

100+ General Science Questions NDA & CDS 2023

Q1. What are the Aptameters?

- (a) Antibody based diagnostic test kits for COVID-19
- (b) DNA or RNA sequences that bind to a specific target molecule
- (c) Enzymes released by body due to lack of adequate healthy red blood cells
- (d) Biosensors measuring oxygen requirement of the body

Q2. The contaminated water and poor sanitation are linked to transmission of which of the following disease(s)?

- 1. Cholera
- 2. Hepatitis A
- 3. Typhoid

Select the correct answer using the code given below:

- (a) 1 and 2 only
- (b) 2 only
- (c) 1 and 3 only
- (d) 1,2 and 3

Q3. Consider the following statements regarding the Glanders Disease:

- 1. It is a bacterial disease.
- 2. It only affects animals and not humans.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q4. Which of the following is/are source(s) of passive immunity?

- 1. Antibodies transported across the placenta to infant receives from its mother
- 2. Blood plasma transfusion from patients who have recovered from an infection
- 3. Vaccination by live attenuated vaccines

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 2 only
- (c) 1 and 3 only
- (d) 1,2 and 3

TEST SERIES
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Q5. Consider the following statements

1. Macrophages are white blood cells that swallow up and digest germs, dead or dying cells.
2. Antibodies are produced by specialized white blood cells called B lymphocytes.
3. T-lymphocytes attack cells in the body that have already been infected.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 2 only
- (c) 1 and 3 only
- (d) 1,2 and 3

Q6. Which of the following correctly defines the Wet-Bulb Temperature?

- (a) Ambient air temperature measured in shade
- (b) Temperature at which water vapor starts to condense out of the air
- (c) Temperature of a moistened thermometer exposed to the air flow
- (d) The ambient temperature measured in the direct sunlight

Q7. Consider the following statements

1. Water has more specific heat capacity than Air.
2. Water expands as it gets warmer at all temperatures.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q8. The Elastocaloric effect is recently seen in news is related to which of the following?

- (a) Cooling
- (b) Aero-dynamics
- (c) Nuclear power
- (d) Wind energy

Q9. The Government of India launched a prestigious programme “National Optical Fibre Network (NOFN)” to provide broadband services to rural areas. On which principle the optical fibre works?

- (a) Polarisation
- (b) Total internal reflection
- (c) Total internal refraction
- (d) None

Q10. Consider the following statements regarding SARAS 3 Telescope:

1. It is indigenously invented and built by Raman Research Institute
2. It is used in detecting extremely faint radio wave signals from the stars.
3. Like all electromagnetic waves, radio waves travel in a vacuum at the speed of light.

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 2 and 3
- (c) 1 and 3
- (d) 1,2 and 3

Q11. Which of the following statement correctly defines the Kessler syndrome?

- (a) A genetic disorder of having three copies of chromosome 21
- (b) A chain reaction of collisions creating more debris in space
- (c) A feeling of trust in cases of kidnapping by a victim towards a captor
- (d) A coping strategy where individuals use passivity and submissiveness when confronted with threat

Q12. NASA's Ingenuity mission is related to

- (a) Study Neptune and Uranus during planetary flybys
- (b) Flying Helicopter on Mars
- (c) Deep space exploration systems
- (d) Nuclear-powered drone to search for life on Mars

Q13. Consider the following statements regarding the NASA's **SOFIA Mission**:

1. It a lander-rover project on the surface of Moon.
2. It has confirmed the presence of water on the surface of the Moon.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q14. Consider the following statements regarding the **NewSpace India Limited (NSIL)**:

1. The ISRO chairperson is the ex-officio chairman of the NSIL.
2. NSIL will be the nodal agency for carrying out PSLV production through Indian Industry

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q15. Which of the following statements correctly defines Quasars?

- (a) Remote celestial objects emitting exceptionally large amounts of energy
- (b) A rapidly spinning neutron star
- (c) A star system consisting of two stars orbiting around their common barycentre
- (d) Star that have exhausted their nuclear fuel

Q16. Consider the following statements regarding Doppler radars

1. Doppler radars forecast weather by using the mechanism of radio waves.
2. They track the movement of weather systems and cloud bands, and thus g
2. They cannot detect thunderstorms and lightning.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q17. A planetary-mass object is recognised as Dwarf planets if it satisfies which of the following conditions?

1. It must be massive enough for it to have become spherical in shape under its own gravity.
2. It must be in direct orbit of the sun.
3. It must have cleared the neighborhood around its orbit.

Select the correct answer code:

- (a) 3 only
- (b) 1 and 2
- (c) 2 and 3
- (d) 1, 2 and 3

Q18. Consider the following statements regarding Machine to Machine communications

1. Machine to Machine communications refer to automated applications which involve machines or devices communicating through a network without human intervention.
2. It enables data to be transmitted from one device to another device through wired and wireless communications network

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q19. Generation AI (artificial intelligence) is the initiative of

- (a) International Telecommunication Union
- (b) World Bank Group
- (c) Global Artificial Intelligence network
- (d) UNICEF

Q20. Consider the following statements

1. People with Peter Pan Syndrome develop behaviours like living life carefree and finding responsibilities challenging in adulthood.
2. World Health Organization recognise Peter Pan Syndrome as a health disorder

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q21. Consider the following statements

- (A) Reprography refers to the reproduction and duplication of documents, written materials, drawings and designs.
- (B) It is carried out with minimal or complete absence of light.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q22. The 2022 Nobel prize for physics awards yet another milestone in quantum physics. In this context, the Quantum theory has applications in which of the following areas?

1. Computation
2. Cryptography
3. Networks

Select the correct answer code:

- (a) 1 only
- (b) 2 and 3
- (c) 1 and 3
- (d) 1, 2 and 3

Q23. Consider the following statements

1. Hominins refer to the now-extinct species of apes.
2. Paleogenomics, focuses on studying the DNA and genetic information of extinct hominins.
3. With time DNA becomes chemically modified and degrades into short fragments

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 and 3
- (c) 1 and 3
- (d) 1, 2 and 3

Q24. Consider the following statements

1. The mosquitoes that transmit Dengue are also vectors of chikungunya and Zika viruses.
2. The mosquitoes that cause Dengue and chikungunya do not breed in clear water.
3. The symptoms of Dengue is similar to that of Measles.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 and 3
- (c) 1 and 3
- (d) 1, 2 and 3

Q25. Wireless mobile charger is replacing USB mobile charger quite rapidly. Wireless mobile charger works on the principle of

- (a) Pascal's law
- (b) Bernoulli's principle
- (c) Electromagnetic induction
- (d) Kirchhoff's law

Q26. Consider the following statements regarding Internet of Things (IoT),

1. It has the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.
2. At present it works only on Virtual Private Networks (VPNs).

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q27. Aedes aegypti mosquito do not spread which of the following diseases

- (a) Chikungunya
- (b) Zika fever
- (c) Yellow fever
- (d) Japanese Encephalitis

Q28. Consider the following statements

1. The Surrogacy (Regulation) Act, 2021 (SRA) allows for surrogacy to married couples, live-in partners, single women, and also foreigners.
2. Assisted Reproductive Technology include gamete donation, intrauterine insemination, and in-vitro fertilisation

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q29. Param Pravega, recently seen in news is a

- (a) Satellite Launch Vehicle
- (b) India's first Quantum computer
- (c) Supercomputer
- (d) Radio telescope

Q30. Which of the following statements regarding Global Partnership on Artificial Intelligence is incorrect?

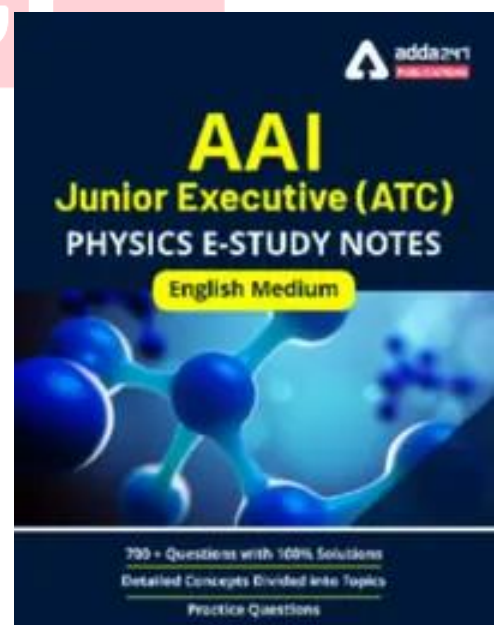
- (a) GPAI is an international and multi-stakeholder initiative to regulate and patent innovations in the sector of Artificial Intelligence
- (b) GPAI is supported by a Secretariat, to be hosted by the UN
- (c) India is a founding member of the GPAI
- (d) India will be the next president of the forum in the year 2022-23

Q31. Consider the following statements regarding Bacteriophages

1. These are ubiquitous viruses found wherever bacteria exist and can kill bacteria.
2. They do not contain any RNA or DNA and thus cannot be infected by bacteria.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2



Q32. Consider the following statements

1. Distributed ledger technology (DLT) is a digital system for recording the transaction of assets in which the details are recorded in multiple places at the same time.
2. Blockchain technology is a specific kind of Distributed ledger technology
3. Unlike traditional databases, distributed ledgers have a central data store or administration functionality

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 1 and 3
- (c) 2 and 3
- (d) 1, 2 and 3

Q33. Consider the following statements

1. Monkeypox is caused by a bacterium that is endemic in a few African countries.
2. Monkeypox has more visible manifestations such as rashes and blisters on human skin.
3. Earlier monkeypox fell under the category of neglected tropical diseases.

