable diseases

19. Ramanujan Machine

Why in News

- Scientists from Israel Institute of Technology have developed a concept they have named the Ramanujan Machine, after the Indian mathematician. It is not really a machine but an algorithm, and performs a very unconventional function
- The purpose of the machine is to come up with conjectures (in the form of mathematical formulas) that humans can analyze, and hopefully prove to be true mathematically. The team that created the machine is hoping that their idea will inspire future generations of mathematicians— to that end, they note that any new algorithms, proofs or conjectures developed by a participant will be named after them. The researchers note that their machine has already discovered dozens of new conjectures
- With most computer programs, humans input a problem and expect the algorithm to work out a solution. With the Ramanujan Machine, it works the other way round. Feed in a constant, say the well-know pi, and the algorithm will come up with a equation involving an infinite series whose value, it will propose, is exactly pi
- He shook the world with his unorthodox mathematics—instead of pounding away at math proofs, he obtained results to famous problems through intuition and then let others find the proofs for them

  ✓Because of this he was described as a conjecture machine
- The Ramanujan machine is more of a concept than an actual machine—it exists as a network of computers running algorithms dedicated to finding conjectures about fundamental constants in the form of continued fractions (these are defined as fractions of infinite length where the denominator is a certain quantity plus a fraction, where a latter fraction has a similar denominator, etc.)
- Conjectures are mathematical statements which are proposed as true statements. In the other words, they are mathematical statements that are, as yet, unproven

About Ramanujan

- Ramanujan was born in 1887 in a village some 400 km from Chennai
- Though he had almost no formal training in pure mathematics, he made substantial contributions to mathematics analysis, number theory, infinite series and continued fractions
- English mathematician G.H. Hardy at the University of Cambridge, England, invited him to England

20. Internet Saathi

- Google India and Tata Trusts initiative aims to facilitate digital literacy among women in rural India and bridge their online gender divide
- Launched in July 2015, the Internet Saathi programme has so far, trained 70000 'Internet Saathis', who have in turn impacted 2.6 crore million women in the country

  ✓Programme now reaches 2.6 lakh villages across 20 states (Punjab and Odisha, recently included)
- Internet Saathi has contributed towards bridging the digital gender divide in rural India — female to male ratio was 1 in 10 in 2015 and in 2018, it has increased to 4 in 10

- Some of the women trained under the programme have started their own micro-business like stitching, honeybee farming and beauty parlours

21. PM-STIAC

- Prime Minister's Science, Technology and Innovation Advisory Council (PM-STIAC) is an overarching body that assesses specific science and technology domains in India and formulates interventions and roadmaps
- It advises the India's Prime Minister on all matters of science, technology and innovation
- It monitors the implementation of PM's vision for the nation
  - ✓Speaking at the recent the 106th Indian Science Congress, Prime Minister Narendra Modi said 'Science is universal, but tech must be local' and coined the phrase 'Jai Anusandhan' , emphasising the importance of research and innovation
- PSA's Office also oversees the implementation of such interventions by concerned S&T Departments and Agencies and other government Ministries. The other important terms of reference of the Council is to formulate, converge, collaborate, co-ordinate and implement multistakeholder policy initiatives, mechanisms, reforms and programmes aimed at:
  - ✓Synergizing S&T covering fundamental to applied research in collaboration with multiple stake holders both in central and state governments
  - ✓Enabling future preparedness in emerging domains of science and technology
  - ✓Formulating and coordinating major inter-ministerial S&T missions
  - ✓Providing an enabling ecosystem for technology led innovations and techno-entrepreneurship
  - ✓Driving innovation and technology delivery towards solving socio-economic challenges for sustainable growth
  - ✓Fostering effective public-private linkages for driving research and innovation
  - ✓Developing innovation clusters with multiple stakeholders including academia, industry and government
  - ✓Skilling in current and futuristic technologies

22. Public Health Emergency of International Concern

- WHO has declared the Ebola virus disease (EVD) outbreak in Democratic Republic of the Congo a Public Health Emergency of International Concern (PHEIC)
- Some serious public health events that endanger international public health may be determined under the Regulations to be public health emergencies of international concern (PHEIC)
- It is defined as "an extraordinary event which is determined
  - ✓to constitute a public health risk to other States through the international spread of disease
  - ✓to potentially require a coordinated international response"

- The definition implies a situation that is serious, unusual or unexpected, carries implications for public health beyond the affected State's natural border and may require immediate international action
- The responsibility of determining whether an event is within this category lies with the WHO Director General and requires the convening of a committee of experts
- Under the 2005 International Health Regulations (IHR), States have a legal duty to respond promptly to a PHEIC
- Between 2009 and 2019, there have been five PHEIC declarations
  - ✓2009 H1N1 (or swine flu)
  - ✓2014 polio declaration
  - ✓2014 outbreak of Ebola in Western Africa
  - ✓2015-16 Zika virus epidemic
  - ✓2018-19 Kivu Ebola epidemic
- The recommendations are temporary and require three-monthly reviews
- SARS, smallpox, wild type poliomyelitis and any new subtype of human influenza are always a PHEIC
- It is not confined to infectious diseases and may cover an emergency caused by a chemical agent or a radio nuclear material

23. 'Dirty Fuel'

- The fuel that powers the core of the GSLV Mk-III, the rocket that was used in Chandrayaan-2 mission has two chemicals at play — UDMH (Unsymmetrical Di-Methyl Hydrazine), which is the fuel and Nitrogen tetroxide, the oxidiser
- This is called a "dirty combination"
  - ✓UDMH is highly toxic and corrosive it if comes into contact with the oxidiser and may result in explosion
- Elsewhere in the world, space programmes have moves to cleaner and greener fuel — liquid methane or kerosene
- ISRO is reluctant to shift because shifting to liquid methane would mean bringing in another cryogenic engine because any liquefied gas would need to be kept in extremely low temperatures to stay liquefied
- ISRO is working on the semi-cryogenic engine that uses kerosene as the fuel (it can be kept at room temperature) and liquid oxygen as the oxidizer
- But ISRO is stuck with the dirty fuel due to legacy issues — PSLV and GSLV worked fine using the dirty fuel

24. Semi-Cryogenic Engine

- The fuel is at normal temperatures and only the oxidiser (liquid oxygen) has to be kept extremely cold
- In full cryo, both the fuel and the oxidiser need to be ultra cold
- GSLV MK III's cryogenic engine has liquid hydrogen (fuel) at -250 degrees C and liquid oxygen at -150 degrees C
- A new engine essentially means a different rocket. Straight-jacketed with a tight schedule of launches, ISRO, with its limited bandwidth, has little headroom to try out a new rocket

25. Milky Way

- The Milky Way, home to our sun and billions of other stars, merged with another smaller galaxy in a colossal cosmic collision roughly 10 billion years ago, scientists said based on data from the Gaia space observatory
- The union of the Milky Way and the so-called dwarf galaxy Gaia-Enceladus increased our galaxy's mass by about a quarter and triggered a period of accelerated star formation lasting about 2 to 4 billion years
- Galaxies of all types, including the Milky Way, began to form relatively soon after the Big Bang explosion that marked the beginning of the universe some 13.8 billion years ago, but were generally smaller than those seen today and were forming stars at a rapid rate. Subsequent galactic mergers were instrumental in configuring galaxies existing now
- High-precision measurements of the position, brightness and distance of around a million stars within 6,500 light years of the sun, obtained by the Gaia space telescope, helped pinpoint stars present before the merger and those that formed afterward
- Certain stars with higher content of elements other than hydrogen or helium arose in the Milky Way, they found, and others with lower such content originated in Gaia-Enceladus, owing to its smaller mass. While the merger was dramatic and helped shape the Milky Way, it was not a star-destroying calamity

26. Gaia Space Observatory

- European Space Agency's (ESA) Gaia telescope, launched in 2013, is an ambitious mission to chart a three-dimensional map of our Galaxy, the Milky Way, in the process revealing the composition, formation and evolution of the Galaxy
- Gaia will provide unprecedented positional and radial velocity measurements with the accuracies needed to produce a stereoscopic and kinematic census of about one billion stars in our Galaxy and throughout the Local Group. This amounts to about 1 per cent of the Galactic stellar population

Relevance

- With its all-sky survey of the position, brightness and motion of over one billion stars in our Milky Way galaxy, Gaia will provide a large dataset to search for exoplanets

- It will also map thousands of Solar System objects, primarily main belt asteroids circling the Sun between the orbits of Mars and Jupiter
- Gaia measures the position and motion of stars using a technique known as parallax, which involves looking at an object from different perspectives.
- From its position in space, Gaia is able to avoid atmospheric distortion when making its observations, and provide more precise estimates of stellar sizes. Ultimately, this helps in estimating the sizes of planets orbiting distant stars
- It will also detect killer asteroids on a potentially fatal collision course with our planet

27. Chief of Defence Staff

- PM Modi announced the creation of the post of CDS to provide "effective leadership at the top level" to the three wings of the armed forces, and to help improve coordination among them
- CDS is a high military office that
  - ✓ oversees and coordinates the working of the three Services, and
  - ✓ offers seamless tri-service views and single-point advice to the Executive (in India's case, to the Prime Minister) on long-term defence planning and management, including manpower, equipment and strategy, and
  - ✓ above all, "jointsmanship" in operations
- Most countries with advanced militaries have such a post, albeit with varying degrees of power and authority. The United States Chairman Joint Chiefs of Staff Committee (CJCSC), for example, is extremely powerful, with a legislated mandate and sharply delineated powers.
- CDS is the most senior military officer and military adviser to the President, and his remit extends to the National Security Council, the Homeland Security Council and the Defence Secretary
- The Chiefs of the United States Army, Navy, Air Force, Marine Corps, and National Guard too, are members of the JCSC. All, including the CJCSC, are four-star officers, but by statute only the CJCSC is designated as the "principal military adviser". However, the CJCSC is barred from exercising any operational authority over combat commanders in varied theatres; this authority rests exclusively with the US President
- India has had a feeble equivalent known as the Chairman, Chiefs of Staff Committee (CoSC); but this is a toothless office, given the manner in which it is structured. The seniormost among the three Service Chiefs is appointed to head the CoSC, an office that lapses with the incumbent's retirement
- The CoSC system is a leftover from the colonial era, with only minor changes being carried out over the years. Apprehensions in the political class about a powerful military leader, along with inter-Services bickering, have long worked to disincentivise the upgrade of the post.

28. Doctrine of Nuclear No First Use

- It is a commitment to not be the first to use a nuclear weapon in a conflict. Pakistan, by contrast, has openly threatened India with the use of nuclear weapons on multiple occasions beginning from the time the two nations were not even acknowledged nuclear powers

- "Nuclear weapons will only be used in retaliation against a nuclear attack on Indian territory or on Indian forces anywhere". However India's nuclear retaliation to a first strike will be massive and designed to inflict unacceptable damage
- Also, in the event of a major attack against India, or Indian forces anywhere, by biological or chemical weapons, India will retain the option of retaliating with nuclear weapons
- Nuclear retaliatory attacks can only be authorised by the civilian political leadership through the Nuclear Command Authority, comprising of a Political Council and an Executive Council
- India would not use nuclear weapons against non-nuclear weapon states
- India would continue to put strict controls on the export of nuclear and missile related materials and technologies, participate in Fissile Material Cutoff Treaty negotiations, and continue to observe the moratorium on nuclear tests
- India will remain committed to the goal of a nuclear weapons free world, through global, verifiable and nondiscriminatory nuclear disarmament

29. SPYDER

- IAF successfully test fired Israeli SPYDER air defence missile system
- SPYDER (Surface-to-air PYthon and DERby) is a low-level, quick reaction missile (LLQRM) to neutralise hostile targets up to 15 km away and at heights between 20 and 9,000 metres.
- The Python-5 is currently the most capable air-to-air missile (AAM) in Israel's inventory, while the Derby is an active radar homing AAM that provides the SPYDER missile system with a fire and-forget option.
- SPYDER (Surface-to-air PYthon and DERby) is an Israeli short and medium range mobile air defence system developed by Rafael Advanced Defence Systems with assistance from Israel Aerospace Industries (IAI)
- IAF will use the SPYDER along with the made-in-India Akash surface-to-air missile which has a little longer effective range of 25 km as part of a layered approach to defend vital assets and locations in the country
- Both the SPYDER and Akash are all-weather missiles and the process to seek and engage an aggressive aircraft or missile is automatic. Besides aircraft and UAVs, they can also neutralise low level cruise missiles
- It can be used to tackle aircraft, cruise missile, surveillance plane or drones and precision-guided munitions

30. MIRV Technology

- Multiple Independently targetable reentry vehicle (MIRV) is a missile payload containing several warheads, each capable of being aimed to hit a different target
- The concept is associated with intercontinental ballistic missiles carrying thermonuclear warheads, even if not strictly being limited to them

- A unitary warhead is a single warhead on a single missile
- Multiple reentry vehicle (MRV) missile is one which carries several warheads which are dispersed but not individually aimed
- MIRV warheads are typically much smaller than unitary warheads and thus require greater miniaturization
- Only China, France, Russia, UK and US are currently confirmed to possess functional MIRV missile systems
- India is working on a four-stage intercontinental ballistic missile (ICBM) - Agni VI - which may have a strike range of 8000 km to 12000 km. Agni VI is expected to be capable of MIRV as well as Manoeuvrable re-entry vehicle (MaRV)

31. E-Cigarettes

- Electronic nicotine delivery systems (ENDS) or non-combustible tobacco products are known by many names — vapes, e-hookahs, electronic cigarettes and e-pipes.
- E-cigarettes may be manufactured to look like traditional cigarettes and are marketed as tobacco-free nicotine delivery devices.