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 1 and 3
- (c) 2 and 3
- (d) 1, 2 and 3

Q34. Consider the following statements regarding 'Indigenously-developed Laser-Guided Anti-Tank Guided Missile (ATGM)

1. The all-indigenous ATGM can even defeat Explosive Reactive Armour (ERA) protected armoured vehicles
2. The capability of ATGM to engage targets from minimum to maximum range has been established

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q35. Consider the following statements

1. A solid-state battery can increase energy density per unit area since only a small number of batteries are needed
2. A solid-state battery has a higher energy density than a Li-ion battery that uses a liquid electrolyte solution

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q36. Consider the following statements regarding Global Nuclear Arsenals'

1. Russia and United States of America together account for more than three-fourths of all nuclear weapons
2. India possesses the highest number of nuclear warheads in the South-Asian region

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q37. Consider the following statements regarding Web 5.0

1. It will allow users to 'own their identity on the Internet and 'control their data'
2. Web 5.0 envision an Internet without the threat of censorship unlike Web 3.0
3. It is being developed by Meta and is still in its nascent stage

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 1 only
- (c) 2 and 3
- (d) 1, 2 and 3

Q38. Consider the following statements regarding Albinism

1. It is a group of inherited disorders where there is little or no production of the pigment melanin
2. Both the parents must carry the gene for their child to have this condition

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q39. 'LaMDA' a term frequently seen in news is used in the context of

- (a) Variant of concern
- (b) Deep learning
- (c) Fifth state of matter
- (d) Quantum computing

Q40. Consider the following statements regarding chromosomes

1. They are thread-like structures located inside the nucleus of animal and plant cells
2. All the human cells contain a pair of chromosomes
3. All eukaryotic chromosomes include packaging proteins called histones which bind to the DNA molecule

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 1 only
- (c) 2 and 3
- (d) 1, 2 and 3

Q41. CHaracterizing ExOPlanet Satellite (CHEOPS) often seen in the news recently is associated with?
(a) Roscosmos
(b) European Space Agency
(c) Japan Aerospace Exploration Agency
(d) National Aeronautics and Space Administration

Q42. Which of the following is the purpose of Terminator Tape sometimes seen in the news recently?
(a) To extract thorium
(b) To remove Space Debris
(c) To remove Nuclear Wastes
(d) Driverless transport technology

Q43. Mastcam-Z, MOXIE, and SHERLOC instruments are onboarded on which of the following Space mission?
(a) Lucy Mission
(b) Aditya L1 mission
(c) Preservance
(d) Artemis mission

Q44. Consider the following statements regarding Biological Safety Levels (BSL)
1. They are a series of protections designed to protect laboratory personnel, as well as the surrounding environment and community.
2. BSL is ranked from one to four and BSL1 refers to the lowest biosafety lab level whereas BSL-4 refers to the highest and most stringent lab level.
Which of the statements given above is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Q45. Consider the following statements regarding Genome India Project
1. The Council of Scientific and Industrial Research (CSIR) will serve as the nodal point of this project.
2. A Genome is defined as an organism's complete set of RNA including all of its genes.
Which of the statements given above is/are correct?
(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Q46. Limiting Factor" – one of the world's most advanced submersibles used to explore inhospitable depths is associated with which of the following missions?
(a) Mission Arabia
(b) Mission Maven
(c) Nekton Mission
(d) Operation Ice Bridge

Q47. Consider the following statements regarding Solar Orbiter (SolO)

1. This is the first medium-class mission to investigate the Sun's uncharted polar regions to learn more about how the Sun works
2. It is a collaborative mission between the European Space Agency (ESA) and NASA

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q48. Consider the following statements

1. Influenza is the same as stomach –flu|| or viruses that cause diarrhea and vomiting.
2. It is a fungal infection that attacks the respiratory system of the human body.
3. Influenza B is found only in humans

Which of the statements given above is/are correct?

- (a) 3 only
- (b) 1 and 2
- (c) 2 and 3
- (d) None

Q49. Consider the following pairs

1. Vajra Prahar – India and US
2. Ajeya Warrior – India and UK
3. Dharma Guardian – India and Japan

Which of the pair/s given above is/are correct?

- (a) 3 only
- (b) 1 and 2
- (c) 2 and 3
- (d) 1,2 and 3

Q50. Consider the following statements regarding Lassa disease.

1. It is a viral hemorrhagic disease caused by the Lassa virus, which naturally infects the widely distributed house flies.
2. Lassa virus does not spread from human to human.
3. There is no drug that exists for the treatment of the Lassa disease.

Which of the statements given above is/are correct?

- (a) 3 only
- (b) 1 and 2
- (c) 2 and 3
- (d) 1,2 and 3

Q51. Consider the following statements regarding recently announced National Guidelines for Gene Therapy,

1. It seeks to regulate the gene therapy procedures in India.
2. It mandates registration of all clinical trials with Clinical Trials Registry-India (CTRI).
3. All entities producing gene therapy products must establish an Institutional Bio-safety Committee (IBSC).

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3



Q52. The lowest amount of water in the soil that a plant requires to maintain its turgidity is known as:

- (a) Field Capacity
- (b) Available Water Capacity
- (c) Permanent Wilting Point
- (d) Total Soil Water Storage Capacity

Q53. Which of the following represents the correct order of abundance of elements by mass in the Earth?

- (a) Iron>Silicon>Magnesium>Oxygen
- (b) Oxygen>Iron>Silicon>Magnesium
- (c) Oxygen>Iron>Magnesium>Silicon
- (d) Iron>Oxygen>Silicon>Magnesium

Q54. The term parthenogenesis refers to

- (a) the process by which different plant pigments are formed
- (b) the phenomenon of night respiration in some plants
- (c) the production of an embryo from a female gamete without a male gamete
- (d) the process by which insectivorous plants absorb nutrients from the trapped Insects

Q55. Which of the following technologies will be enabled by the 5G mobile communication networks?

1. Internet of Things
2. Edge Computing
3. Network Slicing

Select the correct code from below:

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Q56. Operation Vanilla, recently seen in the news, pertains to:

- (a) provision of relief to flood-hit Madagascar by the Indian navy.
- (b) a bilateral tri-service exercise between India and the United States of America.
- (c) a study was undertaken by NITI Aayog to gauge the adoption of new technologies in rural India.
- (d) a field trial to determine the suitable soil conditions for vanilla cultivation in India.

Q57. Hybridoma technology is a new biotechnological approach for the commercial production of

- (a) monoclonal antibodies
- (b) interferon
- (c) antibiotics
- (d) alcohol

Q58. Consider the following statements

1. ELISA test is employed as the first and most basic test for an individual to detect cancer.
2. Almost 50 percent of human beings have Rh+ blood while the remaining have Rh- blood.

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q59. Recently, “oil zapper” was in the news. What is it?

- (a) It is an eco-friendly technology for the remediation of oily sludge and oil spills
- (b) It is the latest technology developed for undersea oil exploration
- (c) It is a genetically engineered high biofuel yielding maize variety
- (d) It is the latest technology to control the accidentally caused flames from oil wells.

Q60. India is an important member of the ‘International Thermonuclear Experimental Reactor’. If this experiment succeeds, what is the immediate advantage for India?

- (a) It can use thorium in place of uranium for power generation
- (b) It can attain a global role in satellite navigation
- (c) It can drastically improve the efficiency of its fission reactors in power generation
- (d) It can build fusion reactors for power generation

Q61. Consider the following statements

1. Nanotechnology is the understanding and control of matter at the nanoscale, at dimensions between approximately 1 and 1000 nanometers.
2. Nanostructured materials can have different magnetic properties compared to other forms or sizes of the same material

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q62. Consider the following statements regarding LiDAR

1. LiDAR is a remote sensing method that uses light in the form of a pulsed laser to examine the surface of the Earth.
2. LiDAR can be used to create 3D elevation map of a particular land.
3. LiDAR can detect pollutant particles of carbon dioxide, Sulphur dioxide, and methane

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 1 and 3
- (c) 2 and 3
- (d) 1, 2 and 3

Q63. Kessler syndrome is associated with

- (a) Gravitational lensing
- (b) Space junk
- (c) Meteor shower
- (d) Black Holes

Q64. Consider the following statements

1. Quantum Technology is based on the principles of quantum theory, which explains the nature of energy and matter on the atomic and subatomic level.
2. In India, the Centre has declared quantum technology as a “mission of national importance”.
3. National Mission on Quantum Technologies & Applications (NM-QTA) is being implemented by the Department of Science & Technology (DST)

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 1 and 3
- (c) 2 and 3
- (d) 1, 2 and 3

Q65. Consider the following statements regarding Indian Space Programme

1. Aryabhata was first Indian satellite and it carried scientific experiments to investigate X-ray astronomy and solar neutrons.
2. Mars Orbiter Mission was ISRO's first interplanetary mission.
3. Chandrayaan-1 was India's first mission to Moon

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 1 and 3
- (c) 2 and 3
- (d) 1, 2 and 3

Q66. Quantum technologies have applications in which of the following areas

1. Aero-space engineering
2. Numerical weather prediction
3. Securing the communications & financial transactions
4. Agriculture
5. Cyber security

Select the correct answer code:

- (a) 1, 2, 3, 4
- (b) 1, 3, 4, 5
- (c) 2, 3, 4, 5
- (d) 1, 2, 3, 4, 5

Q67. Collision of black holes generate which of these?

- (a) Electromagnetic waves
- (b) Cosmic waves
- (c) Gravitational waves
- (d) Neutrino waves

Q68. Which of the following are related to Genome editing techniques?

1. CRISPR-Cas9
2. Hydrogen-Finger Nucleases
3. Transcription Activator like effector Nucleases

Select the correct answer code:

- (a) 1 and 2
- (b) 1 and 3
- (c) 2 and 3
- (d) 1, 2 and 3

Q69. Consider the following statements regarding stem cells

1. They can divide over and over again to produce new cells.
 2. As they divide, they can change into the other types of cell that make up the body
- Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q70. Consider the following statements regarding Toxoid vaccines

1. Toxoid vaccines use a toxin (harmful product) made by the germ that causes a disease.
2. They create immunity against the whole germ that cause a disease.
3. Toxoid vaccines are used to protect against Diphtheria and Tetanus

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 1 and 3
- (c) 2 and 3
- (d) 1, 2 and 3

Q71. Consider the following statements regarding Naturopathy

1. Naturopathy is a system of treatment which recognises the existence of the vital curative force within the body.

2. Except for traumatic and environmental conditions, the cause of all diseases is one

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q72. Consider the following pairs

1. Vitamin A : Night blindness

2. Vitamin D: Scurvy

3. Vitamin B12: Anaemia

Which of the pair/s given above is/are correct?

- (a) 1 and 2
- (b) 2 and 3
- (c) 1 and 3
- (d) 1,2 and 3

Q73. Which among the following can be used to study the DNA?

1. Blood

2. Saliva

3. Bones

4. Teeth

5. Tissue

Which of the statements given above is/are correct?

- (a) 1, 3 and 5
- (b) 2, 3 and 4
- (c) 1, 3, 4 and 5
- (d) 1, 2, 3, 4 and 5

Q74. 'HEAT-Abhyas' is a?

(a) It is an autonomous flying drone (UAV) that will be used as a target for various missile systems.

(b) It is a short-range, surface-to-surface guided ballistic missile

(c) It is an indigenously built Anti-Submarine Warfare stealth corvettes

(d) It is an Indian nuclear-capable intercontinental ballistic missile (ICBM) developed by the DRDO

Q75. Consider the following statements regarding Stem Cell Therapy:

1. It is also known as regenerative medicine, promotes the repair response of diseased, dysfunctional or injured tissue using stem cells or their derivatives.

2. The Department of Biotechnology is responsible for giving regulatory permissions for the conduct of clinical trials and is responsible for approval of marketing licenses for drugs in India.

Which of the statements given above is/are not correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) None of the above

Q76. In India, it is legally mandatory for which of the following to report on cybersecurity incidents?

1. Service providers
2. Data centers
3. Body corporate

Select the correct code from below:

- (a) 1 only
- (b) 1 and 2 only
- (c) 3 only
- (d) 1, 2 and 3

Q77. India is an important member of the 'International Thermonuclear Experimental Reactor'. If this experiment succeeds, what is the immediate advantage for India?