Working

- Instead of burning tobacco leaves like in traditional cigarettes, an e-cigarette, which is a batteryoperated device, produces aerosol by heating a solution containing nicotine among other things
- The device contains nicotine and flavours in the form of liquid which is primarily composed of solvents such as glycerol and/or propylene glycol
- The aerosol containing a suspension of fine particles and gases simulates cigarette smoke. Following a puff, the aerosol is delivered to the user's mouth and lungs and the rest is exhaled

Effects

- Unlike smoking, the adverse health effects of e-cigarettes are not yet known. But like traditional cigarettes, e-cigarettes to deliver ultrafine particles and nicotine deep into the lungs, which is then absorbed by the blood. A 2018 study found the use of e-cigarette daily was associated with a 79% increase in heart attack risk after other variables were taken into account.
- According to a white paper on e-cigarettes by the Indian Council of Medical Research (ICMR), depending on the battery output voltage used, nicotine solvents can release in varying amounts potential carcinogens such as acetaldehyde, formaldehyde and acetone
- The liquid-vapourising solutions also contain "toxic chemicals and metals that can cause several adverse health effects including cancers and diseases of the heart, lungs and brain
- Flavours such as diacetyl used in e-cigarettes are linked to serious lung disease. E-cigarettes also contain volatile organic compounds, heavy metals, such as nickel, tin and lead

32. Class A Poison

- Highly toxic chemicals, which even in very small quantities as gas or vapour in the air are dangerous to life (such as cyanogen, hydrocyanic acid, nitrogen peroxide, and phosgene), are notified under Class A
- Electronic cigarettes are small battery-operated devices that vaporise liquid nicotine to provide the same experience as smoking tobacco
- It is a developmental disorder characterised by significant difficulties in social interaction and nonverbal communication, along with restricted and repetitive patterns of behaviour and interests
- As a milder autism spectrum disorder (ASD), it differs from other ASDs by relatively normal language and intelligence
- Physical clumsiness and unusual use of language are common
- Signs usually begin before two years of age and typically last for a person's entire life

Cause

- Exact cause of Asperger's is unknown. While it is largely inherited, the underlying genetics have not been determined conclusively
- Environmental factors are also believed to play a role

Diagnosis

- It remains within the International Classification of Diseases (ICD-11) as of 2019 but as a subtype of autism spectrum disorder
- In 2013, the diagnosis of Asperger's was removed from the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), and people with these symptoms are now included within the autism spectrum disorder along with autism.

Treatment

- There is no single treatment and the effectiveness of particular interventions is supported by only limited data
- Communication training and behavioural therapy can help people with the syndrome learn to socialise more successfully

33. Ranitidine

- Doctors advised patients to avoid over-the-counter use of antacid ranitidine, following concerns over its contamination by cancer causing substances
- Reports from other countries speak of a nitrosamine impurity called N-nitrosodimethylamine (NDMA) at low levels
  - ✓NDMA is classified as a probable human carcinogen
  - ✓It is a known environmental contaminant and found in water and foods, including meats, dairy products and vegetables

- Ranitidine is a prescription drug included in Schedule-H but it is also being sold over the counter

Uses

- It is used to decrease the volume of acid produced in the stomach
- Prevent and relieve heartburn associated with acid ingestion and sour stomach
- Treatment and prevention of ulcers of the stomach and intestines and treatment of gastroesophageal reflux disease (GRED)

34. Hypertension

- Hypertension is essential high blood pressure
- The normal values of blood pressure measured in a clinic are 140/90 mm Hg and at home is 135/85

  ✓Values more than these are termed as hypertension
- Nearly 42% Indians are either misdiagnosed or have missed diagnosis of hypertension

White Coat Hypertension (WCH)

- A syndrome wherein a person experiences a spike in BP when measured at a doctor's clinic
- It leads to unnecessary medication which can be damaging

Masked Hypertension (MH)

- A syndrome wherein a person records normal BP at a medical set-up but records high BP when measured at home
- It leaves people at the risk of not getting treatment which is very dangerous
- These are mostly those who have unexplained kidney disease

35. Salmonella

In News

- Some batches of a spice mix sold by MDH were taken off the shelves in the United States for salmonella contamination

About Salmonella

- It is a bacteria that commonly causes food borne illness, sometimes called 'food poisoning'
- It is characterised by acute onset of fever, abdominal pain, diarrhoea, nausea and sometimes vomiting

Transmission

- Salmonellosis in humans is generally contracted through the consumption of contaminated food of animal origin (mainly eggs, meat, poultry, and milk), although other foods, including green vegetables contaminated by manure, have been implicated in its transmission.
- Person-to-person transmission can also occur through the faecal-oral route.

Symptoms

- Symptoms of salmonellosis are relatively mild and patients will make a recovery without specific treatment in most cases

Treatment

- Treatment in severe cases is electrolyte replacement and rehydration
- Antimicrobials are also administered if the infection spreads from the intestine to other body parts

36. Bombay Blood Group

Blood Grouping

- The four most common blood groups are A, B, AB and O
- When we say someone has blood group A, it means that the person has antigen of type 'A' and antibody of type 'B' in his/her blood group.
- The rare, Bombay blood group was first discovered in Mumbai in 1952 by Dr YM Bhende.

Blood Groups (Antigens and Antibodies)

Blood Group	Antigens	Antibodies
A	A,H	B
B	B,H	A
AB	A,B,H	-
O	H	A,B
Bombay Blood Group	-	A,B,H

- Each red blood cell has antigen over its surface, which helps determine which group it belongs to
- Bombay blood group, also called hh, is deficient in expressing antigen H, meaning the RBC has no antigen H
  - ✓For instance, in the AB blood group, both antigens A and B are found. A will have A antigens; B will have B antigens. In hh, there are no A or B antigens
- Globally, the hh blood type has an incidence of one in four million. It has a higher incidence in South Asia; in India, one in 7,600 to 10,000 are born with this type
- Because of inbreeding and close community marriages, the blood type is common in South Asia

Testing

- To test for hh blood, an Antigen H blood test is required
- Often it is confused with the O group. The difference is that the O group has Antigen H, while the hh group does not
- If anyone lacks Antigen H, it does not mean he or she suffers from poor immunity or may be more prone to diseases
  - ✓Their counts for haemoglobin, platelets, white blood cells and red blood cells are similar to the count of others based on their health index. Because of rarity, however, they do face problems during blood transfusion

Transfusion

- Rejection may occur if they receive blood from A, B, AB or O blood group.

- hh blood group can donate their blood to ABO blood types

37. GEMINI

- Gagan Enabled Mariner's Instrument for Navigation and Information (GEMINI) is a low-cost device that will receive messages transmitted through GAGAN satellites.

GAGAN

- GAGAN is GPS-Aided Geo Augmented Navigation system operational since 2015, which provides navigation services to Departure, en-route and landing operation in suitably equipped aircrafts,
- The system provides very accurate and high level of integrity satellite signals for precision air navigation over the entire Indian airspace
- Jointly developed by Airports Authority of India and Indian Space Research Organisation
- It consists of three geosynchronous satellites (GSAT-8, GSAT-10 and GSAT-15) and covers the entire Indian Ocean round the clock GEMINI
- Indian National Centre for Ocean Information Services (INCOIS), an autonomous body under Ministry of Earth Sciences (MoES) joined hands with Airports Authority of India (AAI) to utilise the GAGAN (GPS Aided Geo Augmented Navigation) satellite system to transmit disaster warnings and other information to fishermen
- It is a device for seamless and effective dissemination of emergency information and communication on disaster warnings, Potential Fishing Zones (PFZ) and Ocean States Forecasts (OSF) to fishermen.
- This is exclusively designed for fishermen about disasters when they are 10 to 12 km away from the coast.
- These advisories are unable to be communicated beyond 10-12 km, but fishermen move in the sea beyond 50 nautical miles and sometimes upto 300 nautical miles.
- A lacuna was felt during Ockhi cyclone in 2017.

38. Pradhan Mantri Innovative Learning Programme (PMILP) - DHRUV

- Objective: To allow talented students to realise their full potential and contribute to society
- It is being started to identify and encourage talented children to enrich their skills and knowledge
- Gifted children will be mentored and nurtured by renowned experts in different areas in centres if excellence across the country
- The programme will be called DHRUV (after the Pole Star) and every student to be called 'DHRUV TARA'
- Covers 2 areas
    1. Science
    2. Performing Arts

- Students will be broadly from classes 9 to 12, from all schools including government and private
- The new innovators will be helpful for the Nation to achieve the target of 5 Trillion Dollar economy in stipulated time

Planet With Most Moons

- International Astronomical Union's Minor Planet Centre confirmed 20 new moons orbiting Saturn, making it the planet with the most moons in our Solar System at 82
- Until the confirmation, the planet with the most moons was Jupiter, at 79
- A count of the moons listed on the NASA website shows that our Solar System's planets together have 205 confirmed moons now
- Saturn and Jupiter account for nearly 80% of the count of moons of our Solar system
- Another 20% are orbiting Uranus (27) and Neptune (14)
- Of the remaining three moons, one is Earth's own while the other two are with Mars
- Mercury is so close to the Sun and its gravity that it wouldn't be able to hold on to its own moon. Any moon would most likely crash into Mercury or maybe go into orbit around the Sun and eventually get pulled into it

NOTE:

Study the difference between Terrestrial and Jovian Planets (Question already asked in Prelims)

39. International Astronomical Union

- The International Astronomical Union is an international association of professional astronomers, at the PhD level and beyond, active in professional research and education in astronomy.
- Among other activities, it acts as the internationally recognized authority for assigning designations and names to celestial bodies (stars, planets, asteroids, etc.) and any surface features on them.
- Its main objective is to promote and safeguard the science of astronomy in all its aspects through international cooperation. The IAU maintains friendly relations with organizations that include amateur astronomers in their membership. The IAU has its head office on the second floor of the Institut d'Astrophysique de Paris in the 14th arrondissement of Paris

Nobel Prize in Physics

- It was awarded to three scientists for their contribution to the understating of the evolution of the universe

✓Theoretical discoveries in physical cosmology

✓Discovery of an exoplanet orbiting a solar-type star.

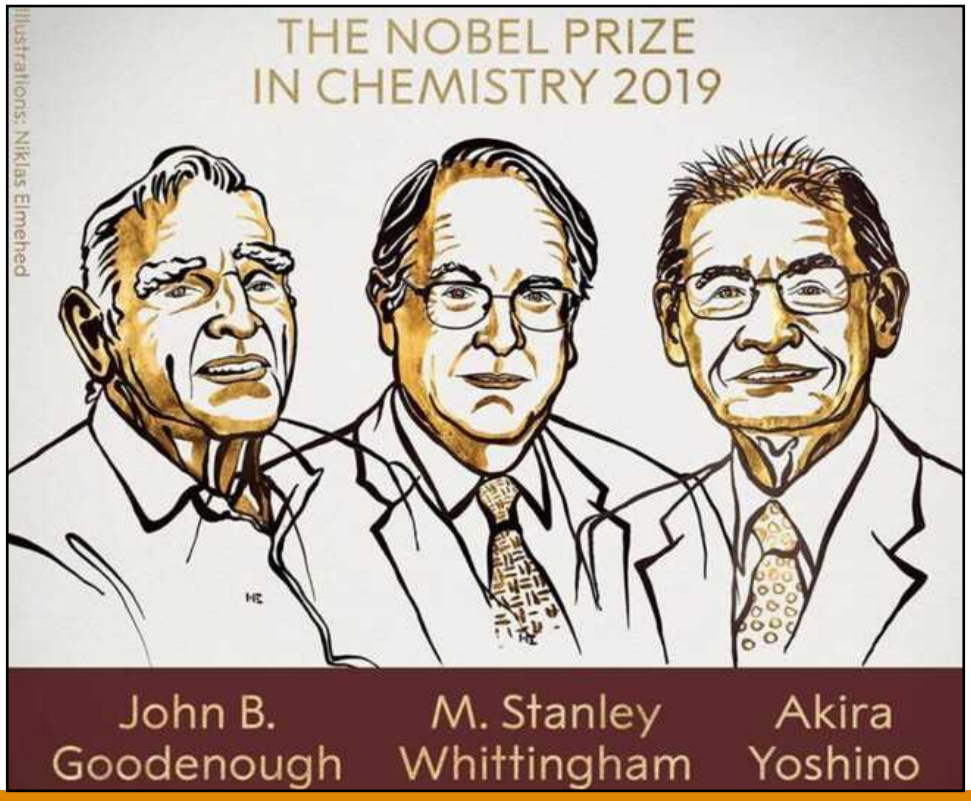
✓An exoplanet or extrasolar planet is a planet outside the Solar System

40. Nobel Prize in Chemistry

- Dr. Yoshino succeeded eliminating pure lithium from the battery, instead basing it wholly on lithium ions, which are safer than pure lithium

✓The advantage of lithium-ion batteries is that they are not based upon chemical reactions that break down the electrodes, but upon lithium ions flowing back and forth between the anode and cathode

If curious watch the video here



41. African Swine Fever

- It is highly contagious hemorrhagic viral disease of domestic and wild pigs, which is responsible for serious economic and production losses
- Although signs of ASF and classical swine fever (CSF) may be similar, the ASF virus is unrelated to the CSF virus

Transmission

- The epidemiology of ASF is complex and varies depending on the environment, types of pig production systems, the presence/absence of competent tick vectors, human behaviour, and the presence/absence of wild pigs.Routes of transmission can include:

✓direct contact with infected domestic or wild pig

✓indirect contact, through ingestion of contaminated material (e.g. food waste, feed, or garbage)

✓contaminated fomites, or biological vectors (soft ticks of the genus Ornithodoros) where present ASF is not a risk to human health

42. Tech Sagar

- National Cyber Security Coordinator's office in partnership with data Security Council (DSCI) of India launched TechSagar

  ✓DSCI is a not-for profit, industry body on data protection in India, setup by NASSCOM

- It is a platform to discover India's technological capability through a portal
- The portal will list business and research entities from the IT industry, startups, academia and individual researchers
- The repository will facilitate new opportunities for businesses and academia to collaborate, connect and innovate in future
- TechSagar is a consolidated and comprehensive repository of India's cyber tech capabilities which provides actionable insights about capabilities of the Indian Industry, academia and research across 25 technology areas like internet of things (IoT), Artificial Intelligence (AI), Machine Learning (ML), blockchain, cloud & virtualisation, robotics & automation, ar/vr, wireless & networking, and more
- TechSagar will allow targeted search, granular navigation and drill down methods using more than 3000 niche capabilities. As of now, the repository features 4000+ entities from industry, academia and research including large enterprises and start-ups providing a country level view of India's cyber competencies
- It will be frequently updated with new entities and information to maintain its relevancy and usefulness

43. CartoSAT-3 Mission/PSLV-C 47

- It was the 21st flight of PSLV in 'XL' configuration (with 6 solid strap-on motors)
- It was injected into an orbit of 509 km
- Cartosat-3 satellite is a third generation agile advanced satellite having high resolution aerial imaging capability in the world
- It is eighth in a series of indigenous Earth observation satellites
- It will also image across multiple spectra — panchromatic (captures all visible colours of light), multispectral (captures light within specific ranges in the electromagnetic spectrum) and hyper spectral (captures light from across the electromagnetic spectrum) earth observation mission
- It will serve in large-scale urban planning, rural resources and infrastructure development, monitoring of coastal land use and land cover etc.

44. Golden Rice

- German scientists (in 1990s) developed a genetically modified variety of rice called Golden Rice
- It was claimed to be able to fight Vitamin A deficiency, which is the leading cause of blindness among children and can also lead to death due to infectious diseases such as measles

- Bangladesh could be on the verge of becoming the first country to approve the plantation of this variety

  ✓Advocates of this variety stress how it can help countries where Vitamin A deficiencies leave millions at high risk

    ✤In Bangladesh, over 21 per cent of the children have vitamin A deficiency

- Rice is naturally low in the pigment beta-carotene, which the body uses to make Vitamin A

  ✓Golden rice contains this pigment, which is why it has golden colour

Vitamin A

- It is a fat-soluble vitamin that maintains healthy vision, skin, bones and other tissues in the body
- It is important for growth and development, for the maintenance of the immune system and for good vision (retina)

45. Winter Grade Diesel

- Indian Oil Corporation has developed winter-grade diesel for Ladakh to address the problem of loss of fluidity in fuel during extreme winter conditions
- Winter grade diesel produced by Panipat Refinery for the first time has a pour point of -33 degree C and does not lose its fluidity function even in the extreme winter weather of the region unlike the normal grade of diesel
- This fuel also meets BIS specification of BS-VI grade diesel and has been successfully produced and certified for the first time by Panipat Refinery on November 8, 2019

BS VI

- Bharat Stage VI is the new emission standard that all vehicles in the country will have to adhere to from April 1, 2020
- Maruti Suzuki has said that BS-VI compliant petrol vehicles will lead to a substantial reduction of nearly 25% in Nitrogen Oxides (NOx) emissions and 70% for diesel engines
- Sulphur content is five times lower than that in BS-IV
- The presence of OBD (onboard Diagnostics) and RDE (Real Driving Emission) on all vehicles will also enable real-time tracking of emissions

46. Pink Ball Cricket

- India played its first pink-ball, day-night Test match against Bangladesh at Eden Gardens
- Pink was the consensus colour after ball makers tried optic yellow and bright orange
- Red, white and pink — all cricket balls are made of cork, rubber and woolen yarn, using similar production techniques

  ✓The colour of the dye on the tanned cowhide, and the difference in 'finishing' decide in which format a ball is used

- Day/Night Test pink ball cannot be dipped into grease since grease would dull the fluorescent pink, affecting the visibility of the ball under lights

  ✓It gets a pigment finish and is sprayed with a thick coat of pink so that it sparkles for long

- It is lighter than red, and swings more with a greater seam movement

47. Vigyan Samagam

- Vigyan Samagam exhibition will traverse you through the world from micro to macro, unveiling the efforts of the international community in understanding the Universe
- Aiming to bring mega-science one step closer to the society, it showcases India's contribution to some of the biggest international collaborations on fundamental science and research, and provides a common interactive platform for mega-science activities, industry, academia and institutions
- The exhibition also presents fundamental science and research as a strong career options for the youngsters
- The Department of Atomic Energy (DAE), Department of Science and Technology (DST), the funding agencies of these projects and the National Council of Science Museums (NCSM), Ministry of Culture, who are venue partners and having expertise in design and hosting such exhibitions, have joined hands to organize this prestigious Science Exhibition
- A first-of-its kind exhibition, the exhibition being hosted in a caravan mode at four cities — Mumbai, Bengaluru, Kolkata and Delhi — from May 2019 to March 2020
- It takes you through the workings of the Universe, from discovery of the Higgs particle to that of the gravitational waves from merger of neutrons stars and black holes
- The Mega Science Projects in which India is participating are the Large Hadron Collider (LHC) at the European Organization for Nuclear Research (CERN), 'Facility for Antiproton and Ion Research' (FAIR), 'India-based Neutrino Observatory' (INO), 'International Thermonuclear Experimental Reactor' (ITER), 'Laser Interferometer Gravitational - Wave Observatory' (LIGO), 'Thirty Meter Telescope' (TMT) and 'Square Kilometers Array' (SKA) for this purpose. All these projects will be showcased during the Exhibition at a single place

48. Alzheimer's disease

- Dementia is not a single disease, but is the name for a group of symptoms that include problems with memory and thinking
- The new drug, Oligomannate, a sugar derived from Chinese seaweed, works by modifying gut bacteria to reduce inflammation in the brain
- The method adopted by the Chinese researchers is a departure from Alzheimer's drug development that has focused on attacking the plaque that forms in the brains of patients; this protein build-up interferes with neural signaling

Alzheimer's disease

- It is a progressive brain disorder that usually appears in individuals who are in their mid-60s

- Very rarely it occur in individuals younger than 65 years of age
- The disease was first described by Alois Alzheimer in 1906 and manifests itself by disrupting the message carrying neurotransmitters after it destroys brain cells and nerves
- A person with Alzheimer's also loses the ability to perform day-to-day tasks
- According to the US-based Alzheimer's Association, there are over 4 million people in India who suffer from some form of dementia

Causes

- Exact causes not yet known. There is, however, some degree of consensus among scientists that the disease involves two proteins — beta-amyloid and tau. When the former reaches abnormal levels, it forms plaque that deposits itself between neurons, disrupting cell function. Tau too reaches abnormal levels, as a result of which it forms "neurofibrillary" tangles inside neurons, blocking the transport system of neurons
- Lifestyle factors such as diet, physical fitness, smoking, alcohol are related to one-third of Alzheimer's cases

Alzheimer's v. Dementia

- Dementia is a syndrome and not a disease, which Alzheimer's is. The two are, however, closely related. Dementia's various symptoms include loss of memory, thinking skills, problems with language, changes in the mood, deterioration in behaviour and an individual's ability to perform everyday activities.
- It is most commonly caused by Alzheimer's disease, which accounts for dementia in over 50-75% of the cases. Dementia can be caused by other diseases such as Parkinson's and Huntington's disease as well.
- It also has types, such as Lewy body and vascular dementia. As per the ADI report, the global costs of dementia have reached to over $1 trillion. The figure is expected to double by 2030.

49. International Treaty of Plant Genetic Resources for Food and Agriculture (ITPGRFA)

- ITPGRFA also known as Seed Treaty, was adopted by the 31st Session of the Conference of the Food and Agriculture Organisation in 2001
- It is a comprehensive international agreement for ensuring food security through conservation, exchange and the sustainable use of the world's plant genetic resources for food and agriculture (PGFRA), as well as the fair and equitable benefit sharing arising from its use
- It also recognises farmers' rights, subject to national laws

Objective

- recognising the enormous contribution of farmers to the diversity of crops that feed the world
- establishing a global system to provide farmers, plant breeders and scientists with access to plant genetic materials

- ensuring that recipients share benefits they derive from the use of these genetic materials wit the countries where they have been originated

Provisions

- **Multilateral system**: It puts 64 of our most important crops into an easily accessible global pool of genetic resources that is freely available to potential users
- **Access and benefit sharing:** The Treaty prevents the recipients of genetic resources from claiming intellectual property rights over those resources in the form in which they received them, and ensures that access to genetic resources already protected by international property rights is consistent with international and national laws
- **Farmers' rights:** It calls for protecting the traditional knowledge of farmers, increasing their participation in national decision-making processes and ensuring that they share in the benefits from the use of these resources
- **Sustainable use**: Most of the world's food comes from four main crops – rice, wheat, maize and potatoes. However, local crops, not among the main four, are a major food source for hundreds of millions of people and have potential to provide nutrition to countless others. The Treaty helps maximize the use and breeding of all crops and promotes development and maintenance of diverse farming systems.