- (a) It can use thorium in place of uranium for power generation
- (b) It can attain a global role in satellite navigation
- (c) It can drastically improve the efficiency of its fission reactors in power generation
- (d) It can build fusion reactors for power generation

Q78. Recently BepiColombo a joint mission of the [European Space Agency](#) (ESA) and the [Japan Aerospace Exploration Agency](#) (JAXA) was seen in the news it was launched to explore-

- (a) Kuiper Belt
- (b) Mercury
- (c) North pole of the moon
- (d) Venus

Q79. Consider the following statements regarding Solo Mission

1. It aims to investigate how the Sun creates and controls its heliosphere.
2. It was launched by JAXA

Which of the statements given above is/are correct?

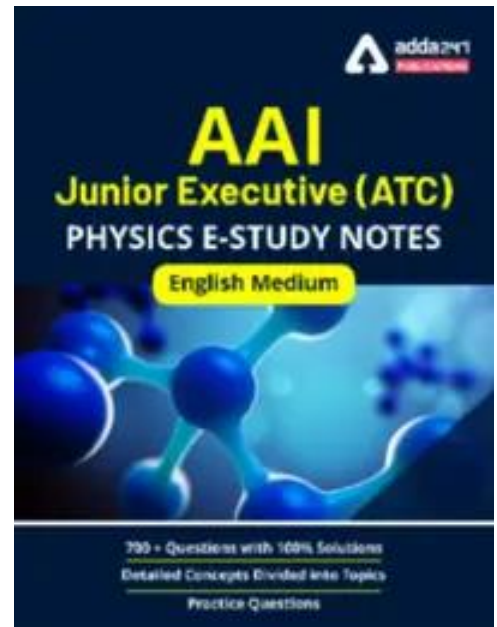
- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q80. Consider the following statements regarding Chandrayaan-2

1. Chandrayaan-2 was sent in 2019 to explore the lunar Surface
2. It consisted of a lunar orbiter, and also included the Vikram rover, and the Pragyan lander, all of which were developed in India.
3. it used the CLASS instrument to provide a global-scale measurement of sodium on the lunar surface using X-ray fluorescent spectra.

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 2 and 3
- (c) 1 and 3
- (d) 1,2 and 3



Q81. Consider the following statements

1. India's nodal authority responsible for command, control and operational decisions regarding India's nuclear weapons programme is Nuclear Command Authority (NCA)
2. The Executive Council of NCA is chaired by the Prime Minister of India who can authorize a nuclear attack if need be.
3. The NCA's directives are executed by the Strategic Forces Command

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 2 and 3
- (c) 1 and 3
- (d) 3 only

Q82. Consider the following statements

1. Embryonic stem cells (ESCs) are formed in the early stages of the embryo whereas Adult stem cells (ASCs) can be found throughout the entire body of an adult organism.
2. Induced pluripotent stem cells (iPSCs) are derived from ASC's cells that have been reprogrammed back into an embryonic-like pluripotent state

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) both 1 and 2
- (d) neither 1 nor 2

Q83. Consider the following statements regarding Cyber Security Exercise "Synergy"

1. It is an Initiative of the International Telecommunication Union
2. Indian Computer Emergency Response Team (CERT-In) under the Ministry of Electronics and IT Represented India in this exercise.
3. It aimed to persuade Member-States to build network resiliency against ransom ware & cyber extortion attacks.

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 2 and 3
- (c) 1 and 3
- (d) 1,2 and 3

Q84. Consider the following statements regarding the SPHEREx Mission

1. This **mission will search for water and organic molecules** in the milky way Galaxy
2. It is scheduled to be launched by 2023 by ESA

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Q85. In the context of solving the pollution problem, what is the Mottainai technique?

- (a) Using scrubbers to clean emissions from the industries.
- (b) Promoting the use of biofuels to reduce emissions from vehicles.
- (c) Reducing waste generation.
- (d) Promoting the use of biological solutions to pollution problems.

Q86. The polarimetry technique is related to which of the following?

- (a) Optical activity
- (b) Measuring ozone
- (c) Electricity measurement
- (d) Pollen Carbon Dating method

Q87. BepiColombo, is a spacecraft launched to explore which planet/ celestial body?

- (a) Saturn
- (b) Mars
- (c) Mercury
- (d) Venus

Q88. What is “Himawari-9” ?

- (a) Satellite launched by ISRO to study about the Himalayas
- (b) a next-generation meteorological satellite launched by JAXA
- (c) space observatory launched by Japan
- (d) meteorological satellite designed by NASA

Q89. Consider the following statements

1. Plant cells have cellulose cell walls whilst animal cells do not.
2. Plant cells do not have plasma membrane unlike animal cells which do.
3. Mature plant cell has one large vacuole whilst an animal cell has many small vacuoles.

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 2 and 3
- (c) 1 and 3
- (d) 1,2 and 3

Q90. Consider the following statements

1. A somatic cell is any cell of the body except sperm and egg cells.
2. Somatic cells are haploid
3. Mutations in somatic cells can affect the individual, but they are not passed on to offspring.

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 2 and 3
- (c) 1 and 3
- (d) 3 only

Q91. Consider the following statements regarding 'Light Combat Helicopter- Prachanda

1. The LCH is the first indigenous Multi-Role Combat Helicopter designed and manufactured by DRDO
2. It is capable of operating from high altitude terrain and carrying out precision strike at high altitude targets

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) both 1 and 2
- (d) Neither 1 nor 2

Q92. 'Network Planning Group' seen in news is used in the context of

- (a) 5G technology
- (b) Connectivity infrastructure
- (c) Internet penetration in rural areas
- (d) Military communication

Q93. Consider the following statements regarding Click chemistry

1. It is a single specific reaction that describes a way of generating products that follow examples in nature
2. Click chemistry is not limited to biological conditions alone
3. Incorporation of unnatural amino acids containing reactive groups into proteins and the modification of nucleotides is possible using click chemistry

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 2 and 3
- (c) 1 and 3
- (d) 1,2 and 3

Q94. Which of the following statements regarding Quantum entanglement is incorrect?

- (a) It is a state where several particles behave like a single unit even when they are separated
- (b) Quantum communication, quantum computation and information processing tasks is possible through entanglement that are impossible for classical systems
- (c) Higher dimensional systems (dimension greater than two) are proven to have advantages in both quantum computing and quantum communications
- (d) All are correct

Q95. Consider the following statements regarding 'Chandrayaan - 2'

1. The orbiter of the mission contains a Large Area Soft X-ray Spectrometer (CLASS) which makes use of X-ray spectra to determine the elemental composition of the lunar surface
2. The main scientific objective is to map the location and abundance of lunar water
3. The mission has recently detected presence of Sodium on lunar surface

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 2 and 3
- (c) 1 and 3
- (d) 1,2 and 3

Q96. Consider the following statements regarding 'New Gen Launch Vehicle

1. It is a two stage reusable heavy lift vehicle
2. It will feature semi-cryogenic propulsion for the booster stages
3. It can carry 50 tonne payload to Geostationary Transfer Orbit

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 2 only
- (c) 1 and 3
- (d) 1,2 and 3

Q97. Consider the following statements regarding 'Women Involvement in Science and Engineering Research (WISER) programme'

1. The programme is open to all the areas of STEM and has a three year tenure period
2. It allows the researchers to work on international projects while continuing to stay in India

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) both 1 and 2
- (d) Neither 1 nor 2

Q98. Which of the following statement regarding Web 3.0 is incorrect?

- (a) It refers to a "read-write-execute" web – with decentralization as its bedrock
- (b) It is a digital world where people are able to interact with each other without the need of an intermediary
- (c) Users will have ownership stakes in platforms and applications under 3.0 unlike earlier versions
- (d) All are correct

Q99. Consider the following statements regarding LVM3-M2/ Oneweb India – 1 Mission'

1. It is a dedicated commercial space mission of the Indian National Space Promotion and Authorisation Centre (IN-SPACe)
2. The mission placed the satellites in the Low Earth Orbit 600 km above Earth
3. The launch vehicle LVM3-M2 consists of three stages consisting of two solid propellant strap-ons

Which of the statements given above is/are correct?

- (a) 1 and 2
- (b) 3 only
- (c) 1 and 3
- (d) 1,2 and 3



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Q100. Consider the following statements regarding ‘Sandalwood Spike Disease’

1. The disease is caused by a fungus which are transmitted by an insect vector
2. There is no cure for this disease currently

Which of the statements given above is/are correct?

- (a) 1 only
- (b) 2 only
- (c) both 1 and 2
- (d) Neither 1 nor 2

SOLUTIONS

S1. Ans.(b)

Sol. Aptamers are oligonucleotide or peptide molecules that bind to a specific target molecule. Aptamers can be classified as: DNA or RNA aptamers consisting of (usually short) strands of oligonucleotides and Peptide aptamers consisting of one (or more) short variable peptide domains, attached at both ends to a protein scaffold. These the artificial single-stranded DNA or RNA sequences (or peptides) fold into secondary and tertiary structures making them bind to certain targets with extremely high specificity. # Birla Institute of Technology, Ranchi, has initiated the research with support from the Science and Engineering Research Board (SERB) under DST on the covid-19 detection kit, which can be stored under less stringent conditions. Scientists are working on detecting a target spike protein using bioinformatics tools. The kit will use aptamer (a biosensor) to detect SARS-Co-V2.

S2. Ans.(d)

Sol. Contaminated water and poor sanitation are linked to transmission of diseases such as cholera, diarrhoea, dysentery, hepatitis A, typhoid, and polio. Diarrhoea is the most widely known disease linked to contaminated food and water but there are other hazards. In 2017, over 220 million people required preventative treatment for schistosomiasis – an acute and chronic disease caused by parasitic worms contracted through exposure to infested water. In 2017, 71% of the global population (5.3 billion people) used a safely managed drinking-water service – that is, one located on premises, available when needed, and free from contamination. In 2010, the UN General Assembly explicitly recognized the human right to water and sanitation.

S3. Ans.(a)

Sol. Statement 1 is correct. Glanders is an infectious disease that is caused by the bacterium *Burkholderia mallei*.

Statement 2 is incorrect. Though not common, people have gotten glanders from sick animals. People who are in close contact with animals that have glanders are more likely to get the disease than those who are not.

S4. Ans.(a)

Sol. Option 1 and 2 are correct. Passive immunity is the transfer of antibody produced by one human or another animal to another. Passive immunity provides protection against some infections, but this protection is temporary. -The most common form of passive immunity is that which an infant receives from its mother. Antibodies are transported across the placenta during pregnancy. As a result, a full-term infant will have the same antibodies as its mother. These antibodies will protect the infant from certain diseases

for up to a year. -Many types of blood products contain antibody. Some products (e.g., washed or reconstituted red blood cells) contain a relatively small amount of antibody and some (e.g., intravenous immune globulin and plasma products) contain a large amount which is used for antibody transfusion. Option 3 is incorrect. Active immunity is stimulation of the immune system to produce antigen-specific humoral (antibody) and cellular immunity. Unlike passive immunity, which is temporary, active immunity usually lasts for many years, often for a lifetime. -One way to acquire active immunity is to survive infection with the disease-causing form of the organism. -Another way to produce active immunity is by vaccination. Vaccines interact with the immune system and often produce an immune response similar to that produced by the natural infection, but they do not subject the recipient to the disease and its potential complications.