50. Tiger Triumph 2019

- India-US tri-**services amphibious** exercise Tiger Triumph
- It continued for 9 days off the Vishakhapatnam and Kakinada coasts
- It will enhance US-India military-to-military relations and hone individual and small-unit skills in **humanitarian assistance and disaster response**
- More than 500 US Marines and sailors and about 1200 Indian soldiers and airmen are participating

51. World Malaria Report

- It is released by World Health Organisation
- Nineteen countries in sub-Saharan Africa and India accounted for 85 per cent of the global malaria burden in 2018. Globally 228 million malaria cases were reported in 2018, which is marginally lower than the number of cases in 2017 (231 million)
- While Africa and India saw the maximum dip in malaria cases between 2017 and 2018, they still accounted for 85 per cent deaths
- India registered a fall of 2.6 million malarial cases in 2018 as compared to 2017. The country also has one of the lowest funding per person at risk of being inflicted with malaria at just US$0.2

Malaria

- It is a life-threatening disease caused by parasites (such as Plasmodium falciparum and Plasmodium vivax) that are transmitted to people through the bites of infected female Anopheles mosquitoes
- The parasite completes life cycles in liver cells and red blood cells It is preventable and curable

- Together with HIV/AIDS, tuberculosis and other neglected tropical diseases, malaria control is included under Goal 3 of Sustainable Development Goals, which aims to end the epidemics of these disease by 2030
- India is the highest burden country in WHO South-East Asia region, but it has shown reduction in reported cases
  - ✓India accounts for 58% total reported deaths in the region
  - ✓The major challenges that remain in this region are decreased funding, treatment failures and vector resistance to the insecticides used against the vectors (pyrethroids)

Global Technical Strategy for Malaria

- Adopted by WHO in 2015, it provides a technical framework for all malaria-endemic countries
- Strategy sets ambitious but achievable goals for 2030, including
  - ✓Reducing malaria case incidence by at least 90%
  - ✓Reducing malaria mortality rates by at least 90%
  - ✓Eliminating malaria in at least 35 countries
  - ✓Preventing a resurgence of malaria in all countries that are malaria-free

52. Extra Neutral Alcohol (ENA)

- Like ethanol, ENA is a byproduct of the sugar industry and is formed from molasses
- It is the primary raw material for making alcoholic beverages
- It is colorless food-grade alcohol that does not have any impurities
- It has a neutral steel and taste, and typically contains over 95% alcohol by volume
- Derived from different sources (sugarcane molasses and grains), it is used in the production of alcoholic beverages such as whisky, vodka, gin, cane and alcoholic fruit beverages
- ENA is also an essential ingredient in the manufacture of cosmetics and personal care products such as perfumes, toiletries, hair spray
- Being a good solvent, ENA is also used in paints and ink for printing industry as well as in pharmaceutical products such as antiseptics, drugs, syrups, medicated sprays etc.

53. Anaemia In India

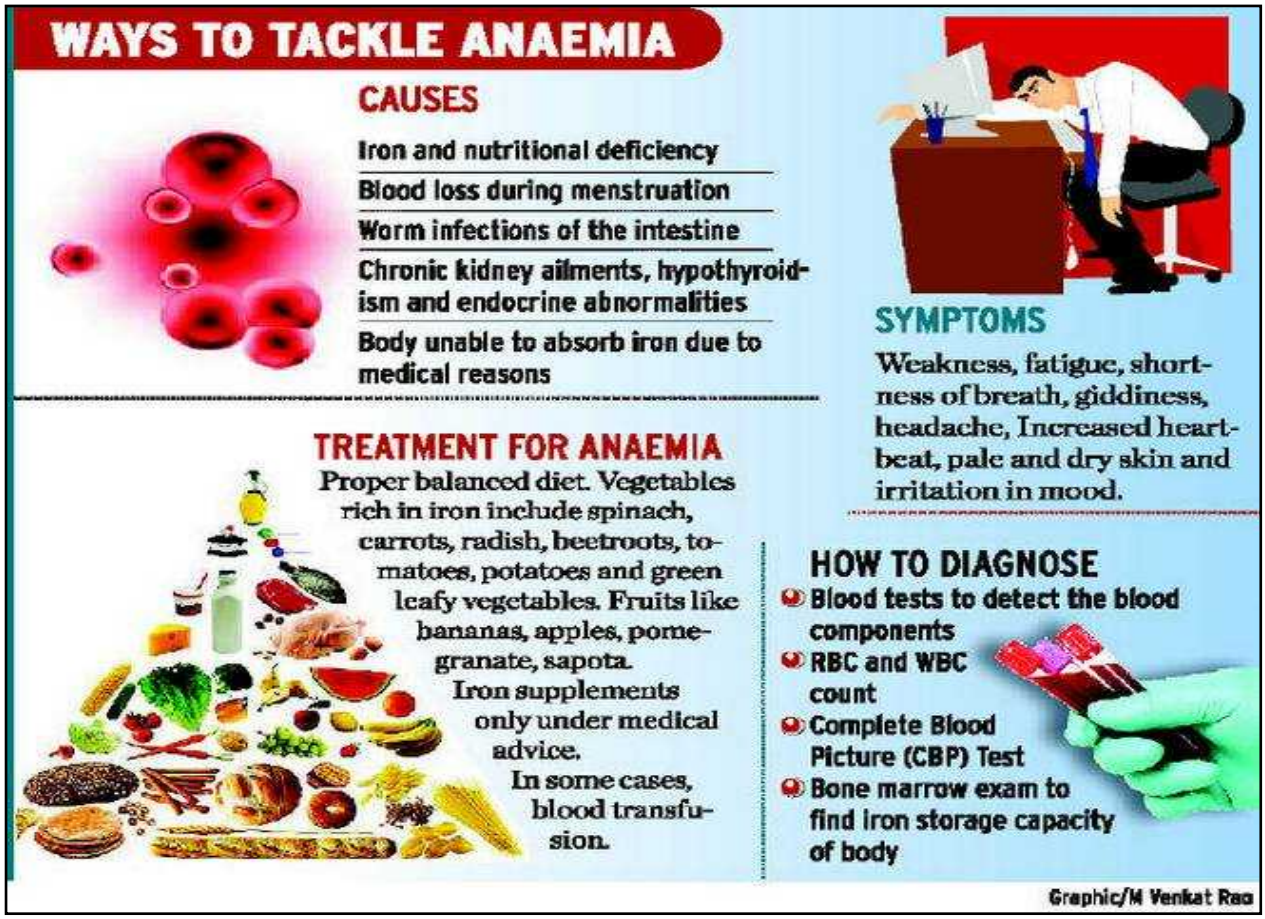
What is Anaemia

- It is a deficiency in the number or quality of red blood cells in body
  - ✓RBCs carry oxygen using the protein hemoglobin
- It results in reduced oxygen flow to body organs Figures of Anaemia in India
- It is widespread in India. As per NFHS, 58.6% of children, 53.2% of non-pregnant women and 50.4% of pregnant women were found to be anaemic in 2016

- India carries the highest burden of the disease despite an anaemia control programme for 50 years
- 23% of Indian men suffer from anaemia

Reasons

- Socio-demographic factors including wealth of family, maternal education, maternal age, type of residence are the main reasons behind the incidence of childhood anaemia



54. Hysterectomy in India

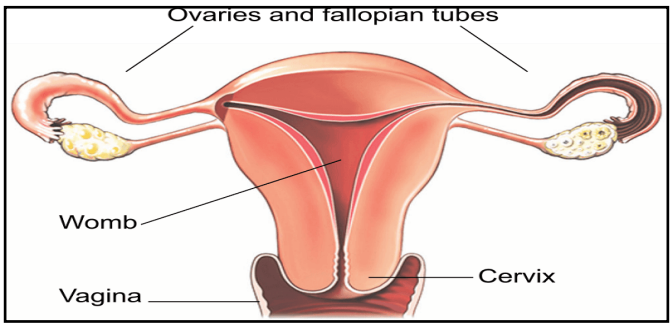
- It is the surgical procedure for uterus removal
- It is the second most frequently performed surgery for women
- In America 6 out of 1000 women undergo hysterectomy while in India, it is 17 out of 1000
- From the data provided by the National Family Health Survey data (2015-16), it emerged that that excessive menstrual bleeding is the main reason for carrying out the procedure
  - ✓Before 1997, only 43% of hysterectomy surgeries were performed in private hospitals but by the end of 2016, it increased to 74%
  - ✓North-east states are an exception where low number of hysterectomy surgeries are performed and most of them on public hospitals
- Generally, patients who undergo hysterectomy believe that the surgery would relieve them from gynecological problems, but it can also cause new health issues such as

✓musculoskeletal disorders like back pain, muscle pain and joint pain

✓weight gain that may reduce the agility to do work

✓increased risk of diabetes, osteoporosis, heart disease and even depression

Female Reproductive System



- Womb (uterus): a pear-shaped organ in the middle of pelvis where the baby develops; the lining of the womb is shed during a period
- Cervix: neck of the womb, where the womb meets the vagina, the cervix is the lower part of the womb and not separate
- Vagina: a muscular tube below the cervix
- Fallopian tubes: tubes that connect the womb to the ovaries
- Ovaries: small organs by the fallopian tubes that release an egg each month

55. PSLV

- It is a third-generation rocket which has been used to launch various satellites into geosynchronous and geostationary orbits
- It is the first Indian launch vehicle to be equipped with liquid stages
- Launch capacity varies from 1000-1750 kg

Advantage

- Capable of placing multiple payloads into orbit with multi-payload adaptors
- Multiple engine restarts to achieve multiple orbits in the same mission

Variants

- PSLV-Core alone (PSLV-CA): Without the solid strap-on motors
- PSLV with six solid strap-on boosters
- PSLV-XL with six extended solid strap-on boosters

Orbit

- Geosynchronous: Satellite in this orbit has an orbital period matching that of the earth. It synchronises with the movement of the earth (23 hours, 56 minutes and 4.09 seconds to rotate on its axis)

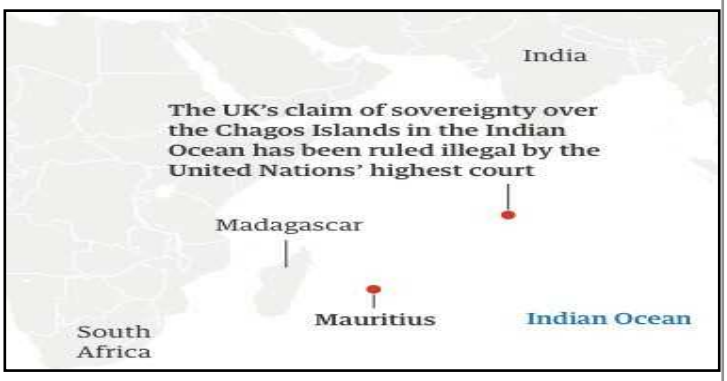
  ✓To the ground observer, these satellites appear to bet at a fixed point above the earth

  ✓They are used to monitor the weather and for communications and surveillance

- Geostationary: They are also geosynchronous. The only difference is that these satellites are on the same plane as the equator, 35785 km above the Earth, unlike geosynchronous satellites which can have any inclination

Stages in PSLV's Journey

4 stage journey from lift-off to placing satellites in orbit



- **First Stage:** S139 solid rocket motor, augmented by six solid strap-on boosters which uses Hydroxyl Terminated Polybutadiene (HTPB) based propellant
- **Second Stage**: Earth storable liquid rocket engine (Vikas)
- **Third Stage:** Solid rocket motor provides the upper stages high thrust after the atmospheric phase
- **Fourth Stage:** Two Earth storable liquid engines

56. Torrefaction

- It is a thermal process to convert biomass into a coal-like material called pellet
  - ✓ It is a mild form of pyrolysis (thermal decomposition of materials at elevated temperatures in inert atmosphere) at temperatures between 200 deg and 320 deg C
  - ✓ It changes biomass properties to provide for a better fuel quality for combustion and gasification applications
- The estimated 30-40 million metric tonnes of paddy straw that remains unutilised and is burnt has the potential to generate 6000-8000 MW of electricity annually by using it with coal in the coal-based power plants
  - ✓ This would work out to 48 million tonnes of carbon dioxide equivalent reduction, or equivalent to greenhouse gas emissions from 10.2 million Indian cars.
- In Jan 2019, National Agri-Food Biotechnology Institute (NABI), in Mohali, signed a MOU with Bioendev AB, Sweden, to set up a pilot project
- The plant uses the process of torrefaction. The green coal leaves no carbon footprint

57. Chagos Archipelago

UK has defied a United Nations deadline to return control of an overseas territory to Mauritius, which has been under continuous British sovereignty since 1814

- British purchased the Chagos Archipelago after it was separated from Mauritius in 1965, when the island nation was still a British colony
- UK set up a joint military base with the US on Diego Garcia, the largest of the isles
  - ✓ Diego Garcia played a strategic role during the Cold War, and then as an airbase, including during the war in Afghanistan
- Mauritius claims it was forced to give it up in exchange for independence, which it gained in 1968

✓It also argued that the separation was in breach of UN resolution 1514, passed in 1960, which specifically banned the breakup of colonies before independence

- UK regards neither the ICJ judgement nor the UN motion as binding

✓It says that the court has no jurisdiction to hear the case

British Indian Ocean Territory

- It is the overseas territory of the UK in the central Indian Ocean, established in 1965 . Since 1976 , it has been coterminous with the Chagos Archipelago
- At the centre of the Indian Ocean region and out of the path of cyclonic storms, the territory is strategically located
- It is a semi-circular group, open to the east comprising Salomon Islands, Peros Banhos atoll, Nelson Island, the Three Brother Islands, the Eagle Islands, Danger Island, the Egmont Islands and Diego Garcia
- There is no permanent civilian population

58. Chandrayaan-3 & Gaganyaan

Gaganyaan

- Four pilots from the Indian Air Force (IAF) will leave for Russia to receive training as astronauts of Gaganyaan at the Yuri Gagarin Cosmonaut Centre in Moscow
- Gagayaan is the Rs 10,000 crore Indian human space flight scheduled for 2022
- It is designed to have 3-7 crew members who will spend 3-7 days in space in a 400-km orbit

Chandrayaan-3

- It is the third lunar mission which will cost around Rs 600 crore
- It consists of a lunar rover and a stationary lander
- It will also try to land in the lunar south pole like Chandrayaan-2
- Chandrayaan-2 was the most complex mission ever attempted by India's space agency

✓It had aimed to land on the south pole of the Moon - in a spot that no other landing craft had reached before - to carry out tasks including searching for water and minerals and measuring moonquakes

- If successful it will make India the fourth country to achieve a soft landing on the moon

✓So far only Russia, US and China have successfully put a mission on the Moon's surface

59. 2nd Launch Port for ISRO

- Tamil Nadu government has started acquiring 2300 acres of land in Thoothukudi district for ISRO's second launch port

✓Currently satellites are launched from the Sriharikota launch centre in Andhra Pradesh

- Thoothukudi offers a locational advantage to launch towards India's South
- When functional, it will handle mainly the small satellite launch vehicle (SSLV) that is under development

  ✓SSLVs are meant to carry payload of up to 500 kg in space

60. Be Healthy Be Mobile (BHBM) Initiative

- It is a joint project set up by the World Health Organisation (WHO) and International Telecommunication Union in 2012, to use mobile technology, in particular text messaging and apps, to help member states combat the growing burden of NCDs
- It will harness the power and reach of mobile phones to address the noncommunicable disease (NCD) risk factors by educating people to make healthier lifestyle choices to help prevent and manage NCDs via their phones
- Instead of promoting specific products, it provides cross-cutting health content and technical support which can be used and incorporated into other applications
- It also works to develop the broader ecosystem within which a national mHealth
- programme will sit, helping ensure that it is integrated with other health services
- Its objective is to help the global community achieve SDG Goal 3 by 2030

Why use Mobile phones?

- There are more than 7 billion mobile phone subscriptions around the world, over 70% of which are in low- or middle- income countries
- Mobile phones have already been successfully used in different health fields, improving the access to health services, training health workers and assist individuals to manage their diseases
- They are extremely cost-effective

61. Cessation Programme–Quit Tobacco for Life

- Tobacco kills almost one million persons in India every year. It is a major risk factor for cancer, CVDs, chronic lung diseases & stroke
- Ministry of Health & Family Welfare in partnership with WHO and ITU has started the initiative for utilising mobile technology for tobacco cessation in 2016 as part of Digital India Initiative

  ✓It uses two-way messaging between individual seeking to quit tobacco use and programme specialists providing them dynamic support
- The programme that allows people who want to quit tobacco use to register by giving a missed call to a dedicated national number
- The programme's progress is monitored in real-time through an online dashboard that details the number of registrations
- The report released in Brazil, states that India is the second largest consumer of tobacco products, with more than 200 million users of smokeless tobacco and 276 million consumers of tobacco overall

Graphic Warning

- Since 2007 Health minister is pushing to introduce stronger graphic health warnings on tobacco packets with mixed success
- WHO report notes that India is among the countries with the highest level of achievement to benefit from large graphic health warnings
- While there has been no India-specific evaluation, studies from several countries that introduced similar strong labels have shown that this policy has been most effective in reducing tobacco use among the youth and also in motivating users to quit

62. Extraocular Vision

- It is the ability to see without eyes
- Researchers have shown that a species of brittle stars, which are relatives of starfish, can see even though it does not have eyes
- The red brittle star lives in the coral reefs of the Caribbean Sea
- It is only the second creature, after a sea urchin species, known to have this ability
  - ✓ In both these species, the researchers suspect that extraocular vision is facilitated by the photoreceptor cells found on their bodies
  - ✓ Another peculiar feature of the red brittle star is its signature colour change. While it is deep red during the day, it changes its colour to beige at night
    - ✤ The responses tested during the day, disappeared at night, indicating a linkage between extraocular vision and colour changing abilities: Researchers

Caribbean Sea

- It is an American Mediterranean Sea of the Atlantic Ocean
- To the south it is bounded by the coasts of Venezuela, Colombia, and Panama; to the west by Costa Rica, Nicaragua, Honduras, Guatemala, Belize, and the Yucatán Peninsula of Mexico; to the north by
- the Greater Antilles islands of Cuba, Hispaniola, Jamaica, and Puerto Rico; and to the east by the north-south chain of the Lesser Antilles, consisting of the island arc that extends from the Virgin Islands in the

northeast to Trinidad, off the Venezuelan coast, in the southeast. Within the boundaries of the Caribbean itself, Jamaica, to the south of Cuba, is the largest of a number of islands.

- It has the world's second biggest barrier reef (Mesoamerican Barrier reef)

63. Indian Data Relay Satellite System

- India plans to ring in its own space-to-space tracking and communication of its space assets this year by putting up a new satellite series called IDRSS
- It is planned to track and be constantly in touch with Indian satellites, in particular those in low-earth orbits which have limited coverage of earth
- Two IDRSS satellites are planned initially
- While the U.S. is putting up its third-generation advanced fleet of TDRS (Tracking & Data Relay Satellites), Russia has its Satellite Data Relay Network and Europe is building its own European Data Relay System. China is into its second generation Tianlian II series.
- Older space majors such as the U.S. and Russia started their relay satellite systems in the late 1970s-80s and a few already have around 10 satellites each. They have used them to monitor their respective space stations Mir and the International Space Station, and trips that dock with them, as well as the Hubble Space Telescope

Benefits

- ISRO has a roadmap dotted with advanced LEO mission such as space docking, space station, as well as distant expeditions to moon, Mars and Venus
- It will also be useful in monitoring launches
- Gaganyaan mission would also benefit as the prospective crew could be fully and continuously in touch with mission control throughout their travel.

64. GOCO Model

- Army has initiated the process of identifying potential industry partners to implement the Government Owned Contractor Operated (GOCO) model of its base workshops and ordnance depots intended to improve operational efficiency
- The model was one of the recommendations of the Lt. Gen DB Shekatkar committee to enhance combat capability and re-balancing defence expenditure
- Based on the recommendations, the government has decided to disband two advance base workshops, one static workshop and four ordnance depots and eight Army Base Workshops (ABWs) are recommended to be corporatised on GOCO model
- The service provider should be an Indian registered company with at least 10 years of working experience in related domains and have a turnover of ₹ 50 crore for eacf of the last three financial years.

65. H9N2 Virus

- Indian scientists have detected the country's first case of infection with a rare variant of the virus that causes avian influenza or bird flu

About the Virus

- It is a subtype of the influenza A virus, which causes human influenza as well as bird flu
- It was isolated for the first time in US in 1966 from turkey flocks
- H9N2 viruses are found worldwide in wild birds and are endemic in poultry in many areas
- H9N2 virus infections in humans are rare, but likely under-reported due to typically mild symptoms of the infections. Cases of human infection have been observed in Hong Kong, China, Bangladesh, Pakistan, and Egypt

✓The first case of human infection was reported from Hong King in 1998

In India

- The virus was picked up in February 2019 during a community-based surveillance study in 93 villages of Korku tribes in Melghat district of Maharashtra

66. Oldest Material on Earth

- Scientists have discovered stardust that formed five to seven billion years ago in a meteorite that fell fifty years ago in Australia
- All of the dust specks analysed in the research came from before the solar system's formation known as "presolar grains"

✓It is a major discover since presolar grains are found only in about five percent of meteorites that fall to Earth

✓The grains are small, measuring from 2 to 30 micrometers in size

Murchison meteorite?

- It is an especially chemically primitive carbonaceous chondrite meteorite that fell near the town of Murchison in Victoria Australia in 1969
- It is one of the most studied meteorites of all because it contains 90 different amino acids, only 19 of whichare found on Earth

Why is the meteorite important?

- Presolar grains are formed when a star dies. By measuring their exposure to cosmic rays high energy particles that fly through our galaxy and penetrate solid matter using isotopes of Neon, the scientists figured out how old the presolar grains are

✓During the solar system's birth, this dust was incorporated into everything that formed including theplanets and the sun but survived intact until now only in asteroids and comets

- Most are 4.6-4.9 billion years old, some are older than 5.5 billion years, but the oldest are 7.5 billion yearsold

What does it tell?

- Contrary to the theory that stars form at a steady rate, this study provides evidence that there was a period of intense star formation seven billion years ago
- Stardust is the oldest material to reach Earth, and from it, we can learn about our parent stars, the origin of the carbon in our bodies, the origin of the oxygen we breathe

Oldest Materials

- Scientists previously had found a presolar grain in the Murchison meteorite that was about 5.5 billion years old, until now the oldest-known solid material on Earth. The oldest-known minerals that formed on Earth are found in rock from Australia's Jack Hills that formed 4.4 billion years ago, 100 million years after the planet formed.

67. Hydrochlorofluorocarbon (HCFC) - 141 b

- India has successfully achieved the complete phase out of HCFC-141 b
- It is a chemical used by foam manufacturing enterprises and one of the most potent ozone depleting chemical after Chlorofluorocarbons (CFCs).
- (HCFC)-141 b is used mainly as a blowing agent in the production of rigid polyurethane (PU) foams.
- It is not produced in the country and all the domestic requirements are met through imports
- In India, the foam manufacturing sector is mix of large, medium and small enterprises having varying capacities, with preponderance of MSMEs. Many of the MSMEs operate largely in the informal sector.

68. Vyommitra

- ISRO introduced Vyommitra, a half-humanoid to an international gathering where she introduced herself
- It will be sent to space as a trail before Gaganyaan, which will be launched in 2022
- The humanoid will simulate the human functions required for space before real astronauts take off before August 2022
- Two flights without crew will take place with a humanoid — in 2020 and 2021 Her body stops at the torso and has no legs

69. Thirty Metre Telescope

- Once it is built, the Thirty-Meter Telescope (TMT) will become one of the world's largest general-purpose observations, allowing astronomers to study the outer reaches of the universe and study distant stars and exoplanets than much greater detail than is currently possible.
- India wants TMT to be shifted out of Hawaii because the proposed site for the TMT, atop the dormant Mauna Kea volcano is a sacred location for the island's native population
- India has committed 10% of the project's resources and Indian scientists are in turn guaranteed 10% of observation time on the TMT once it is ready

- Prior to picking Mauna Kea, the international collaboration had prepared a shortlist of five sites, including one in Hanle, Ladakh, where the Indian Astronomical Observatory is also located.