S5. Ans.(d)

Sol. The immune system uses several tools to fight infection. Blood contains red blood cells, for carrying oxygen to tissues and organs, and white or immune cells, for fighting infection. These white cells consist primarily of macrophages, B-lymphocytes and T-lymphocytes: Macrophages are white blood cells that swallow up and digest germs, plus dead or dying cells. The macrophages leave behind parts of the invading germs called antigens. The body identifies antigens as dangerous and stimulates antibodies to attack them. B-lymphocytes are defensive white blood cells. They produce antibodies that attack the antigens left behind by the macrophages. Each B cell produces a single species of antibody, each with a unique antigen-binding site. T-lymphocytes are another type of defensive white blood cell. There are two major types of T cells: the helper T cell and the cytotoxic T cell. As the names suggest helper T cells 'help' other cells of the immune system, whilst cytotoxic T cells kill virally infected cells and tumors.

S6. Ans.(c)

Sol. The Wet Bulb temperature is the temperature of adiabatic saturation. This is the temperature indicated by a moistened thermometer bulb exposed to the air flow. Wet Bulb temperature can be measured by using a thermometer with the bulb wrapped in wet muslin. The wet bulb temperature is always lower than the dry bulb temperature but will be identical with 100% relative humidity (the air is at the saturation line). -The Dry Bulb Temperature refers basically to the ambient air temperature. It is called "Dry Bulb" because the air temperature is indicated by a thermometer not affected by the moisture of the air. Dry-bulb temperature can be measured using a normal thermometer freely exposed to the air but shielded from radiation and moisture.

S7. Ans.(a)

Sol. Statement 1 is correct. Water has a much higher heat capacity than air, meaning the oceans can absorb larger amounts of heat energy with only a slight increase in temperature. Water's specific heat capacity is $4200 \text{ Jkg}^{-1}\text{K}^{-1}$ and Air's is $993 \text{ Jkg}^{-1}\text{K}^{-1}$ therefore water has 4.23 times more specific heat capacity. The specific heat capacity is the amount of energy that must be added, in the form of heat, to one unit of mass of the substance in order to cause an increase of one unit in its temperature. Statement 2 is incorrect. Water is an unusual liquid and has unique properties. Water does indeed expand when warms, and it contracts when it cools, but not at all temperatures. An oddity occurs between 4 and 0 degrees Celsius (about 40- and 32-degrees Fahrenheit). Between the temperatures of 32 F (0 C) to 40 F (4 C), liquid water actually contracts with increasing temperature.

S8. Ans.(a)

Sol. When rubbers bands are twisted and untwisted, it produces a cooling effect. This is called the “elastocaloric” effect, and researchers have suggested that it can be used in a very relevant context today. Researchers from multiple universities, including Nankai University in China, have found that the elastocaloric effect, if harnessed, may be able to do away with the need of fluid refrigerants used in fridges and air-conditioners. These fluids are susceptible to leakages, and can contribute to global warming. In the elastocaloric effect, the transfer of heat works much the same way as when fluid refrigerants are compressed and expanded. When a rubber band is stretched, it absorbs heat from its environment, and when it is released, it gradually cools down. In order to figure out how the twisting mechanism might be able to enable a fridge, the researchers compared the cooling power of rubber fibres, nylon and polyethylene fishing lines and nickel-titanium wires. They observed high cooling from twist changes in twisted, coiled and super-coiled fibres.

S9. Ans.(b)

Sol. Optical fibre is a device which works on the principle of total internal reflection by which light signals can be transmitted from one place to another with negligible loss of energy.

S10. Ans.(d)

Sol. SARAS Telescope

It is indigenously invented and built by, researchers from Raman Research Institute, an autonomous institute of the Department of Science & Technology, Govt. Of India refuted this claim.

SARAS 3 is an indigenously invented and built radio telescope that can detect extremely faint radio wave signals from the depths of time. It can detect faint cosmological signals, especially radiation emitted by hydrogen atoms at the 21-cm wavelength (1.4 ghz) arising from the depths of the cosmos. Radio waves are a type of electromagnetic radiation with the longest wavelengths in the electromagnetic spectrum, typically with frequencies of 300 gigahertz (ghz) and below. Like all electromagnetic waves, radio waves in vacuum travel at the speed of light, and in the Earth's atmosphere at a close, but slightly lower speed.

S11. Ans.(b)

Sol. Spent rockets, satellites and other space trash have accumulated in orbit increasing the likelihood of collision with other debris. NASA space debris expert Don Kessler observed that, once past a certain critical mass, the total amount of space debris will keep on increasing: collisions give rise to more debris and lead to more collisions, in a chain reaction. The collisions create more debris creating a runaway chain reaction of collisions and more debris known as the Kessler Syndrome. This cascade of collisions first came to NASAs attention in the 1970's when derelict Delta rockets left in orbit began to explode creating shrapnel clouds. # Down's syndrome is a genetic disorder caused when abnormal cell division results in extra third genetic material from chromosome 21. # Stockholm syndrome refers to feelings of trust or affection felt in many cases of kidnapping or hostage-taking by a victim towards a captor.

S12. Ans.(b)

Sol. NASA's Ingenuity Mars Helicopter became the first aircraft in history to make a powered, controlled flight on another planet.

S13. Ans.(b)

Sol. Statement 1 is incorrect. SOFIA, the Stratospheric Observatory for Infrared Astronomy, is a Boeing 747SP aircraft modified to carry a 2.7-meter (106-inch) reflecting telescope (with an effective diameter of 2.5 meters or 100 inches). Flying into the stratosphere at 38,000-45,000 feet puts SOFIA above 99 percent of Earth's infrared-blocking atmosphere, allowing astronomers to study the solar system and beyond in ways that are not possible with ground-based telescopes. SOFIA is designed to observe the infrared universe. Many objects in space emit almost all their energy at infrared wavelengths and are often invisible when observed with visible light. Statement 2 is correct. NASA's Stratospheric Observatory for Infrared Astronomy (SOFIA) has confirmed, for the first time, water on the sunlit surface of the Moon. This discovery indicates that water may be distributed across the lunar surface, and not limited to cold, shadowed places. SOFIA has detected water molecules (H₂O) in Clavius Crater, one of the largest craters visible from Earth, located in the Moon's southern hemisphere.

S14. Ans.(a)

Sol. In order to commercially exploit the products and services emanating from Indian Space Programme, the "NewSpace India Limited (NSIL)" was incorporated in March 2019, as a wholly-owned Government of India under the administrative control of Department of Space (DOS). Statement 1 is incorrect. NewSpace India Limited (NSIL) is a Central Public Sector Enterprise of Government of India and commercial arm of ISRO. ISRO chairperson is not NSIL head, the current NSIL's Chairman and Managing Director, Narayanan, was earlier a Deputy Director at ISRO's Liquid Propulsion Systems Centre at Thiruvananthapuram. Statement 2 is correct. NSIL will be the nodal agency for carrying out PSLV production through Indian Industry under consortium route. The Industry consortium will be responsible for producing, assembling and integrating the launch vehicle. NSIL will be responsible for providing launch services to global satellite customers, onboard SSLV, PSLV, GSLV and GSLV-MkIII launchers.

S15. Ans.(a)

Sol. Quasars are extremely remote celestial objects, emitting exceptionally large amounts of energy. Quasars are believed to produce their energy from supermassive black holes in the center of the galaxies in which the quasars are located. Because quasars are so bright, they drown out the light from all the other stars in the same galaxy.

S16. Ans.(a)

Sol. How does a Doppler radar work?

In radars, a beam of energy— called radio waves— is emitted from an antenna. When this beam strikes an object in the atmosphere, the energy scatters in all directions, with some reflecting directly back to the radar. The larger the object deflecting the beam, the greater is the amount of energy that the radar receives in return. Observing the time required for the beam to be transmitted and returned to the radar allows weather forecasting departments to "see" raindrops in the atmosphere, and measure their distance from the radar. What makes a Doppler radar special is that it can provide information on both the position of targets as well as their movement. In India, Doppler radars of varying frequencies — S-band, C-band and X-band — are commonly used by the IMD to track the movement of weather systems and cloud bands, and gauge rainfall over its coverage area of about 500 km. An X-band radar is used to detect thunderstorms and lightning whereas C-band guides in cyclone tracking

S17. Ans.(b)

Sol. According to the definition adopted by the International Astronomical Union (IAU) in 2006, a dwarf planet is, "a celestial body orbiting a star that is massive enough to be rounded by its own gravity but has not cleared its neighboring region of planetesimals and is not a satellite. In essence, the term is meant to designate any planetary-mass object that is neither a planet nor a natural satellite that fits two basic criteria. For one, it must be in direct orbit of the sun and not be a moon around another body. Second, it must be massive enough for it to have become spherical in shape under its own gravity. And, unlike a planet, it must have not cleared the neighborhood around its orbit

S18. Ans.(c)

Sol. M2M communications refer to automated applications which involve machines or devices communicating through a network without human intervention. Sensors and communication modules are embedded within M2M devices, enabling data to be transmitted from one device to another device through wired and wireless communications networks.

S19. Ans.(d)

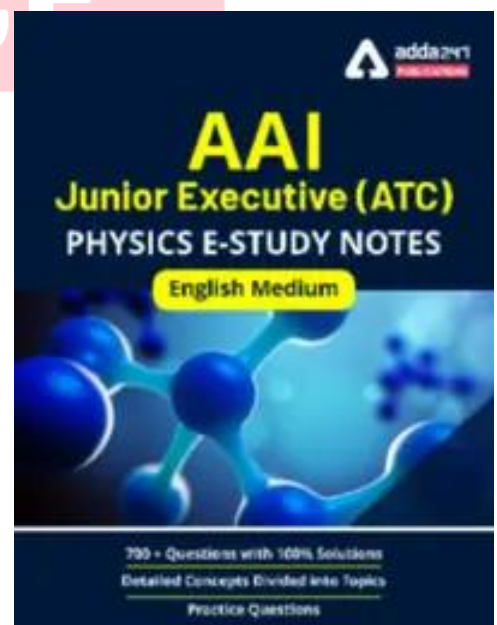
Sol. UNICEF's Generation AI initiative is currently working with the World Economic Forum's Centre for the Fourth Industrial Revolution and other stakeholders to realise the potential of AI for children in a safe and transparent way.