  ✓Mauna Kea came out on top because it offers better viewing conditions for astronomers; on the other hand, Hanle is located close to the India-China border and is a high-security area with tightly controlled access.

- The telescope was originally expected to be ready by 2025
- The next most favourable location on the shortlist is the Roque de los Muchachos Observatory in the Canary Islands, which belong to Spain.

Evaluation Process for an Appropriate Site

- Scientific suitability (water vapour in the atmosphere, atmospheric turbulence and number of cloud-free nights in a year)
- Infrastructure
- logistics for setting-up of such a large international scientific project

About TMT

- It is an international project being funded by scientific organisations of Canada, China, India, Japan and USA
- The project is the joint responsibility of the Department of Science & Technology (DST) and the Department of Atomic Energy (DAE)
- It will enable scientists to study fainter objects far away from us in the Universe, which gives information about early stages of evolution of the Universe
- It will give us finer details of not-so-far-away objects like undiscovered planets and other objects in the Solar System and planets around other stars.
- TMT being the largest optical and infrared telescope in the northern hemisphere will enable several discoveries which will surely inspire future generations. Project will also provide state-of-the-art high end technologies to the country, which would benefit a number of industries and R&D centers in the country.

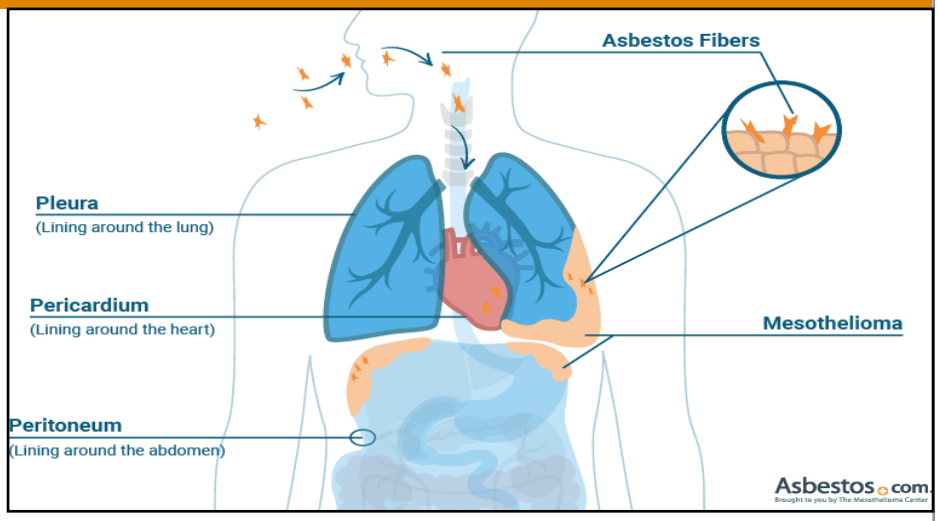
70. Air Defence Tactical Control Radar (ADTCR)

- ADTCR, developed by DRDO, was displayed during the Republic Day Parade
- It is used for volumetric surveillance, detection, tracking and friend/foe identification of aerial targets of different types, and transmission of prioritised target data to multiple command posts/weapon
- systems
- The radar is capable of detecting very small and low flying targets. The system employs state of the art Active Phased Array Technology with Digital Beam Formatting
- The Radar System including 4D Radar, power & cooling systems, operator shelter, communication equipment etc. is configured on two High Mobility Vehicles.

- The Radar can be deployed in plain lands, deserts and in the mountain regions for the purpose of tactical early warning for Ground based Weapon Systems.

71. Mesothelioma

- It is an incurable, asbestos-related cancer that typically affects the lining of the lungs. However, this tumour can developed in the lining of the abdominal cavity or heart
- Asbestos exposure is the primary cause of mesothelioma. People exposed to asbestos at home, work or in the military have a higher risk of developing the disease.



Exposure

- People exposed to large amounts of asbestos as part of their career
- Secondhand exposure is also common, especially among the spouses and children of people who worked with asbestos
- Blue-Collar Workers: Firefighters, construction workers, power plant workers etc.

Treatment

- Treatment may improve prognosis and can include surgery, chemotherapy or radiation

72. Project NETRA

- Network for space object Tracking and Analysis
- It is an early-warning system initiated by ISRO in space to detect debris and other hazards to Indian satellites
- It will give India its own capability in space situational awareness (SSA) which could be used to predict threats from debris to Indian satellites
- It can also serve as an unstated warning against missile or space attack for the country
- Under it various observational facilities such as connected radars, telescopes, data processing units and a control centre would be set up
  - ✓ They can spot, track and catalogue objects as small as 10 cm, up to a range of 3400 km and equal to a space orbit of around 2000 km
- NETRA's eventual goal is to capture the GEO scene at 36000 km where communication satellites operate

NORAD

- It is the North American Aerospace Defense Command, an initiative of the US and Canada that shares selective debris data with many countries
- ISRO uses the services of NORAD at present to do collision avoidance manoeuvres.

73. Blue Dot Network

- U.S. has launched a "Blue Dot Network" which has already taken Japan and Australia on board to encourage private investment in infrastructure projects
- The aim of this initiative is to bring governments, the private sectors, and civil societies for promoting high-quality global infrastructure development in an open and inclusive framework
- The network is "ratings mechanism" that will classify the market-driven nominated infrastructure projects which will be based on the transparency and financially sustainability in the Indo-Pacific region and around the world and is planned as direct counter to China's Belt and Road Initiative
  - ✓ Unlike the BRI, the BDN would not offer public funds or loans for the project
  - ✓ It will grade infrastructure projects on debt, environmental standards, labour standards etc.
- Through Blue Dot Network, transparent, sustainable, and socially and environmentally responsible critical infrastructure has been envisaged for widespread economic empowerment. The US is quite happy being a partner of this network to fully unlock the power of quality infrastructure to foster unprecedented opportunity, progress, and stability.
- Endorsement of Blue Dot Network not only creates a solid foundation for infrastructure global trust standards but reinforces the need for the establishment of umbrella global trust standards in other sectors, including digital, mining, financial services, and research.

74. Classical Swine Fever

Context

- Indian scientists at ICAR have developed Classical Swine Fever (CSF) cell culture vaccine which will help in producing cost-effective alternative to currently used vaccines for preventing the deadly fever in pigs that contribute to 10% of the country's total meat production
- The indigenously developed vaccine will also help in saving rabbits as the currently used vaccine (lapinized CSF vaccine) is produced by sacrificing large numbers of rabbits
- CSF is one of the deadliest diseases of pigs, causing high mortality — CSF is considered one of the reasons for causing decline in population of pigs in the country in 2019 compared to 2012 census
- The new vaccine will be part of the government's 'One Health Initiative' and will nip the spread of the virus at animal stage so that it does not pass on to the human population

About CSF

- CSF also known as hog cholera is a contagious viral disease of domestic and wild swine

- It is caused by a virus of the genus *Pestivirus* of the family *Flaviviridae*, which is closely related to the viruses that cause bovine viral diarrhoea in cattle and border disease in sheep
- There is only one serotype of CSF virus (CSFV). CSF is a disease listed by the OIE World Organisation for Animal Health (OIE) *Terrestrial Animal Health Code* and must be reported to the OIE

Transmission

- Direct contact
- The virus is shed in saliva, nasal secretions, urine, and feces.
- Contact with contaminated vehicles, pens, feed, or clothing may spread the disease. Animals that are chronic carriers of the disease (persistently infected) may show no clinical signs of illness but may shed the virus in their feces. Offspring of infected sows can become infected in the uterus, and can shed the virus for months.
- Humans are not affected by this virus

75. Vikram Sarabhai Centenary Programme

- Over 100 events would be organized in 100 selected cities across the country, as the Indian Space Research Organization (ISRO) celebrates the birth centenary of India's space pioneer Vikram Sarabhai
- A commemorative coin would also be unveiled on the occasion
- The inaugural event took place in Ahmedabad which witness participation from school students and noted scientists from ISRO, Department of Space and Department of Atomic Energy
- A special exhibition—Space on Wheels— also took place
- The programme included space exhibitions, competitions for school and college students and speeches by eminentpersonalities
- ISRO has announced Vikram Sarabhai Journalism Award in Space Science, Technology and Research as part of the centenary year celebrations

About Vikram Sarabhai

- Father of Indian space programme was born on 12 August 1919, in Ahmedabad (Gujarat)
- He led the establishment of the Physical Research Laboratory (PRL) in the city in 1947
- Instrumental in setting up of Indian Space Research Organisation on 15 August 1969 under Department of AtomicEnergy
- He set up the first rocket launching station of India at Thiruvanathapuram
- ISRO began with air-borne remote sensing experiments and then went on to fulfill Sarabhai's dream the Satellite Instructional Television Experiment (SITE) in 1975, four years after his death. SITE demonstrated the power of satellite technology for mass media and introduced the country especially its rural areas to satellite-based television programmes.
- Late president Dr. APJ Abdul Kalam termed Dr Sarabai as the "Mahatma Gandhi of Indian Science"

76. INS Karanj

- It is a Scorpene-class submarine launched at Mazagon Dock Shipbuilders Limited in 2018
- It is the third of the six Scorpene-class submarines under Project 75 programme
- It is a diesel-electric attack submarine
- The state-of-the-art technology utilised for construction of the Scorpene class submarines has ensured superior stealth features such as

  ✓advanced acoustic silencingtechniques

  ✓low radiated noiselevels

  ✓hydro-dynamically optimized shapeand

  ✓the ability to launch a crippling attack on the enemy using precision guided weapons.
- The attack can be launched with both torpedoes and tube launched anti-ship missiles, whilst underwater or on surface. The stealth of this potent platform is enhanced by the special attention given to various signatures. These stealth features give it aninvulnerability, unmatched by most submarines.
- Scorpene submarines can undertake multifarious types of missions i.e Anti-Surface warfare, Anti-Submarine warfare, intelligence gathering, mine laying, area surveillance etc. The submarine is designed to operate in all theatres, with means provided to ensure interoperability with other components of a Naval Task Force. It is a potent platform, marking a generational shift in submarine operations.
- The attacks can be carried out with torpedoes both while submerged or on the surface — in all war theatres including the tropics, giving it an unmatched invulnerability.

77. Solar Orbiter (Solo)

- Collective mission between European Space Agency and NASA to study the Sun
- It will take first pictures of the top and bottom of the sun
- Before SolO, all solar imaging instruments have been within the ecliptic plane, in which all planets orbit and which is aligned with the sun's equator
- Solo will use the gravity of Venus and Earth to swing itself out of the ecliptic plane, passing inside the orbit of Mercury, and will be able to get a bird's eye view of the sun's poles for the first time
- In 1990, NASA and ESA had sent the Ulysses mission, which also passed over the sun's poles but at much farther distances, and did not carry a camera

Importance

- By understanding the behaviour of the sun, the Orbiter aims to provide information on how the former would affect technology such as satellites, navigation systems, power grids, and telecommunication services

- The Orbiter will help scientists understand the sun's dynamic behaviour, and solve mysteries such as the sunspot cycle, or why the star spews out high velocity charged particles through the solar system
- With more data on the global magnetic field of the star, scientists would be able to forecast space weather events

78. Integrated Air Defense Weapon System

- Also known as National Advanced Surface to Air Missile System (NASAMS), provides integrated air
- missile defence and is currently deployed around Washington, DC
- It includes radar, launchers, targeting and guidance systems, advanced medium-range air-to-air missile (AMRAAM) and Stinger missiles
- US has approved the sale of an Integrated Air Defence Weapon System to India for an estimated cost of $1.9 billion to modernise its armed forces and to expand its existing air defence architecture to counter threats posed by air attacks.

79. Dark Fibre

- In order to cut down on capital expenditure, Reliance Jio, Bharti Airtel and Vodafone Idea has reached out to the state-run Bharat Broadband Network Limited (BBNL) to use the dark fibre laid by the latter

  ✓ It could help in extending the 4G/LTE connectivity
- Dark fibre is the extra optical fibre laid by companies in order to avoid cost repetition when more bandwidth is needed
- It is also known as unlit fibre

Bharat Broadband Network Limited

- It is a Special Purpose Vehicle set up under Companies Act by Government of India with an authorized capital of Rs. 1000 Cr
- It has been mandated to create the National Optical Fiber Network (NOFN) in India.