S20. Ans.(a)

Sol. Peter Pan is a fictional character created by Scottish novelist James Matthew Barrie in the early 1900s. His character is one of a care-free young boy, who never grows up. It is said that people who develop similar behaviours — of living life carefree, finding responsibilities challenging in adulthood, and basically, "never growing up" — suffer from Peter Pan Syndrome. While the World Health Organization does not recognise Peter Pan Syndrome as a health disorder, many experts believe it is a mental health condition that can affect one's quality of life. As Peter Pan Syndrome hasn't officially been diagnosed as a health disorder, there aren't clearly-defined symptoms or characteristics or even reasons which cause it. However, according to HealthLine, it could affect one's daily routine, relationships, work ethic, and result in attitudinal changes

S21. Ans.(a)

Sol. International Day of Non-Violence, held at the UN headquarters in New York, saw a life-size hologram of Gandhi displayed. According to the official website of UNESCO MGIEP, the 3D hologram of Gandhi was "created using photomapped images from 1930-1940 and advanced contouring software and 3D printing to create a life size wireframe of the Mahatma." To add colour and texture and produce a life-like image of the leader, "digital sculpting tools were used." The resultant image was further "animated and the voice lip-synced to produce a colour hologram with advanced reprographic techniques." Reprography refers to the "reproduction and duplication of documents, written materials, drawings, designs, etc., by any process making use of light rays or photographic means, including offset printing, microfilming, photography, ... and the like."



S22. Ans.(d)

Sol. This year's Nobel prize for physics awards yet another milestone in quantum physics. This has been dubbed a revolution in the making, with many possibilities for applications in quantum computation, quantum cryptography and quantum networks. Quantum entanglement: This is a quirk of quantum mechanics which allows two or more particles to exist in an 'entangled state' such that what happens to one particle affects the others immediately, irrespective of how far they may be.

S23. Ans.(d)

Sol. The Nobel Prize for Medicine was awarded to Swedish academic Svante Pääbo "for his discoveries concerning the genomes of extinct hominins and human evolution". Svante Pääbo accomplished something seemingly impossible: sequencing the genome of the Neanderthal, an extinct relative of present-day humans. Hominins refer to the now-extinct species of apes that are believed to be related to modern humans, as well as modern humans themselves. "Pääbo also found that gene transfer had occurred from these now extinct hominins to Homo sapiens following the migration out of Africa around 70,000 years ago. This ancient flow of genes to present-day humans has physiological relevance today, for example affecting how our immune system reacts to infections." Svante Pääbo established an entirely new scientific discipline, called paleogenomics, that focuses on studying the DNA and genetic information of extinct hominins through reconstruction. What are the challenges in carrying out such research? There are "extreme technical challenges because with time DNA becomes chemically modified and degrades into short fragments". The main issue is that only trace amounts of DNA are left after thousands of years, and exposure to the natural environment leads to contamination with DNA from bacteria and contemporary humans, making research complex

S24. Ans.(c)

Sol. Dengue is transmitted by several species of mosquitoes within the genus Aedes. Symptoms include fever, headache, muscle, and joint pain, and a characteristic skin rash that is similar to measles. There are four types of dengue strains, and type II and IV are considered to be more severe and normally require hospitalisation. According to experts, the aedes mosquito breeds in clean stagnant water. These mosquitoes are also vectors of chikungunya, yellow fever and Zika viruses. Dengue and chikungunya are caused by the bite of Aedes aegypti mosquito, which breeds in clear water. The Anopheles mosquito, which causes malaria, can breed in both fresh and muddy water.

S25. Ans.(c)

Sol. Wireless charging works by transferring energy from the charger to a receiver in the back of the phone via electromagnetic induction. The charger uses an induction coil to create an alternating electromagnetic field, which the receiver coil in the phone converts back into electricity, to be fed into the battery

S26. Ans.(a)

Sol. IoT is a system of interrelated computing devices, mechanical and digital machines, objects, or people that are provided with unique identifiers. Thus it can be said that it is an inter-networking of physical devices, vehicles, buildings and other items— embedded with electronics, software, sensors and network connectivity. The inter-networking has ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. IoT is also dubbed as the infrastructure of the information society. It allows objects to be sensed and controlled remotely across existing network infrastructure.

S27. Ans.(d)

Sol. Aedes aegypti, the yellow fever mosquito, is a mosquito that can spread dengue fever, chikungunya, Zika fever, Mayaro and yellow fever viruses, and other disease agents. Malaria is transmitted by Anopheles mosquito. Japanese Encephalitis is generally spread by mosquitoes, specifically those of the Culex type

S28. Ans.(b)

Sol. Surrogacy is defined by law as “a practice whereby one woman bears and gives birth to a child for an intending couple” and intends to hand over the child to them after the birth, as per The Surrogacy (Regulation) Act, 2021 (SRA). It further allows for surrogacy to be available only to infertile Indian married couples. The other legislation on this matter, the Assisted Reproductive Technology (ART) (Regulation) Act, 2021. This is open to married couples, live-in partners, single women, and also foreigners. ART procedures include gamete donation, intrauterine insemination, and in-vitro fertilisation or IVF. The SRA Act says the surrogate should be married and have a child of her own. Restricting altruistic surrogacy to legally wedded infertile Indian couples, the Act sets an age limitation for the couple where a husband must be between 26 and 55 years of age and a wife between 23 and 50 years. Further, Indian couples with biological or adopted children are prohibited to undertake surrogacy, save for some exceptions such as mentally or physically challenged children, or those sufferings from a life-threatening disorder or fatal illness

S29. Ans.(c)

Sol. The Indian Institute of Science (IISc.) has installed and commissioned Param Pravega, one of the most powerful supercomputers in India, and the largest in an Indian academic institution, under the National Supercomputing Mission (NSM).

S30. Ans.(b)

Sol. GPAI is an international and multi-stakeholder initiative to guide the responsible development and use of AI, grounded in human rights, inclusion, diversity, innovation, and economic growth.

GPAI will be supported by a Secretariat, to be hosted by Organization for Economic Cooperation and Development (OECD) in Paris, as well as by two Centers of Expertise- one each in Montreal and Paris.

Launched in June 2020 with 15 members, GPAI is the fruition of an idea developed within the G7. Today, GPAI's 25 members are Australia, Belgium, Brazil, Canada, Czech Republic, Denmark, France, Germany, India, Ireland, Israel, Italy, Japan, Mexico, the Netherlands, New Zealand, Poland, the Republic of Korea, Singapore, Slovenia, Spain, Sweden, the United Kingdom, the United States and the European Union. India had in 2020 joined the group as a founding member.

India will take over the chair of the Global Partnership on Artificial Intelligence for 2022-23.

S31. Ans.(a)

Sol. A bacteriophage is a type of virus that infects bacteria. In fact, the word "bacteriophage" literally means "bacteria eater," because bacteriophages destroy their host cells. All bacteriophages are composed of a nucleic acid molecule that is surrounded by a protein structure. In other words, they are comprised of a protein capsule around an RNA or DNA genome.

S32. Ans.(a)

Sol. Distributed ledger technology (DLT) is a digital system for recording the transaction of assets in which the transactions and their details are recorded in multiple places at the same time.

- Unlike traditional databases, distributed ledgers have no central data store or administration functionality.
- Whether distributed ledger technologies, such as blockchain, will revolutionize how governments, institutions and industries work is an open question.
- Blockchain technology is a specific kind of DLT that came to prominence after Bitcoin, a cryptocurrency that used it, became popular.
- Cryptocurrencies such as Bitcoin use codes to encrypt transactions and stack them up in blocks, creating Blockchains. It is the use of codes that differentiates cryptocurrencies from other virtual currencies.

S33. Ans.(c)

Sol. The World Health Organization, for the second time in two years, has declared a viral outbreak to be a Public Health Emergency of International Concern (PHEIC). A PHEIC is just one step short of a 'pandemic' classification. Though monkeypox is caused by a virus that is endemic in a few African countries, the world took note only after it was first reported in the U.K. on May 6, 2022. Monkeypox, for now, has more visible manifestations such as rashes and blisters and is said to be overrepresented in men who have sex with men. It is believed to spread only through close contact and is fatal only to the extremely immunocompromised. Until now, monkeypox fell under the category of neglected tropical diseases. Related to the eradicated smallpox virus, monkeypox is suspected to have amplified due to reduced immunity against the smallpox virus.

S34. Ans.(c)

Sol. The all-indigenous ATGM employs a tandem High Explosive Anti-Tank (HEAT) warhead to defeat Explosive Reactive Armour (ERA) protected armoured vehicles. The ATGM has been developed with multi-platform launch capability and is currently undergoing technical evaluation trials from 120 mm rifled gun of MBT Arjun. Engaging the targets at lower ranges is a challenge due to the dimensional constraints of tank-launched ATGMs, which has been successfully accomplished by the ATGM for MBT Arjun. With the trial, the ATGM's capability to engage targets from minimum to maximum range has been established. Earlier the trials ha

S35. Ans.(c)

Sol. A solid-state battery can increase energy density per unit area since only a small number of batteries are needed. For that reason, a solid-state battery is perfect to make an EV battery system of module and pack, which needs high capacity. A solid-state battery has a higher energy density than a Li-ion battery that uses a liquid electrolyte solution. It doesn't have a risk of explosion or fire, so there is no need to have components for safety, thus saving more space. Then we have more space to put more active materials which increases battery capacity in the battery.

S36. Ans.(a)

Sol. A key finding is that despite a marginal decrease in the number of nuclear warheads in 2021, nuclear arsenals are expected to grow over the coming decade. Russia and the USA together possess over 90 per cent of all nuclear weapons. India had 160 nuclear warheads as on January 2022 and it appears to be expanding its nuclear arsenal. While India's nuclear stockpile increased from 156 in January 2021 to 160 in January 2022, Pakistan's nuclear stockpile has remained at 165. China is in the middle of a substantial expansion of its nuclear weapon arsenal, which satellite images indicate includes the construction of over 300 new missile silos. China had 350 nuclear warheads in January 2021 and 2022

S37. Ans.(b)

Sol. Web 5.0 is Web 2.0 plus Web 3.0 that will allow users to 'own their identity on the Internet and 'control their data'. Web 5.0 is aimed at "building an extra decentralized web that puts one in control of one's data and identity"

Both Web 3.0 and Web 5.0 envision an Internet without the threat of censorship – from governments or big tech, and without fear of significant outages.

It is being developed by Jack Dorsey's Bitcoin business unit, The Block Head (TBH), Web 5.0 is aimed at "building an extra decentralized web that puts you in control of your data and identity"

S38. Ans.(c)

Sol. It is a group of inherited disorders where there is little or no production of the pigment melanin Both parents must carry the gene for their child to have the condition. Even though the parents carry the gene, they may not show any physical signs of the condition

S39. Ans.(b)

Sol. LaMDA or Language Models for Dialog Applications is Google's modern conversational agent enabled with a neural network capable of deep learning. Like BERT, GPT-3 and other language models, LaMDA is built on Transformer, a neural network architecture that Google invented and open-sourced in 2017.

S40. Ans.(c)

Sol. Chromosomes are thread-like structures located inside the nucleus of animal and plant cells. Each chromosome is made of protein and a single molecule of deoxyribonucleic acid (DNA) The only human cells that do not contain pairs of chromosomes are reproductive cells, or gametes, which carry just one copy of each chromosome. When two reproductive cells unite, they become a single cell that contains two copies of each chromosome.

Most eukaryotic chromosomes include packaging proteins called histones which, aided by chaperone proteins, bind to and condense the DNA molecule to maintain its integrity

S41. Ans.(b)

Sol. In 2019, the European Space Agency (ESA) launched the CHaracterizing Exoplanet Satellite (CHEOPS) – its first mission focused on exoplanets.

- Tasked with finding new information about already-discovered planets, CHEOPS has finally opened its eyes to observe the universe for the first time.
- Ever since its launch in December, ESA's CHEOPS satellite has been orbiting the Earth at an altitude of 700 kilometers (435 miles).

S42. Ans.(b)

Sol. Terminator Tape

- To tackle the problem of Space Debris, a company called Tethers Unlimited has demonstrated an easy solution to get rid of satellites once they are of no use.
- The solution involves a 230-foot long strip of conductive tape, which is delightfully called the Terminator Tape.
- The Terminator Tape is a small module about the size of a notebook.
- How does it Work?
- Weighing less than two pounds, it is designed to attach to the exterior of a satellite that deploys the 230-foot long conductive tape through an electric signal from either the satellite or an independent timer unit when the satellite completes its mission and is ready to get disposed.
- This tape interacts with the space environment to create a drag force on the satellite that lowers its orbit far more rapidly than it would if it were simply abandoned in orbit

S43. Ans.(c)

Sol. The mission of the Mars 2020 Perseverance rover focuses on surface-based studies of the Martian environment, seeking preserved signs of biosignatures in rock samples that formed in ancient Martian environments with conditions that might have been favorable to microbial life. It is the first rover mission designed to seek signs of past microbial life. Earlier rovers first focused on and confirmed that Mars once had habitable conditions.

Perseverance rover will carry seven primary instruments:

- Mastcam-Z: An advanced camera system with panoramic and stereoscopic imaging capability and the ability to zoom. The instrument can also help scientists assess the mineralogy of the Martian surface and assist with rover operations.
- Mars Oxygen ISRU Experiment (MOXIE) An exploration technology investigation to produce oxygen from Martian atmospheric carbon dioxide
- Scanning Habitable Environments with Raman & Luminescence for Organics & Chemicals (SHERLOC) A spectrometer to provide fine-scale imaging and use an ultraviolet (UV) laser to determine fine-scale mineralogy and detect organic compounds. SHERLOC is the first UV Raman spectrometer to fly to the surface of Mars and will provide complementary measurements with other instruments in the payload.
- Mars Environmental Dynamics Analyzer (MEDA:) A set of sensors to provide measurements of temperature, wind speed and direction, pressure, relative humidity, and dust size and shape. Planetary Instrument for X-ray Lithochemistry (PIXL):An X-ray fluorescence spectrometer with a high-resolution camera to determine the fine-scale elemental composition of Martian surface materials SuperCam



S44. Ans.(c)

Sol. Biological Safety Levels (BSL):

- Biological Safety Levels (BSL) is a series of protections relegated to autoclave-related activities that take place in particular biological labs.
- They are individual safeguards designed to protect laboratory personnel, as well as the surrounding environment and community.
- These levels, which are ranked from one to four, are selected based on the agents or organisms that are being researched or worked on in any given laboratory setting
- For example, a basic lab setting specializing in the research of nonlethal agents that pose a minimal potential threat to lab workers and the environment are generally considered BSL-1—the lowest biosafety lab level.
- A specialized research laboratory that deals with potentially deadly infectious agents like Ebola would be designated as BSL-4—the highest and most stringent level

S45. Ans.(d)

Sol. Recently, the Government has given clearance to an ambitious Gene-mapping project called Genome India Project.

- The Project will involve 20 leading institutions including the Indian Institute of Science (IISc) in Bengaluru and a few IITs.
- The IISc's Centre for Brain Research, an autonomous institute, will serve as the nodal point of the project.
- Its aim is to ultimately build a grid of the Indian —reference genome||, to understand fully the type and nature of diseases and traits that comprise the diverse Indian population

S46. Ans.(c)

Sol. A team of scientists is preparing to dive deep into the depths of the Indian Ocean — into a —Midnight Zone|| where light barely reaches but life still thrives.

- Scientists from the British-led Nekton Mission plan to survey wildlife and gauge the effects of climate change in the unexplored area.
- Working with the Seychelles and Maldives governments, the five-week expedition is targeting seamounts — vast underwater mountains that rise thousands of meters from the sea floor
- To explore such inhospitable depths, Nekton scientists will board one of the world's most advanced submersibles, called —Limiting Factor||.

S47. Ans.(c)

Sol. Recently, the Solar Orbiter, a collaborative mission between the European Space Agency and NASA to study the Sun, took off from Cape Canaveral in Florida.

- The mission, which will take the first pictures of the top and bottom of the sun, was launched on an Atlas V rocket.
- It will chart the Unexplored Polar Regions of the Sun.
- Carrying 4 in-situ instruments (which measure the space environment immediately around the spacecraft like the sense of touch) and 6 remote-sensing imagers (which see the sun from afar), the Solar Orbiter (called SolO) will face the sun at approximately 42 million kilometers from its surface.
- The new spacecraft 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.

S48. Ans.(a)**Sol.** Influenza

- It is commonly known as the –Flu||.
- It is a viral infection.
- There are four types of flu viruses: A, B, C and D.
- Influenza A viruses are the only influenza viruses known to cause flu pandemics, i.e., global epidemics of flu disease.
- A pandemic can occur when a new and very different influenza A virus emerges that both infect people and has the ability to spread efficiently between people.
- Unlike type the flu viruses, type B flu is found only in humans.
- Influenza type C infections generally cause mild illness and are not thought to cause human flu epidemics.
- Influenza D viruses primarily affect cattle and are not known to infect or cause illness in people.

S49. Ans.(d)

Sol. Vajra Prahar – India and US

Ajeya Warrior – India and UK

Dharma Guardian – India and Japan

S50. Ans.(a)**Sol.** Lassa fever

- It is a viral hemorrhagic disease caused by the Lassa virus, which naturally infects the widely distributed house rat.
- It's transmitted through the urine and droppings of infected rats found in most tropical and subtropical countries in Africa.
- They are able to contaminate anything they come in contact with.
- The Lassa virus spreads through human-to-human contact with tissue, blood, body fluids, secretions or excretions.
- In hospitals the disease is spread through contaminated equipment.
- A drug does exist for the treatment of the disease.

S51. Ans.(d)**Sol.** National Guidelines for Gene Therapy Product Development and Clinical Trials

- The apex health research body ICMR has released national guidelines regarding the procedures to be followed for developing and performing gene therapies to tackle inherited genetic or rare diseases in India. Hence, statement 1 is correct.
- The aim of the document is to ensure that gene therapies can be introduced in India and clinical trials for gene therapies can be performed in an ethical, scientific, and safe manner.
- Cumulatively, approximately 70 million Indians suffer from some form of rare disease. These include hemophilia, thalassemia, sickle-cell anemia certain forms of muscular dystrophies, retinal dystrophies such as retinitis pigmentosa, corneal dystrophies, primary immunodeficiency (PID) in children, lysosomal storage disorders such as Pompe disease, Gaucher's disease, haemangioma, cystic fibrosis, etc.

- These national guidelines provide the general principles for developing Gene Therapy Products (GTPs) for any human ailment and provides the framework for human clinical trials which must follow the established general principles of biomedical research for any human applications.
- The guidelines cover all areas of GTP production, pre-clinical testing, and clinical administration, as well as long term, follow up.

The mechanism for Review and Oversight:

- Proposed establishment of Gene Therapy Advisory and Evaluation Committee (GTAEC)- an
- an independent body with experts from diverse areas of biomedical research, government agencies, and other stakeholders.
- It is mandatory for all institutions and entities engaged in the development of GTPs to establish an
- Institutional Bio-safety Committee (IBSC). Hence, statement 3 is correct.
- Research involving the development of new Gene Therapy Product (GTPs) needs to obtain approvals from IBSC and Ethics Committee (EC). Biological material from humans can be procured only from clinics/hospitals that have an Ethics Committee.
- All clinical trials are mandated to be registered with Clinical Trials Registry-India (CTRI). It is an online public record system for the registration of clinical trials being conducted in India. Hence, statement 2 is correct.

S52. Ans.(c)

Sol. Permanent wilting point (PWP) or wilting point (WP) is defined as the minimum amount of water in the soil that the plant requires not to wilt. If the soil water content decreases to this or any lower point a plant wilts and can no longer recover its turgidity when placed in a saturated atmosphere for 12 hours. Turgidity is the state of being turgid or swollen, especially due to high fluid content. Turgidity is essential in plant cells to make them keep standing upright. Plant cells that lose much water have less turgor pressure and tend to become flaccid.

- The matric potential at this soil moisture condition is commonly estimated at -15 bar. Most agricultural plants will generally show signs of wilting long before this moisture potential or water content is reached (more typically at around -2 to -5 bars) because the rate of water movement to the roots decreases and the stomata tend to lose their turgor pressure and begin to restrict transpiration.
- This water is strongly retained and trapped in the smaller pores and does not readily flow. The volumetric soil moisture content at the wilting point will have dropped to around 5 to 10% for sandy soils, 10 to 15% in loam soils, and 15 to 20% in clay soils.
- Hence option (c) is the correct answer.

S53. Ans.(d)

Sol. The abundance of elements in the earth is different than that in the earth's crust. Oxygen is the most abundant element in the earth's crust but when considered earth as a whole, iron is the most abundant, by mass.

- Iron-32%, Oxygen-30%, Silicon-15%, Magnesium-14%.
- Moreover, around 91 % of the earth's mass is constituted by these four elements. Next in line are Sulphur, Nickel, Calcium, and Aluminium.

S54. Ans.(c)

Sol. Parthenogenesis can be defined as the production of an embryo from a female gamete without any genetic contribution from a male gamete, with or without the eventual development into an adult. It is distinct from asexual reproduction since it involves the production of egg cells.

- Parthenogenesis is a normal method of reproduction in many lower organisms but does not lead to viable mammalian offspring. Parthenogenetic development can proceed by various routes depending on whether meiosis has occurred or has been suppressed, in which case the egg develops as a result of mitotic divisions.
- Whenever sex is determined by chromosome constitution, parthenogenetic offspring, in the absence of effective meiosis, all will be, mostly female.

S55. Ans.(d)

Sol. 5G is the communications backbone that will enable revolutionary applications in other markets, including industrial, automotive, medical, and even defense. For a world that is becoming increasingly connected with the Internet of Things (IoT), 5G's significant improvements in speed (at least 10 times faster than 4G, up to 10 Gbps), latency (10 times lower than 4G, down to 1 ms) and density (supporting 1 million IoT devices per square kilometer) will make many innovative applications possible – especially those in which security, reliability, quality of service, efficiency and cost are equally important.

- The **Internet of Things** is a system of interrelated computing devices, mechanical and digital machines, objects, animals, or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.
- **Edge Computing:** Edge computing means taking real-time decisions close to the source of data. By locating computational intelligence close to the individual and different sources of the data, edge computing reduces latency in the implementation of the requested service. Instead of sending data through the entire core network to the cloud for processing, edge computing uses a distributed network architecture to ensure near-real-time processing with reduced delays, which would otherwise simply not be acceptable for the specific service.
- **Network Slicing:** Network slicing allows operators to separate the packet traffic layer from the control layer, supporting multiple applications and services running in parallel for a range of users who require different levels of quality, latency, and bandwidth. This means that 5G systems will have many logical network slices, or “fast-track lanes,” to support specific applications and customers.