Bharat Net

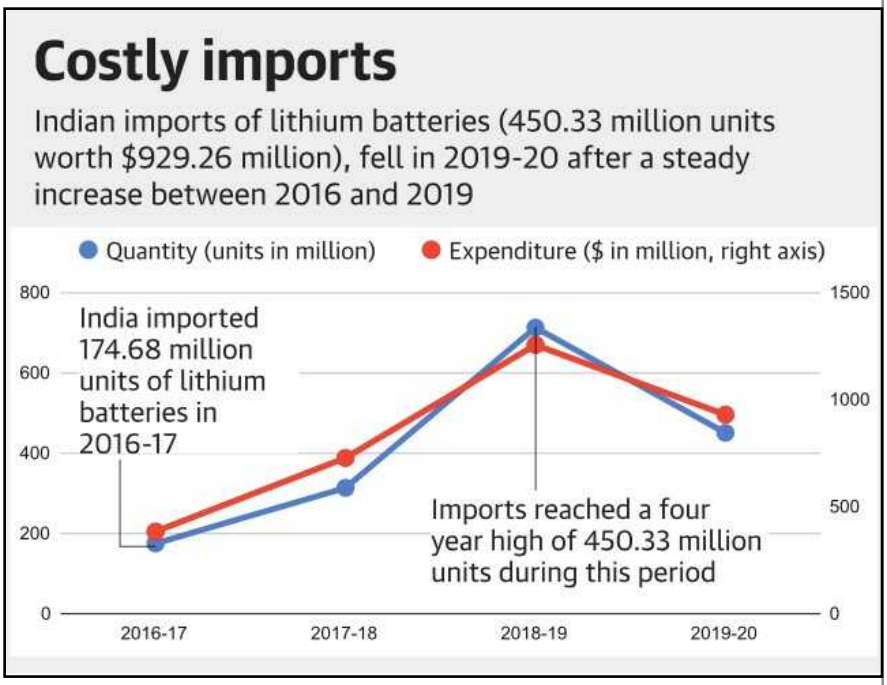
- BharatNet (previously NOFN) is planned to connect all the 2,50,000 Gram Panchayats in the country for providing broadband connectivity in the Gram Panchayats. Non-discriminatory access to the network will be provided to all the telecom service providers
- BBNL is the implementing agency for BharatNet
- The project is being funded by Universal Service Obligation Fund (USOF)

80. Import of Li–ion Batteries

- India has quadrupled its imports of lithium-ion (Li-ion) batteries and more than tripled its import bill on the product

  ✓ Used for powering a range of devices from cellphones to electric vehicles

- Indian manufacturers source Li-ion batteries from China, Japan and South Korea and the country among the largest importers in the world
- The Indian Space Research Organisation (ISRO) manufactures such batteries but volumes are limited and they are restricted for use in space applications



National Mission on Transformative Mobility and Battery Storage

- to drive clean, connected, shared, sustainable and holistic mobility initiatives
- Multi-disciplinary mission with Inter-Ministerial Steering Committee will be chaired by CEO NITI Aayog
- Mission will recommend and drive the strategies for transformative mobility and Phased Manufacturing Programmes for EVS, EV Components and Batteries.

81. India's First Space Science Museum

- India's first Space Science Museum has opened in Hyderabad
- It's a collaborative effort between the Indian Space Research Organization (ISRO) and the B M Birla Science Centre
- This museum exhibits scale models of Indian Launch vehicles GSLV Mark III, GSLV Mark II and PSLV, Chandrayaan-1, Mars Orbiter spacecraft, APPLE, Aryabhata, Bhaskara, Rohini RS-1 and a model of the International Space Station (ISS)
- Visitors can directly get in touch with India's Antarctic Space Station (Dakshin Gangotri) in real time

82. SUTRA PIC

- Scientific Utilisation Through Research Augmentation-Prime Products from Indigenous Cows is a programme to research on 'indigenous' cows
- Led by Department of Science and Technology (DST) in collaboration with Department of Biotechnology, the Council of Scientific and Industrial Research, the Ministry for AYUSH among others and the Indian Council of Medical Research as partners
- It has five themes
  1. Uniqueness of Indigenous Cows
  2. Prime-products from Indigenous Cows for Medicine and Health

3. Prime-products from Indigenous Cows for Agricultural Applications
4. Prime-products from Indigenous Cows for Food and Nutrition
5. Prime-products from indigenous cows-based utility items, according to a concept note on the DST website

- The research is aimed on complete characterisation of milk and milk products derived from Indian indigenous cows; scientific research on nutritional and therapeutic properties of curd and ghee prepared from indigenous breeds of cows by traditional methods; development of standards for traditionally processed dairy products of Indian-origin cow

Panchagavya

- It is an Ayurvedic panacea and is a mixture of five products of the cow — milk, curd, ghee, dung and urine

83. NASA InSight

- InSight is the first mission dedicated to looking deep beneath the Martian surface
  - ✓ It is supported by European partners including France's CNES, German Aerospace Centre (DLR) and United Kingdom Space Agency (UKSA)
- It is part of NASA's Discovery Program

Science Tools

- Seismometer for detecting quakes
- Sensors for gauging wind and air pressure
- Magnetometer
- Heat flow probe to take the planet's temperature

Findings

- Mars trembles more often than expected, but also more mildly
- It doesn't have tectonic plates like Earth, but it does have volcanically active regions that can cause rumbles
- Billions of years ago, Mars had a magnetic field. Although it is no longer present, it left behind what NASA describes as "ghosts" – magnetised rocks that are now between 61 m to several km below ground
- Thousands of passing whirlwinds occur, which are called dust devils — InSight is yet to see these
- InSight has two radios. One is for regularly sending and receiving data. The other radio, which is more powerful, is designed to measure the "wobble" of Mars as it spins. This X-band radio, also known as the Rotation and Interior Structure Experiment (RISE), can eventually reveal whether the planet's core is solid or liquid. A solid core would cause Mars to wobble less than a liquid one would

84. Habitable-zone Planet Finder (HPF)

- It is an astronomical spectrograph, built by Penn State University scientists, and recently installed on the 10m Hobby-Eberly Telescope in Texas
- The instrument is designed to detect and characterise planets in the habitable-zone — the region around the star where a planet could sustain liquid water on its surface — around nearby low-mass stars

  ✓The newly confirmed planet, called G 9-40b, is the first one validated by HPF. It is about twice the size of Earth, and orbits its star once every six Earth-days

- Spectrograph is an instrument that splits light into its component wavelengths

NASA Kepler Mission

- Part of NASA's Discovery Program, it is designed to survey a portion of our region of the Milky Way to discover Earth-size exoplanets in or near habitable zones (HZ) and estimate how many of the billions of stars in the Milky Way have such planets
- Primary goal is to determine the frequency of Earth-size and larger planets in the HZ of solar-like stars

85. Global Health Security Index

- The Global Health Security (GHS) Index is the first comprehensive assessment and benchmarking of health security and related capabilities across the 195 countries that make up the States Parties to the International Health Regulations (IHR [2005]).
- The GHS Index is a project of the Nuclear Threat Initiative (NTI) and the Johns Hopkins Center for Health Security (JHU) and was developed with The Economist Intelligence Unit (EIU).
- To create the GHS Index, NTI, JHU, and the EIU project team—with generous grants from the Open Philanthropy Project, the Bill & Melinda Gates Foundation, and the Robertson Foundation—worked with an international advisory panel of 21 experts from 13 countries to create a detailed and comprehensive framework of 140 questions, organized across 6 categories, 34 indicators, and 85 subindicators to assess a country's capability to prevent and mitigate epidemics and pandemics.

The 140 GHS Index questions are organized across six categories

1. **Prevention:** Prevention of the emergence or release of pathogens
2. **Detection and Reporting:** Early detection and reporting for epidemics of potential international concern
3. **Rapid Response:** Rapid response to and mitigation of the spread of an epidemic
4. **Health System:** Sufficient and robust health system to treat the sick and protect health workers
5. **Compliance with International Norms:** Commitments to improving national capacity, financing plans to address gaps, and adhering to global norms
6. **Risk Environment:** Overall risk environment and country vulnerability to biological threats

The GHS Index also includes indicators of nations' capacities and capabilities to reduce Global Catastrophic Biological Risks (GCBRs), which are biological risks of unprecedented scale that could cause severe damage to human civilization at a global level, potentially undermining civilization's long-term potential.

Findings

- The GHS Index analysis finds that **no country is fully prepared for epidemics** or pandemics. Collectively, international preparedness is weak.
- The **average** overall GHS Index score among all 195 countries assessed is **40.2** of a possible score of 100.
- The **US is the "most prepared" nation** (scoring 83.5), with the UK (77.9), the Netherlands (75.6), Australia (75.5) and Canada (75.3) behind it.
- **Thailand is ranked sixth in the Index** — the highest ranking for an Asian country.
- **India is ranked 57th** with a score of 46.5, falling in the middle tier.

The index **measures countries' capabilities from 0-100**, with 100 representing the highest level of preparedness. The GHS Index **scoring system** includes three tiers.

- **Low Scores:** Countries that score between 0 and 33.3 are in the bottom tier.
- **Moderate Scores:** Countries that score between 33.4 and 66.6 are in the middle tier and
- **High Scores:** Countries that score between 66.7 and 100 are in the upper or "top" tier.

86. Pradhan Mantri Bhartiya Janaushadhi Pariyojana

Objective

- Making quality medicines available at affordable prices for all, particularly the poor and disadvantaged, through exclusive outlets — Pradhan Mantri Bhartiya Janaushadhi Kendras— so as to reduce out of pocket expenses in healthcare

PM Bhartiya Janaushadhi

- PMBJ is a campaign launched by the Department of Pharmaceuticals in association with Central Pharma PSUs, to provide quality medicines at affordable prices to the masses through dedicated outlets called 'Pradhan Mantri Bhartiya Janaushadhi Kendra'. These kendras provide generic medicines at much lesser price

Jan Aushadhi Store (JAS)

- All therapeutic medicines are made available from Jan Aushadhi Stores.
- In addition to medicines and surgical items supplied by BPPI, Jan Aushadhi stores also sell allied medical products commonly sold in chemist shops so as to improve the viability of running the Jan Aushadhi store
- BPPI (Bureau of Pharma Public Sector Undertakings of India) has been established under the Department of Pharmaceuticals, Govt. of India, with the support of all the CPSUs for co-coordinating procurement, supply and marketing of generic drugs through the Jan Aushadhi Stores

Generic Medicine

- Generic drugs are marketed under a non-proprietary or approved name rather than a proprietary or brand name
- They are equally effective and inexpensive compared to their branded counterparts

87. Flow Diverter Stents Technology

- The research team of Sree Chitra Thirunal Institute of Medical Science and Technology (SCTIMST), Thiruvanthapuram, an Institute of National Importance under the Department of Science and Technology has developed an innovative intracranial flow diverter stent for the treatment of aneurysms of the blood vessels of the brain
- Flow diverters stents when deployed in the artery in the brain bearing the aneurysms, divert blood flow away from the aneurysm, thus reducing the chances of its rupture from the pressure of blood flow
- Intracranial aneurysm is a localized ballooning, bulging or dilation of arteries in the brain caused by progressive weakening of the inner muscles of the wall of the blood vessels
- Spontaneous rupture of the aneurysm can result in bleeding into the space around the brain resulting condition called a subarachnoid hemorrhage (SAH). Subarachnoid hemorrhage can lead to paralysis, coma or death
- The Surgical treatment of an aneurysm involves opening the skull and a clip on the neck of aneurysm, so that it is cut off from the path of blood flow
- There are three non surgical, minimally invasive endovascular treatments of aneurysms of the brain. In two of these procedures, the aneurismal sacis filled with platinum coils or occluded using high viscosity liquid polymer which solidifies when released into the sac thus sealing the sac. All these techniques have some limitation or the other
- A more attractive third minimally invasive option is deploying a flow diverter stent to bypass the segment of the blood vessel which has the aneurysm. Flow diverters have the advantages of being flexible and adaptable to the shape and course of the vessel. Also flow diverters promote healing of the vessel wall by removing the constant stress of blood flow on it
- The Chitra flow diverter is designed to have better grip on the walls of arteries of complex shapes in order to reduce the risk of migration of the device. The unique design is in its weave also makes this stent resistant to kinking or twisting, when it is placed in tortuous arteries and those with complex shapes. Even a 180 degrees bend does not occlude the lumen of the stent. Portion of the wires is made radio opaque for better visibility in X–Rays and fluoroscopy thus aiding accurate delivery of the diverter in the blood vessel
- Nitinol, a super elastic alloy with shape memory was acquired from National Aero Space Laboratories, Bengaluru (CSIR-NAL). When the device is deployed at the site, it is released from its crimped locked position and assumes the desired and originally designed shape because of the shape memory property of Nitinol. The flow diverter is delivered to the aneurysm in the brain using a delivery system. The delivery system has also been developed by the team