S56. Ans.(a)

Sol. Recently, India handed over relief material and stores to the authorities of Madagascar. As the first respondent, the Indian Navy Ship Airavat, which was en-route to Seychelles was diverted to Madagascar for rendering assistance after the island nation was lashed with cyclone causing heavy flooding and landslides leading to massive loss of life and property. The operation was launched and was codenamed Operation Vanilla. Hence option (a) is the correct answer.

S57. Ans.(a)

Sol. Hybridoma technology is used to commercially production of monoclonal antibodies. The monoclonal antibodies are protective protein produced by the clone of a single immune cell

S58. Ans.(d)

Sol. ELISA (Enzyme-Linked ImmunoSorbent Assay) is most widely used in detecting the presence of HIV antibodies. Rh+ blood group is found in more than 85% of people.

S59. Ans.(a)

Sol. The oil zapper feeds on hydrocarbon compounds present in crude oil and oily sludge (a hazardous hydrocarbon waste generated by oil refineries) and converts them into harmless CO₂ and water. The scientific term for the above-mentioned process is bioremediation

S60. Ans.(d)

Sol. (i) The ITER (International Thermonuclear Experimental Reactor) project aims to make the long-awaited transition from experimental studies of plasma physics to full-scale electricity-producing fusion power stations.

(ii) As such project started in 2006, to find whether Nuclear fusion can be a source of energy and electricity in the future. Hence (d) is the apt choice

S61. Ans.(b)

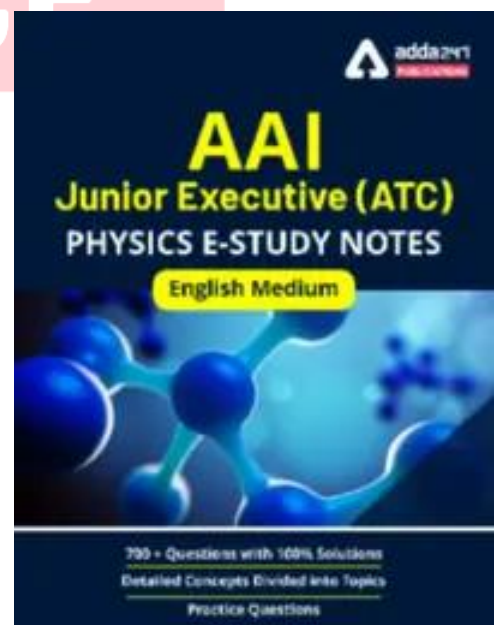
Sol. Nanotechnology is the understanding and control of matter at the nanoscale, at dimensions between approximately 1 and 100 nanometers, where unique phenomena enable novel applications. Some nanostructured materials are stronger or have different magnetic properties compared to other forms or sizes of the same material

S62. Ans.(d)

Sol. Lidar, which stands for Light Detection and Ranging, is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth. These light pulses—combined with other data recorded by the airborne system — generate precise, three-dimensional information about the shape of the Earth and its surface characteristics. LiDAR can be used to create 3D elevation map of a particular land. LiDAR wavelength is shorter. It operates in ultraviolet, visible region or near infrared. This helps to image the matter which is of the same size or larger than the wavelength. So LiDAR can detect pollutant particles of carbon dioxide, Sulphur dioxide, and methane

S63. Ans.(b)

Sol. The Kessler Syndrome is a phenomenon in which the amount of junk in orbit around Earth reaches a point where it just creates more and more space debris, causing big problems for satellites, astronauts and mission planners



S64. Ans.(d)

Sol. Quantum Technology is based on the principles of quantum theory, which explains the nature of energy and matter on the atomic and subatomic level. It concerns the control and manipulation of quantum systems, with the goal of achieving information processing beyond the limits of the classical world. In 2019, the Centre declared quantum technology a “mission of national importance”. The government in its budget 2020 has announced a National Mission on Quantum Technologies & Applications (NM-QTA) with a total budget outlay of Rs 8000 Crore for a period of five years to be implemented by the Department of Science & Technology (DST).

S65. Ans.(d)

Sol. The first Indian satellite, Aryabhata, launched in 1975, carried scientific experiments to investigate X-ray astronomy, solar neutrons and supra-thermal electron density. Mars Orbiter Mission is ISRO’s first interplanetary mission to planet Mars with an orbiter craft designed to orbit Mars in an elliptical orbit. Chandrayaan-1, India's first mission to Moon, was launched successfully on October 22, 2008.

S66. Ans.(d)

Sol. Quantum technologies are rapidly developing globally with a huge disruptive potential. Their applications which will receive boost include those in aero-space engineering, numerical weather prediction, simulations, securing the communications & financial transactions, cyber security, advanced manufacturing, health, agriculture, education and other important sectors with focus on creation of high skilled jobs, human resources development, start-ups & entrepreneurship leading to technology lead economic growth.

S67. Ans.(c)

Sol. Gravitational waves are 'ripples' in space-time caused by some of the most violent and energetic processes in the Universe. The strongest gravitational waves are produced by cataclysmic events such as colliding black holes, supernovae (massive stars exploding at the end of their lifetimes), and colliding neutron stars.

S68. Ans.(d)**S69. Ans.(c)**

Sol. A stem cell is a cell with the unique ability to develop into specialised cell types in the body. In the future they may be used to replace cells and tissues that have been damaged or lost due to disease. Stem cells provide new cells for the body as it grows, and replace specialised cells that are damaged or lost. They have two unique properties that enable them to do this: They can divide over and over again to produce new cells. As they divide, they can change into the other types of cell that make up the body.

S70. Ans.(c)

Sol. Toxoid vaccines: Toxoid vaccines use a toxin (harmful product) made by the germ that causes a disease. They create immunity to the parts of the germ that cause a disease instead of the germ itself. That means the immune response is targeted to the toxin instead of the whole germ. Toxoid vaccines are used to protect against: • Diphtheria • Tetanus

S71. Ans.(c)

Sol. According to the manifesto of British Naturopathic Association, "Naturopathy is a system of treatment which recognises the existence of the vital curative force within the body." It therefore, advocates aiding human system to remove the cause of disease i.e. toxins by expelling unwanted and unused matters from human body for curing diseases.

The main features of Naturopathy are:

1. All diseases, their causes and treatment are one. Except for traumatic and environmental conditions, the cause of all diseases is one i.e. accumulation of morbid matter in the body. The treatment of all diseases is elimination of morbid matter from the body.
2. The primary cause of disease is accumulation of morbid matter. Bacteria and virus enter and survive in the body only after the accumulation of morbid matter when a favourable atmosphere for their growth is established in body. Hence, the basic cause of disease is morbid matter and bacteria secondary causes. 3. Acute diseases are self-healing efforts of the body. Hence, they are our friends, not the enemy. Chronic diseases are outcome of wrong treatment and suppression of the acute diseases.

S72. Ans.(c)

Sol. Types of Vitamins Deficiency Diseases

- A (Retinol) Night blindness
- B1 (Thiamine) Beri-beri
- B2 (Riboflavin) Retarded growth, bad skin
- B12 (Cyanocobalamin) Anaemia
- C (Ascorbic acid) Scurvy
- D (Calciferol) Rickets
- K (Phylloquinone)
- Excessive bleeding due to injury
- Types of Minerals Deficiency Diseases
- Calcium Brittle bones, excessive bleeding
- Phosphorus Bad teeth and bones
- Iron Anaemia
- Iodine Goitre, enlarged thyroid gland
- Copper Low appetite, retarded growth

S73. Ans.(d)

Sol. What is DNA fingerprinting?

- It is a technique, for identification of an individual by examining their DNA.
- DNA, or Deoxyribonucleic acid, is the basic building block of life. This component in cells
- contains all the information about an organism and it also helps transfer the characteristics to the next generation.
- The DNA of each individual is composed of Bases [Adenine (A), Thymine (T), Guanine (G), and Cytosine (C)], Sugar and a Phosphate. Two bases link to each other using hydrogen bonds to form base pairs.
- Blood, bones, hair with root, saliva, semen, teeth, and tissue can also be used to study the DNA

S74. Ans.(a)

Sol. Abhyas High-speed Expendable Aerial Target (HEAT):

- It was first successfully tested in 2019.
- It offers a realistic threat scenario for the practice of weapon systems.
- It is designed for autonomous flying with the help of an autopilot
- It is developed at Aeronautical Development Establishment (ADE).
- It has RCS, Visual, and IR augmentation systems required for weapon practice.
- It has a high subsonic speed trajectory at a very low altitude with long endurance.
- Initial speed by two boosters and turbojet engine for sustained high subsonic speed.

S75. Ans.(a)

Sol. Clinical Trial Regulations In India

- Central Drugs Standard Control Organization (CDSCO) which comes under the Ministry of Health and Family Welfare is the main body which works on development of regulatory procedures and standards for drugs, cosmetics, diagnostics and devices.
- It lays down regulatory guidance by amending acts and rules; and regulates new drug approval process.
- Its main objective is to standardize clinical research and bring safer drugs to the Indian market.
- The Drug Controller General of India (DCGI) is responsible for giving regulatory permissions for the conduct of clinical trials and is responsible for approval of marketing licenses for drugs in India.

S76. Ans.(d)

Sol. In the pursuance of section 70-B of the Information Technology Act, 2000 (the "IT Act"), Central Government issued the Information Technology (The Indian Computer Emergency Response Team and Manner of Performing Functions and Duties) Rules, 2013, these CERT Rules also impose an obligation on service providers, intermediaries, data centres, and body corporates to report cyber incidents within a reasonable time so that CERT-In may have scope for timely action

S77. Ans.(d)

Sol. (i) The ITER (International Thermonuclear Experimental Reactor) project aims to make the long-awaited transition from experimental studies of plasma physics to full-scale electricity-producing fusion power stations.

(ii) As such project started in 2006, to find whether Nuclear fusion can be a source of energy and electricity in the future. Hence (d) is the apt choice

S78. Ans.(b)

Sol. BepiColombo is a joint mission of the European Space Agency (ESA) and the Japan Aerospace Exploration Agency (JAXA) to the planet Mercury. The mission comprises two satellites launched together: the Mercury Planetary Orbiter (MPO) and Mio (Mercury Magnetospheric Orbiter, MMO).[5] The mission will perform a comprehensive study of Mercury, including characterization of its magnetic field, magnetosphere, and both interior and surface structure. It was launched on an Ariane 5 rocket on 20 October 2018, with arrival at Mercury planned for 5 December 2025,

S79. Ans.(a)

Sol. The Solar Orbiter (SolO)[8] is a Sun-observing satellite developed by the European Space Agency (ESA). SolO, designed to obtain detailed measurements of the inner heliosphere and the nascent solar wind, will also perform close observations of the polar regions of the Sun which is difficult to do from Earth. These observations are important in investigating how the Sun creates and controls its heliosphere. SolO was launched on 10 February 2020. The mission is planned to last seven years.

S80. Ans.(c)

Sol. Context: Scientists from the Indian Space Research Organisation (ISRO) have mapped out the global distribution of sodium on the Moon's surface. The methodology used: They used the CLASS instrument (Chandrayaan-2 large area soft X-ray spectrometer) carried by the second Indian Moon mission, Chandrayaan-2.

This is the first effort to provide a global-scale measurement of sodium on the lunar surface using X-ray fluorescent spectra.

Methodology : X-ray fluorescence is commonly used to study the composition of materials in a non-destructive manner. When the sun gives out solar flares, a large amount of X-ray radiation falls on the moon, triggering X-ray fluorescence. The CLASS measures the energy of the X-ray photons coming from the moon and counts the total number.

Chandrayaan-2 (sent in 2019) was the second lunar exploration mission developed by the Indian Space Research Organisation, after Chandrayaan-1 (2008). It consisted of a lunar orbiter, and also included the Vikram lander, and the Pragyan lunar rover, all of which were developed in India.

S81. Ans.(b)

Sol. Nuclear Command Authority (NCA) is India's nodal authority responsible for command, control and operational decisions regarding India's nuclear weapons programme. It has Executive Council and Political Council.

The Executive Council is chaired by the National Security Adviser (NSA).

It gives inputs to the Political Council, which authorises a nuclear attack if need be. The Political Council is chaired by the Prime Minister and is advised by the Executive Council. The NCA's directives are executed by the Strategic Forces Command. The strategic forces command (SFC) would be in charge of the nuclear forces' administration and would be in charge of firing nuclear weapons

S82. Ans.(b)

Sol. Embryonic stem cells (ESCs) are the cells of the inner cell mass of a blastocyst, formed prior to implantation in the uterus. Adult stem cells are found in a few select locations in the body, known as niches, such as those in the bone marrow or gonads. iPSC is derived from skin or blood cells that have been reprogrammed back into an embryonic-like pluripotent state that enables the development of an unlimited source of any type of human cell needed for therapeutic purposes.

S83. Ans.(b)

Sol. Indian Computer Emergency Response Team (CERT-In) under the Ministry of Electronics and IT, in collaboration with the Cyber Security Agency of Singapore, successfully designed and conducted the Cyber Security Exercise "Synergy" for 13 Countries yesterday. It was a part of the International Counter Ransomware Initiative- Resilience Working Group.

The specific objective of the exercise was to Assess, Share and Improve strategies and practices among Member-States to build network resiliency against ransom ware & cyber extortion attacks.

S84. Ans.(a)

Sol. Spectro-Photometer for the History of the Universe, Epoch of Reionization, and Ices Explorer (SPHEREx):

It is a space telescope scheduled to be launched in 2023. It is part of NASA's Explorer Program and is planned as a two-year mission with a twofold aim: to understand the evolution of the universe and how common the ingredients for life are in our galaxy. It will survey the entire sky every 6 months from low-Earth polar orbit, in optical as well as near-infrared light, creating the first spectral all-sky survey at infrared wavelengths.

SPHEREx will survey hundreds of millions of galaxies near and far, some so distant, that their light has taken 10 billion years to reach Earth. 2. In the Milky Way, the mission will search for water and organic molecules -- essentials for life, as we know it -- in stellar nurseries, regions where stars are born from gas and dust, as well as disks around stars where new planets could be forming.

S85. Ans.(c)

Sol. Mottainai, literally meaning 'essence' is an ancient Buddhist term that translates into having respect for the resources around you, not wasting these resources, and using them with a sense of gratitude. Mottainai is closely associated with the conservation practices that we recognize in the West as the three R's – Reduce, reuse, recycle – with a fourth R added: respect.

S86. Ans.(a)

Sol. The Polarimetry is a sensitive, nondestructive technique for measuring the optical activity exhibited by inorganic and organic compounds.

- A compound is considered to be optically active if linearly polarized light is rotated when passing through it.
- A team of astronomers has discovered that the closest known brown dwarf, Luhman 16A, shows signs of cloud bands similar to those seen on Jupiter and Saturn.
- The researchers used an instrument on the Very Large Telescope in Chile to study polarized light from the Luhman 16 system. Polarization is a property of light that represents the direction that the light wave oscillates.
- The polarimetry technique is not limited to brown dwarfs, it can also be applied to exoplanets orbiting distant stars, the atmospheres of hot, gas giant exoplanets are similar to those of brown dwarfs.

S87. Ans.(c)

Sol. The BepiColombo is a joint mission of the European Space Agency (ESA) and the Japan Aerospace Exploration Agency (JAXA), which aims to explore Mercury.

- Recently, the spacecraft has crossed Venus for the first time and captured an image of Venus from a distance of 17,000 kilometres.
- The spacecraft was launched in 2018 to undergo a seven-year trip to Mercury.

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S88. Ans.(b)

Sol. The Himawari 9 is a Japanese weather satellite, the 9th of the Himawari geostationary weather satellite operated by the Japan Meteorological Agency.

- The spacecraft was constructed by Mitsubishi Electric, and is the second of two similar satellites to be based on the DS-2000 bus .
- The first satellite in the Himawari, or sunflower, series was launched in 1977.

S89. Ans.(c)

Sol. Both animal and plant cells have mitochondria, but only plant cells have chloroplasts.

- Plants don't get their sugar from eating food, so they need to make sugar from sunlight. This process (photosynthesis) takes place in the chloroplast.
- Once the sugar is made, it is then broken down by the mitochondria to make energy for the cell. Because animals get sugar from the food they eat, they do not need chloroplasts: just mitochondria.
- Both plant and animal cells have vacuoles. A plant cell contains a large, singular vacuole that is used for storage and maintaining the shape of the cell. In contrast, animal cells have many, smaller vacuoles. 3 is correct.
- The Plant cells have a cell wall, as well as a cell membrane. In plants, the cell wall surrounds the cell membrane. This gives the plant cell its unique rectangular shape. Animal cells simply have a cell membrane, but no cell wall. 1 is correct.
- The Plant cells have a cell wall, chloroplasts, plasmodesmata, and plastids used for storage, and a large central vacuole, whereas animal cells do not. 2 is incorrect

S90. Ans.(d)

Sol. A somatic cell is any cell of the body except sperm and egg cells. Somatic cells are diploid, meaning that they contain two sets of chromosomes, one inherited from each parent. Mutations in somatic cells can affect the individual, but they are not passed on to offspring.

S91. Ans.(b)

Sol. The LCH is the first indigenous Multirole Combat Helicopter designed and manufactured by HAL. It has potent ground attack and aerial combat capability. The helicopter possesses modern stealth characteristics, robust armour protection and formidable night attack capability. Onboard advanced navigation system, guns tailored for close combat and potent air to air missiles make the LCH especially suited for the modern battlefield. Capable of operating from high altitude terrain and carrying out precision strike at high altitude targets

S92. Ans.(b)

Sol. An integrated multi-modal Network Planning Group (NPG) with heads of Network Planning Division of all connectivity infrastructure ministries and departments is responsible for unified planning and integration of the proposals. It will assist the empowered group of secretaries (EGOS), which is headed by the cabinet secretary. NPG will guide all the departments and ministries responsible for creation of economic zones and connectivity infrastructure during the planning phase itself.

S93. Ans.(b)

Sol. Click chemistry is not a single specific reaction, but describes a way of generating products that follow examples in nature, which also generates substances by joining small modular units. Click chemistry is not limited to biological conditions: the concept of a "click" reaction has been used in chemoproteomic, pharmacological, and various biomimetic applications. However, they have been made notably useful in the detection, localization and qualification of biomolecules. Novel methods have been used to incorporate click reaction partners onto and into biomolecules, including the incorporation of unnatural amino acids containing reactive groups into proteins and the modification of nucleotides using click chemistry.

S94. Ans.(d)

Sol. Quantum entanglement is a state where several particles behave like a single unit even when they are separated. Entangled state is a crucial state of quantum mechanics and can be used as a resource for quantum communication, quantum computation and information processing tasks that are impossible for classical systems. Higher dimensional systems (dimension greater than two) are proven to have advantages in both quantum computing and quantum communications. Thus experimentally realising higher dimensional entangled states along with the studies of quantification of the entanglement are of critical importance.

S95. Ans.(d)

Sol. Chandrayaan-2 Large Area Soft X-ray Spectrometer (CLASS) from the ISRO Satellite Centre (ISAC), which makes use of X-ray fluorescence spectra to determine the elemental composition of the lunar surface. Solar X-ray monitor (XSM) from Physical Research Laboratory (PRL), Ahmadabad, primarily supports CLASS instrument by providing solar X-ray spectra and intensity measurements as input to it. The main scientific objective is to map and study the variations in lunar surface composition, as well as the location and abundance of lunar water. The abundance of sodium was mapped in a recent work published in 'The Astrophysical Journal Letters' for the first time using CLASS (Chandrayaan-2 Large Area Soft X-ray Spectrometer), the national space agency. Built at the U R Rao Satellite Centre of ISRO in Bengaluru, CLASS provides clean signatures of the sodium line thanks to its high sensitivity and performance.

S96. Ans.(b)

Sol. NGLV is understood to be a cost-efficient, three-stage to orbit, reusable heavy-lift vehicle with a payload capability of ten tonnes to Geostationary Transfer Orbit (GTO). NGLV will feature semi-cryogenic propulsion (refined kerosene as fuel with liquid oxygen (LOX) as oxidiser) for the booster stages which is cheaper and efficient. It can carry 10 tonne payload to Geostationary Transfer Orbit.

S97. Ans.(d)

Sol. The programme has a three-year tenure period or till completion of the project and is open to all the areas of STEM. It allows the researchers to work on international projects while continuing to stay in India. It will cover one visit per year for a short stay up to 1 month.

S98. Ans.(d)

Sol. Web 3.0 is an evolving term that is used to refer to the next generation of Internet – a "read write-execute" web – with decentralization as its bedrock.

With block chain, the time and place of the transaction are recorded permanently. Thus, Web3 enables peer to peer (seller to buyer) transactions by eliminating the role of the intermediary.

In Web3, users will have ownership stakes in platforms and applications unlike now where tech giants control the platforms.

S99. Ans.(b)

Sol. LVM3-M2 is the dedicated commercial satellite mission of New Space India Limited (NSIL), a Central Public Sector Enterprise (CPSE) under the Department of Space, Government of India. The launch is also first for LVM3- M2 to place the satellites in the Low Earth Orbit (up to 1,200 kames above the earth) unlike Geosynchronous Transfer Orbit (GTO). LVM3-M2 is a three-stage launch vehicle consisting of two solid propellant S200 strap-ons on its sides and core stage comprising L110 liquid stage and C25 cryogenic stage.

S100. Ans.(b)

Sol. It is an infectious disease which is caused by Phytoplasmas, which are bacterial parasites of plant tissues which are transmitted by insect vectors and involved in plant-to-plant transmission. Presently, there is no option but to cut down and remove the infected tree to prevent the spread of the disease.