- The imported Flow diverter stents costs Rs 7-8 lakhs and is not manufactured in India. With the availability of the indigenous technology from SCTIMST and Nitinol from NAL, a well established industry should be able to manufacture and sell at a much lower price. The device is expected to be transferred to the Industry very soon and will subsequently undergo testing in animal and human clinical trails before commercialization

88. Milan Exercise

- The Navy has postponed its largest-ever Milan multilateral exercise due to the continuing spread of the deadly coronavirus
- 32 Navies including US, Russia, France, Australia and UK apart from neighbouring countries had already confirmed their participation
- China and Pakistan were not among the 41 countries invited for the exercise
- Navy has held 10 editions of Milan exercise, with the theme of "synergy across the seas" to enhance professional interactions between friendly foreign navies and learn best practices from each other since 1995

89. Bi-luminescent Security Ink

- Scientists from CSIR-National Physical Laboratory have come with a security ink that can prevent fake printing of passports and counterfeiting of currency notes
- The ink glows in red and green colours when illuminated by two different excitation sources at 254 nano meters (nm) and 365 nm, respectively
- The formation can be used to check the authenticity of passports, Government documents, tamper evident labels, identity cards, etc.

90. National Supercomputing Mission

- India has produced just three supercomputers since 2015 under the National Supercomputer Mission
  - ✓ It is a dedicated programme aimed at boosting the country's overall computing facilities
- MeiTy and DST handle the National Supercomputer Mission, and the mission's nodal agencies are the Centre for Development of Advanced Computing (C-DAC), Pune and Indian Institute of Science (IISc), Bengaluru
- Launched in 2015, it was conceived as a seven-year mission ending in 2022

The Mission

- It envisaged setting up a network of 70 high-performing computing facilities
  - ✓ These were to be installed at many of India's top academy institutions and scientific establishments like IITs, IISERs, NITs among others
- NSM's first supercomputer - PARAM Shivay installed in IIT-BHU, Varanasi inaugurated in 2019 (837 TeraFlop capacity)
- Second Supercomputer with a capacity of 1.66 PetaFlop was installed in IIT-Kharagpur

- Third System, PARAM Brahma (797 TeraFlop)

91. Terminology in Diseases

- Outbreak: Sudden rise in cases of a disease in a particular place
- Epidemic: A large outbreak, one that spreads among a population or region
- Pandemic: It refers to an endemic that has spread on a more global scale, affecting large numbers of people

92. KIRAN Scheme

- Knowledge Involvement in Research Advancement through Nurturing (KIRAN) Scheme is implemented by Department of Science and Technology (DST) to provide various career opportunities to women scientists and technologists
- Primarily aimed to bring gender parity in the S&T sector by inducting women talent in R&D domain
- Women Scientists Scheme (WOS) of the Department under the KIRAN scheme, including other schemes, empowers women in science and technology

93. India as an observer at Indian Ocean Commission (IOC)

- India became the fifth observer status of the Indian Ocean Commission
- The Western Indian Ocean (WIO) which is strategically connects the Indian Ocean to the Southeastern coast of Africa and beyond The member states are known to be erstwhile French colonies or partly British, partly French colonies. With France a member of IOC because of Reunion Islands, sources say they played a key role in ensuring India's admission
- The move will also lend greater significance to India's SAGAR (Security and Growth for all in the Region) policy of the Modi administration

Indian Ocean Commission (IOC)

- Created in 1982 at Port Louis, Mauritius
- It has five member nations-Comoros, Madagascar, Mauritius, Reunion (an overseas region of France) and Seychelles

94. Covid -19

- According to the WHO, around 80 per cent of people contracting COVID-19 recover without requiring any specialist treatment, and suffer only mild, cold-like symptoms

  ✓Only one in six people get seriously ill, when the disease develops further and features pneumonia

- Four categories into which people getting COVID-19 can be placed:

  ✓Those who have the virus but have no symptoms

  ✓Those who get an infection in the upper respiratory tract, showing symptoms such as fever, cough, and headache. Such people are able to transmit the virus despite not being aware of it

✓Those showing flu-like symptoms. This is the largest group

✓Those who develop a serious illness that features pneumonia

- Mostly older people and those with underlying conditions such as diabetes, heart and lung issues, high blood pressure are prone to develop a serious illness

How it becomes Severe?

- When the infection reaches the bronchial tree, or the structure which provides a passage for air to move into and out of each lung, it leads to inflammation, causing nerves to get irritated. This causes cough and fever
- If, however, the infection goes beyond the lining of the bronchial tree and to the end of air passages, where the gas exchange units are located, the situation exacerbates. Gas exchange is the process by which oxygen is delivered from the lungs to the bloodstream, and carbon dioxide is removed from the bloodstream to the lungs

  ✓When these gas exchange units get infected, they pour out inflammatory material into air sacs at the bottom of the lungs–causing pneumonia

- When the lungs are filled with this material, they are unable to get the required amount of oxygen into the bloodstream. The body's ability to take in oxygen and throw out carbon dioxide thus reduces. As pneumonia becomes severe, it can become life-threatening

COVID-19 pneumonia

- Most types of pneumonia that are known are bacterial, and treated using antibiotics. Pneumonia caused by COVID-19 is highly severe–affecting all of the lungs instead of small parts
- Additionally, the body's first responder mechanism–by which it tries to destroy a virus and limit its growth during an infection–gets impaired among groups of people, such as those having underlying heart and lung conditions, diabetes, and those over age 65

Treatment

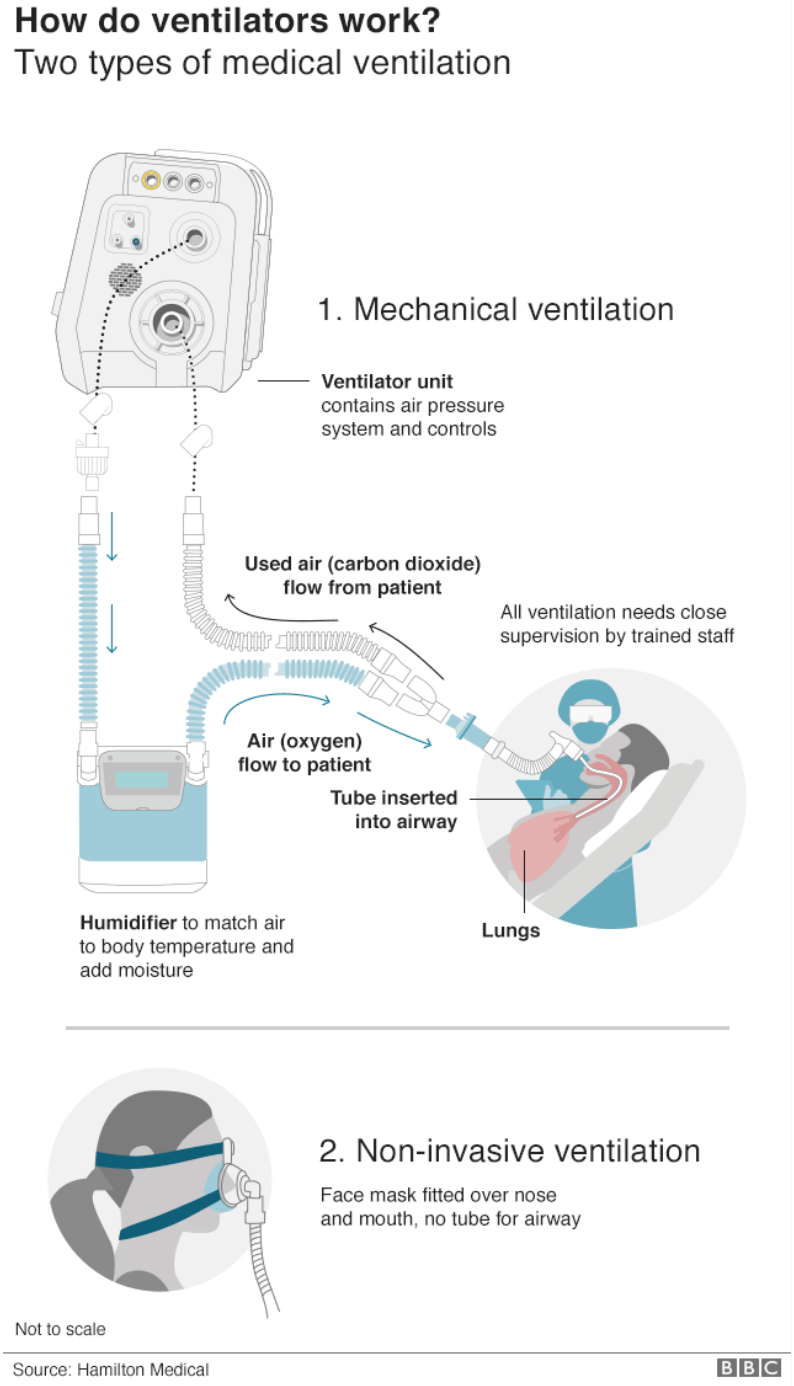
- Currently, apart from supportive treatment, there are no medications that can stop people from getting COVID-19 pneumonia
- Patients in intensive care are ventilated, and high oxygen levels are maintained so that the lungs are able to function in a normal way. Such patients are also treated with antiviral medication and antibiotics in order to avert the risk of contracting secondary infections

95. Ventilator

- It is a machine that helps to get more oxygen into the lungs and take carbon dioxide out
- Lungs are interwoven with blood vessels, which is how oxygen gets into the bloodstream and carbon dioxide gets carried out

  ✓COVID-19 makes this exchange more difficult in the most severe cases because a patient's lungs are inflamed and filled with fluid. (This also happens with infections like pneumonia)

- Modern ventilators consist of a pump machine and a tube that health care professionals slide into your windpipe to control airflow
- Normal breathing rate is about 15 breaths a minute, if the rate gets to about 28 times a minute, then this is a signal that ventilation may be needed
- In severe cases of Covid-19, the virus causes damage to the lungs. The body's immune system detects this and expands blood vessels so more immune cells enter
  - ✓But this can cause fluid to enter the lungs, making it harder to breathe, and causing the body's oxygen levels to drop
- Ventilation using facemasks, nasal masks or mouthpieces which allow pressurised air or mixtures of gases to be pushed into the lungs
  - ✓These are known as "non-invasive" ventilation, as no internal tubes are required



96. Serological Test

- In a first, India is set to start antibody test for Covid-19 to confirm whether a person had previously been infected with the virus
  - ✓It is known as a serological test, which looks for antibodies in the blood
  - ✓It is different from the current, diagnostic tests that determine active infection through nasal or throat swabs
- It will allow doctors to determine if a person has previously had a viral infection, based on the presence of antibodies in the blood, possible even if they were asymptomatic
- It is not a confirmatory test, but for the purpose of surveillance to generate data and understand the exposure

Serological Tests

- They are blood-based tests that are used to identify if any person has been exposed to a particular pathogen

- As part of these tests, the serum of the whole blood (the part that does not contain white and red blood cells) is analyzed as it contains antibodies that the body produces to fight pathogens, called antigens
- The serological tests are used during viral infections to see if the patient has an immune response to a pathogen, such as influenza. Using these tests, an infection can be used to diagnose an infection